

Mokelumne River Integrated Conjunctive Use Program

Draft Environmental Impact Report

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prepared for

San Joaquin County
Department of Public Works
1810 East Hazelton Avenue
Stockton, California 95205
Contact: Ashley Couch, PE, Water Resources Manager

prepared by

Rincon Consultants, Inc.
601 University Avenue
Sacramento, California 95825

prepared with support from

GEI Consultants
11010 White Rock Road
Rancho Cordova, California 95670

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RINCON CONSULTANTS

GEI Consultants

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Acronyms and Abbreviations

AAQA	ambient air quality assessment
AB	Assembly Bill
ACE	Area of Conservation Emphasis
ACE	Altamont Commuter Express
ACF	Advanced Clean Fleets
ACHP	Advisory Council on Historic Preservation
AFY	Acre-feet per year
ALUCP	Airport Land Use Compatibility Plan
ASR	aquifer storage and recovery
BERD	Built Environment Resources Directory
BMPs	best management practices
BPS	best performance standards
BTEX	benzene, toluene, ethylbenzene, and xylenes
BTU	British thermal units
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	corporate average fuel economy
CA FID	California Facility Inventory Database
CAOs	Cleanup Abatement Orders
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CAL FIRE	California Department of Forestry and Fire Protection
CalOES	California Office of Emergency Services
CalOSHA	California Occupational Safety and Health Administration
Cal Water	California Water Service
CAP	Climate Action Plan
CARB	California Air Resources Board
CASGEM	California Statewide Groundwater Elevation Monitoring
CBC	California Building Code
CCAA	California Clean Air Act
CCAIC	Central California Information Center

CCAP	Climate Change Action Plan
CCR	California Code of Regulations
CCV steelhead	California Central Valley steelhead
CCWD	Calaveras County Water District
CDFW	California Department of Fish and Wildlife
CDOs	Cease and Desist Orders
CDPR	California Department of Pesticide Regulation
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CESA	California Endangered Species Act
CFCs	chloroflurocarbons
CFGC	California Fish and Game Code
CFR	Code of Federal Regulations
Cfs	cubic feet per second
CGP	Construction General Permit
CGS	California Geological Survey
CH_4	methane
CHB	Cultural Heritage Board
CHRIS	Statewide California Historical Resources Information System
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent
CNG	compressed natural gas
CNPS	California Native Plant Society
CO	Carbon monoxide
CO_2	Carbon dioxide
CO_2e	carbon dioxide equivalents
COSMUD	City of Stockton Municipal Utilities Department
CPG	Comprehensive Preparedness Guide
CPUC	California Public Utilities Commission
CRHR	California Register of Historical Resources
CRPR	California Rare Plant Rank

CSJWCD	Central San Joaquin Water Conservation District
CTR	California Toxics Rule and State Implementation Policy
CVP	Central Valley Project
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
DACs	disadvantaged communities
dB	decibel
dBA	decibels using the A-weighted sound pressure level
DDW	Division of Drinking Water
Delta	Sacramento-San Joaquin Delta
DOC	California Department of Conservation
DPC	Delta Protection Commission
DPR	California Department of Parks and Recreation
DPS	distinct population segment
DPM	diesel particulate matter
DREAM	Demonstration, Recharge, Extraction, and Aquifer Management
DRP	Development review process
DTSC	California Department of Toxic Substances
DWR	California Department of Water Resources
DWSP	Delta Water Supply Project
DWTP	Delta Water Treatment Plant
EC	electrical conductivity
EFH	Essential Fish Habitat
EBMUD	East Bay Municipal Utilities District
EIR	Environmental Impact Report
EOP	Emergency Operations Plan
EPACT92	National Energy Policy Act of 1992
ESA	Endangered Species Act
ESA	Environmental Site Assessment
FCAA	Federal Clean Air Act
FHSZ	Fire Hazard Severity Zone
Flood-MAR	flood managed aquifer recharge
FMMP	Farmland Mapping and Monitoring Project

FRAP	Fire and Resource Assessment Program
FTA	Federal Transit Administration
GAMA	Groundwater Ambient Monitoring and Assessment Program
GAMAQI	Guidance for Assessing and Mitigating Air Quality Impacts
GBA	Groundwater Banking Authority
GDE	groundwater-dependent ecosystem
GHG	Greenhouse Gas
GSA	Groundwater Sustainability Agency
GSMA	Groundwater Sustainability Management Act
GSP	Groundwater Sustainability Plan
GWh	Gigawatt hour
GWP	Global Warming Potential
ESJGA	Eastern San Joaquin Groundwater Authority
ESJ GSP	Eastern San Joaquin Groundwater Sustainability Plan Update
ESJGWA	Eastern San Joaquin Groundwater Authority
ESJWRM	Eastern San Joaquin Water Resources Model
ESJ IWFM	Eastern San Joaquin Integrated Water Flow Model
ESJPWA	East San Joaquin Parties Water Authority
ESJSB	Eastern San Joaquin Subbasin
GSP	Groundwater Sustainability Plan
GSSP	Global Stratotype Section and Point
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HCP	Habitat Conservation Plan
HFCs	hydrofluorocarbons
HMBPs	Hazardous Materials Business Plans
HMP	Hazard Mitigation Plan
HMUPA	Hazardous Materials Unified Program Agency
HRA	Health Risk Assessment
HRE	historical resources evaluation
HUCs	hydrologic unit codes
HWCL	Hazardous Waste Control Law
Hz	hertz

IBA	important bird area
ICS	Incident Command System
IOU	investor-owned utility
IPaC	Information, Planning, and Conservation System
IPCC	Intergovernmental Panel on Climate Change
IPS	Intake Pump Station
IRWMP	Irrigated Regional Water Management Plan
ISW	interconnected surface water
ITF	Interagency Task Force
IWMP	Integrated Waste Management Plans
JPA	Joint Powers Authority
JSA	Join Settlement Agreement
kW	kilowatt
LBP	Lead-based paint
LCC	Land Capability Classification
Leq	equivalent continuous sound level
LESA	Land Evaluation and Site Assessment
LEV	Low-Emission Vehicle
LID	low-impact development
LNG	liquefied natural gas
LOS	Level of Service
LSEs	load-serving entities
LUST	leaking underground storage tank
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conversation and Management Act
MBTA	Migratory Bird Treaty Act
MCF	million cubic feet
MCLs	Measurable Contaminant Levels
MEP	maximum extent practicable
MGD	million gallons per day
MICUP	Mokelumne River Integrated Conjunctive Use
MLD	Program most likely descendant
MOCASIM	Mokelumne-Calaveras Simulation Model
MOK	Mokelumne River Fish Hatchery

Mos	measurable objectives
MokeWISE	Mokelumne Watershed Interregional Sustainability Evaluation
MPOs	Metropolitan Planning Organizations
MRWPA	Mokelumne River Water and Power Authority
MSL	mean sea level
MS4s	municipal separate storm sewer systems
MT	metric tons
MTs	minimum thresholds
MTBE	Methyl tert-butyl ether
MUD	Municipal Utilities Department
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCCAG	Natural Communities Commonly Associated with Groundwater
NCCP	Natural Community Conservation Planning
NCR	Natural and Cultural Resources
NEHRPA	National Earthquake Hazards Reduction Program Act
NEP	non-essential population
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic and Safety Administration
NIMS	National Incident Management System
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Association
NOC	Notice of Completion
NOD	Notice of Determination
NOP	Notice of Preparation
NO_X	Nitrogen Oxides
NO_2	Nitrogen Dioxide
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRF	National Response Framework

NRHP	National Register of Historic Places
NSJWCD	North San Joaquin Water Conservation District
NTR	National Toxics Rule
NWI	National Wetlands Inventory
OEHHA	Office of Environmental Health Hazard Assessment
OHP	California Office of Historic Preservation
O&M	operations and maintenance
OPR	State Office of Planning and Research
OSHA	Occupational Safety and Health Administration
PAC	Public Advisory Committee
PBD	Paleobiology Database
PCBs	polychlorinated biphenyls
PCE	perchlororethylene
PDA	Protest Dismissal Agreement
PEIR	Program Environmental Impact Report
PFCs	perfluorocarbons
PFOA	perfluorooctantoic acid
PFOS	Perfluorooctanesulfonic acid
PGA	peak ground acceleration
PG&E	Pacific Gas and Electric
$PM_{2.5}$	Particulates less than 2.5 microns in diameter
PM_{10}	Particulates less than 10 microns in diameter
PMMP	Paleontological Mitigation and Monitoring Plan
Ppb	parts per billion
Ppm	parts per million
ppt	parts per trillion
PPV	peak particle velocity
PRC	Public Resources Code
QPP	Qualified Professional Paleontologist
RACT	Reasonably Available Control Technology
RCNM	Roadway Construction Noise Model
RCRA	Resource Conservation and Recovery Act of 1976
rkm	river kilometer

RMS	representative monitoring sites
RMWs	representative monitoring wells
ROG	reactive organic gases
ROWs	rights-of-way
rst	rotary screw trap
RSW	Re-Diversion from Storage Window
RTP/SCS	Regional Transportation Plan and Sustainable Communities Strategy
RWQCB	Regional Water Quality Control Boards
SAF	Safe Alternative Fuels
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SCADA	Supervisory Control and Data Acquisition
SCNHM	Sierra College Natural History Museum
SDC	Stockton Diverting Canal
sDPS	southern distinct population segment
SEMS	California's Standardized Emergency Management System
SEWD	Stockton East Water District
SGMA	Sustainable Groundwater Management Act
SGMP	Soil and Groundwater Management Plan
SHMP	State of California Multi-Hazard Mitigation Plan
SHPO	State Historic Preservation Officers
SIL	Significant Impact Level
SIP	State Implementation Plan
SJCFCWCD	San Joaquin County Flood Control and Water Conservation District
SJCOG	San Joaquin Council of Governments
SJCPW	San Joaquin County Public Works
SJRRP	San Joaquin River Restoration Program
SJRRC	San Joaquin Regional Rail Commission
SJRTD	San Joaquin Regional Transit District
SJMSCP	San Joaquin County Multi-Species Habitat Conservation and Open Space Plan
SJVAB	San Joaquin Valley Air Basin
SJVAPCD	San Joaquin Valley Air Pollution Control District

SMC	Stockton Municipal Code
SMCL	Secondary Maximum Contaminate Levels
SOC	Statement of Overriding Considerations
SO_2	Sulfur Dioxide
SOI PQS	Secretary of the Interior's Professional Qualification Standards
SR	State Route
SRA	State Responsibility Area
SSMP	Sewer System Management Plan
SSO	Sanitary Sewer Overflows
SVP	Society of Vertebrate Paleontology
SWEEP	State Water Efficiency and Enhancement Program
SWMP	Stormwater management program
SWP	State Water Project
SWPPP	stormwater pollution prevention plan
SWQCCP	Stormwater Quality Control Criteria Plan
SWRCB	State Water Resources Control Board
TAC	Toxic Air Contaminants
TCE	trichloroethylene
TCP	trichloropropane
TDS	total dissolved solids
THPO	Tribal Historic Preservation Officers
TMDL	total maximum daily loads
TMP	Transportation Management Plan
UCMP	University of California Museum of Paleontology
UFC	Uniform Fire Code
USACE	U.S. Army Corps of Engineers
USEIA	United States Energy Information Administration
USBR	United States Bureau of Reclamation
USC	United States Code
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

USS	Underground Storage Supplement
USTs	Underground Storage Tanks
UWMP	Urban Water Management Plan
VDECS	Verified Diesel Emission Control Strategies
VHFHSZ	Very High Fire Hazard Severity Zones
VMT	Vehicle Miles Traveled
VOC	volatile organic compounds
WAA	Water Availability Analysis
WDRs	Waste Discharge Requirements
WEAP	Worker Environmental Awareness Program
WID	Woodland Irrigation District
WSS	Watershed Sanitary Survey
WY	water year
ZEV	Zero Emission Vehicle

Executive Summary

This document is an Environmental Impact Report (EIR) analyzing the environmental effects of the proposed Mokelumne River Integrated Conjunctive Use Program ("MICUP" or "proposed project"). San Joaquin County, as the Lead Agency and pursuant to the California Environmental Quality Act (CEQA), has prepared this EIR to assess the potential environmental impacts associated with implementation of MICUP. MICUP refers to the suite of project components to put unappropriated Mokelumne River water to beneficial use on lands in the Eastern San Joaquin Groundwater Subbasin (Subbasin) upon State Water Resources Control Board (SWRCB) approval of Mokelumne River Water & Power Authority (MRWPA) Water Right Application 29835 (A029835). North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), and City of Stockton are the MICUP Partner Agencies. The Partner Agencies and MRWPA are also CEQA Responsible Agencies. A Responsible Agency refers to a public agency other than the Lead Agency that has discretionary approval over a project or plan. The Partner Agencies have discretionary approval over their respective MICUP components.

The primary purpose of MICUP is to secure a supplemental surface water supply to help achieve groundwater sustainability in the Subbasin.

This Executive Summary summarizes the characteristics of the proposed project, alternatives to the proposed project, the environmental impacts and mitigation measures associated with implementation of the proposed project, alternatives considered to reduce or avoid impacts, areas of known controversy, and issues to be resolved, if any (*CEQA Guidelines* Section 15123).

Project Summary

Lead Agency Contact Person

Ashley Couch, PE, CFM, Water Resources Manager
San Joaquin County
44 North San Joaquin Street, Suite 455
Stockton, California 95202
acouch@sjgov.org

Project Description

The following is a summary of the full project description, which can be found in Chapter 3, *Project Description*.

MICUP would entail diverting unappropriated Mokelumne River water either to serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply demands, or to recharge surface water to underground storage for later extraction from existing production wells to meet existing demands. Under A029835, as amended, MICUP would divert up to 110,000 acre-feet per year (AFY) (at a rate of up to 620 cubic feet per second (cfs)) between December 1 and June 30, using a combination of existing and proposed infrastructure. In addition, up to 48,000 AFY of water stored in Camanche and/or Pardee Reservoir by East Bay Municipal Utilities District (EBMUD) under existing operations could be allocated to MICUP if EBMUD determines it has stored water in excess of EBMUD's needs and legal and/or operational obligations, including contract obligations to

Woodbridge Irrigation District and NSJWCD. This additional up to 48,000 AFY of MICUP stored water would be released from storage and available for re-diversion by the MICUP Partner Agencies between July 1st and October 31st. In years when EBMUD determines there is stored water for MICUP, the MICUP Partner Agencies would need to release and use that stored water prior to October 31st of the same year. MICUP stored water cannot remain in storage after October 31st or be carried over in storage to the next year.

MICUP is a coordinated effort among the Partner Agencies in the defined Place of Use to divert water from the Mokelumne River. The MICUP project components are summarized in Table ES-1. The Partner Agencies and MICUP overview are shown in Figure ES-1 and Figure ES-2. The MICUP does not propose to use MICUP surface water to serve new demands, or for recharge to meet new pumping demands. Water available under MICUP would serve existing Partner Agency irrigated agriculture and municipal and industrial demands currently met with groundwater pumping.

Existing water right holders for Mokelumne River water include Woodbridge Irrigation District (WID), NSJWCD, Amador County, Calaveras County, EBMUD, and riparian and pre-1914 appropriative rights along the river. The proposed MICUP diversions would be junior to all existing water rights on the Mokelumne River.

Table ES-1 Summary of MICUP Components

MICUP Component	Diversion Capacity (cubic feet per second)	Maximum Annual MICUP Direct Diversion Window (acre-feet)	Maximum Annual Rediversion from Storage (acre-feet)	Direct Surface Recharge (acres)	In-Lieu Recharge (acres)	Flood-MAR Recharge (acres)	Pipelines (linear feet)	Number of ASR Wells	Number of Dry Wells
North San Joaquin Water Conservation District									
North, CalFed and South System Expansion (max expansion)	130	47,000	19,800	Up to 1,000	Up to 7,000	Up to 500	Up to 140,900 (new and upgraded)	N/A	N/A
ASR Wells off Mokelumne Aqueduct	20	8,500	4,900	N/A	N/A	N/A	Up to 27,000 (new)	20	N/A
Expanded Use of Private Pumps	24	4,300	N/A	N/A	N/A	Up to 800	Up to 22,000 (new)	N/A	N/A
NSJWCD Total		**59,800**	**24,700**	**Up to 1,000**	**Up to 7,000**	**Up to 1,300**	**Up to 189,900**	**Up to 20**	**N/A**
Stockton East Water District									
East Mosher Creek at Messick Road	46 (from West Linden turnout)	19,600	11,300	80 (new)	N/A	N/A	8,000 LF (new)	N/A	N/A
Mosher Creek at Tully Dam	53 (from West Linden turnout)	22,600	13,100	125 (new)	N/A	N/A	7,000 LF (new)	N/A	N/A
West Linden Recharge Area	65 (new)	27,400	15,800	N/A	5.700	5,700	70,000 LF (60”) 10,000 LF (18”) (new)	4 (new)	142 (new)
ASR Wells off Mokelumne Aqueduct – Beckman Well	0.7 (Beckman)	300	200	N/A	N/A	N/A	N/A	1 (new)	N/A
SEWD Total		**69,900**	**40,400**	**205**	**5,700**	**5,700**	**95,000 LF**	**5**	**142**
City of Stockton									
DWTP Recharge Basins	31 (existing)	7,300	1,500	43.5 (new)	N/A	N/A	N/A	N/A	9 (new)
Stormwater Basins	8 (existing)	1,000	1,700	31 (existing)	N/A	N/A	N/A	N/A	N/A
Recharge Basins	18 (new)	6,900	3,800	70 (new)	N/A	N/A	6,000 LF (new)	N/A	N/A
City of Stockton Total		**15,200**	**7,000**	**145**	**N/A**	**N/A**	**6,000 LF**	**N/A**	**9**

Figure ES-1 Eastern San Joaquin Groundwater Subbasin and Partner Agencies with MICUP Components

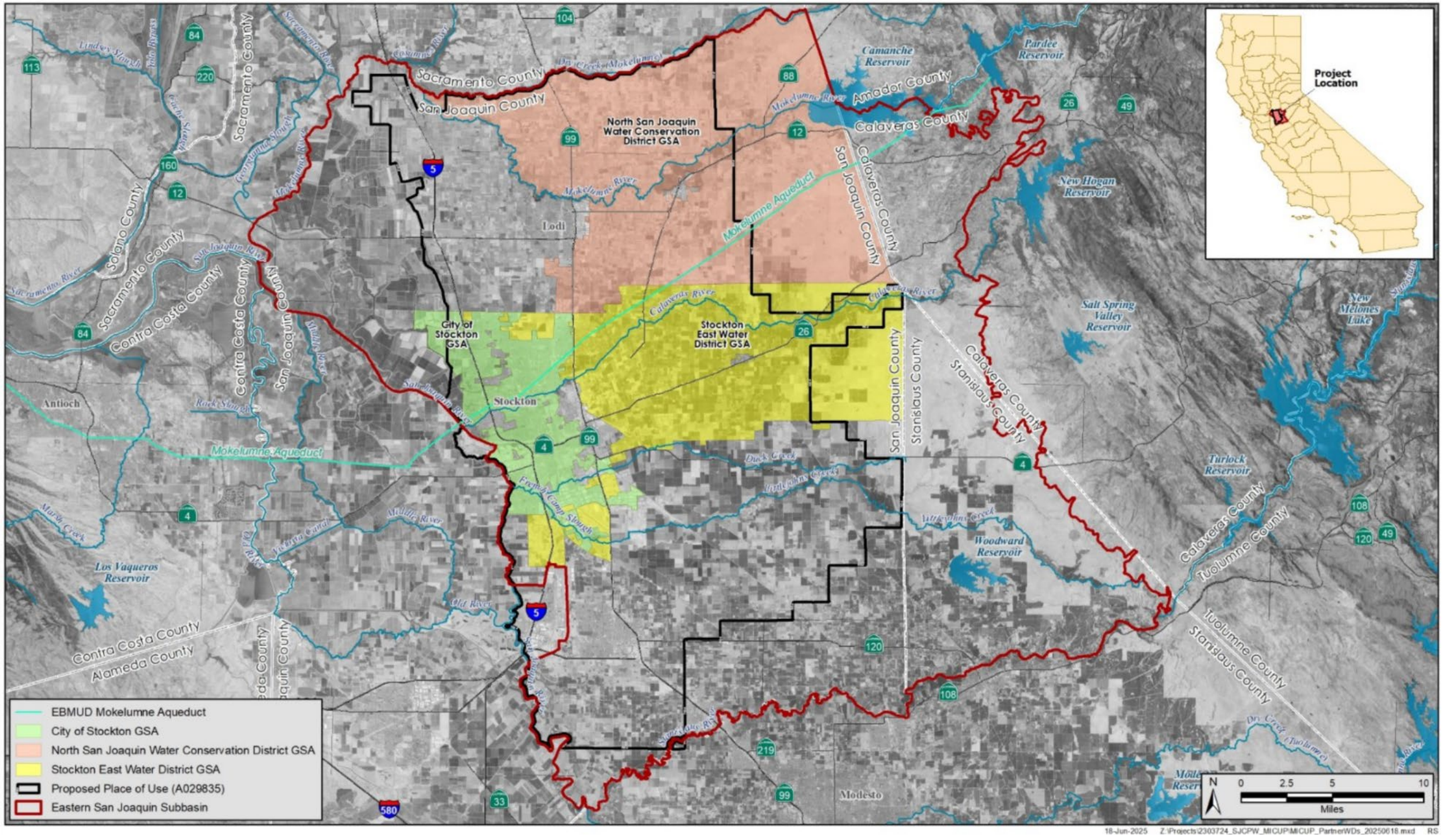
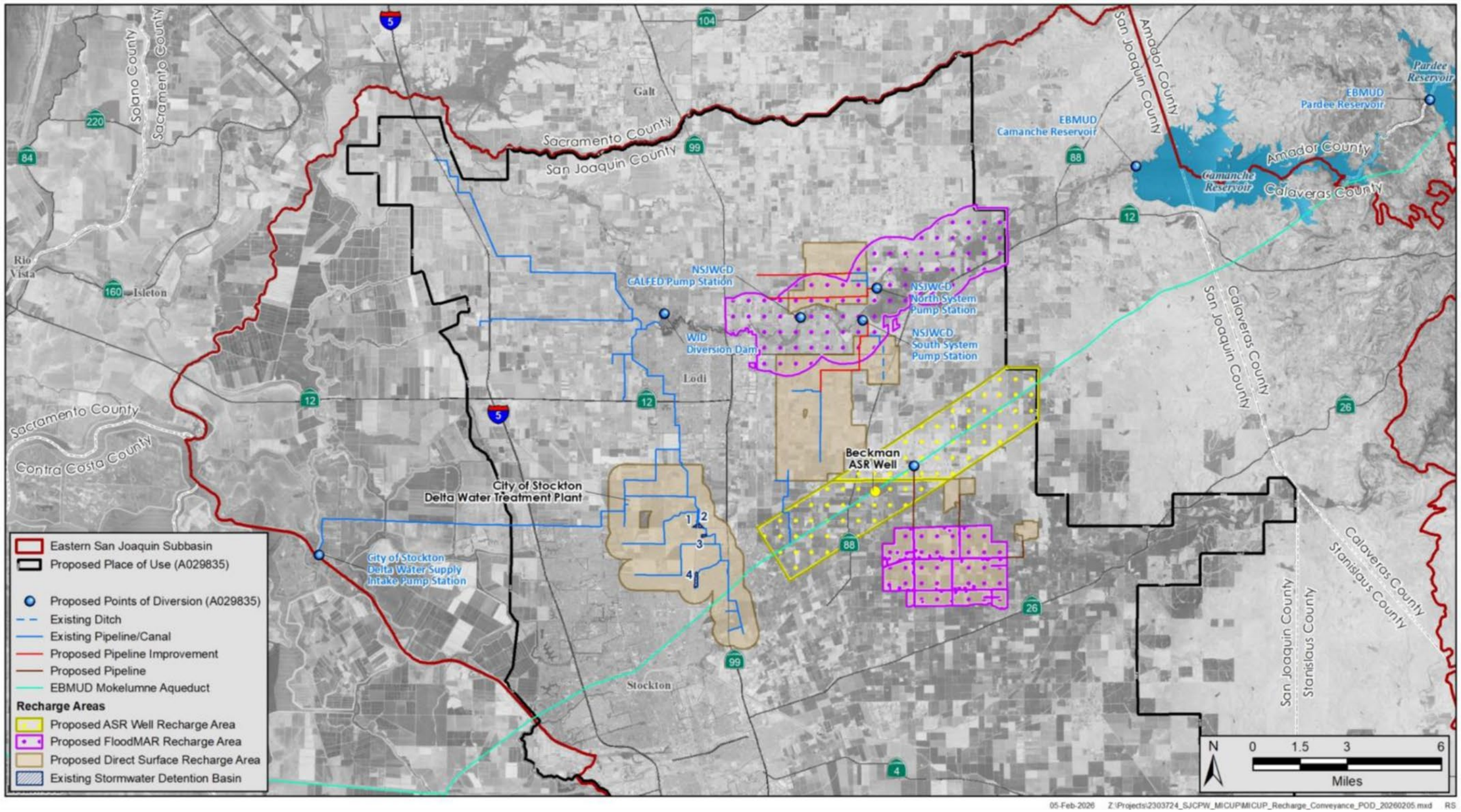


Figure ES-2 MICUP Overview



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MICUP Objectives

San Joaquin County currently relies on groundwater for approximately half of its water supply, with surface water meeting the remaining demands. The 2024 Amended Eastern San Joaquin Groundwater Sustainability Plan Update (ESJ GSP) notes that the Subbasin, which is shown in Figure ES-1, is critically overdrafted.[1] The ESJ GSP estimates that an additional 95,000 acre-feet (AF) of supply per year is necessary to reduce groundwater pumping and/or recharge groundwater supplies.[2] Under climate change conditions this number increases to 166,000 AF per year to achieve a modeled net-zero change in storage.[3]

While real world conditions and observed groundwater levels will dictate exactly how much pumping must be reduced to achieve sustainability, the additional water supplies from MICUP are intended to help meet demands in the Subbasin as reliance on native groundwater is reduced to achieve sustainability.

MICUP is a proposed coordinated effort to put unappropriated Mokelumne River water to beneficial use in the Subbasin through approval of Water Right Application 29835 (A029835). MICUP would implement a comprehensive set of project components and actions to assist in meeting the adopted goals and objectives of the ESJ GSP. The proposed MICUP goals include:

- Develop a supplemental Mokelumne River surface water supply to meet existing demands;
- Use surface water and groundwater conjunctively to respond to drought and climate change;
- Increase groundwater levels in the Eastern San Joaquin Groundwater Subbasin;
- Achieve integrated water supply and environmental benefits in the lower Mokelumne watershed.

Alternatives Analysis

Pursuant to *CEQA Guidelines* Section 15123(b)(3)*,* a lead agency is required to include issues to be resolved, including the choice among EIR alternatives, in the summary of an EIR. As required by CEQA Guidelines Section 15126.6, this EIR examines alternatives to the proposed project. These alternatives are considered to cover the range of alternatives that would meet the objectives of MICUP while lessening one or more of its significant impacts. Studied alternatives include the following:

- **Alternative 1 - No Project Alternative:** The *CEQA Guidelines* (Section 15126.6[e]) require that the alternatives discussion include an analysis of a "No Project" Alternative. Pursuant to CEQA, the No Project Alternative refers to the analysis of existing conditions and what would reasonably be expected to occur in the foreseeable future if the proposed project (i.e., MICUP) was not approved. This is based on current plans and projects and consistent with available infrastructure information.

  For purposes of this EIR, the No Project Alternative (Alternative 1) assumes MICUP would not be implemented. However, the No Project Alternative also assumes the ESJ GSP Category A

[1] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan.
[2] Eastern San Joaquin Groundwater Authority, 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan: Executive Summary.
[3] Ibid.

projects adopted in 2023 and amended in 2024[4] would be implemented over the next five years.[5] Category A projects have existing water rights or agreements and include but are not limited to direct recharge projects and in-lieu recharge projects similar in nature to MICUP, including construction and operation of new recharge basins, pipelines, and pumps. Some Category A projects involve similar facilities to MICUP for purposes of recharging water under existing water rights, such as for NSJWCD, SEWD, and City of Stockton.

- **Alternative 2 - Modified MICUP Project:** CEQA requires consideration of alternatives that would feasibly attain most of the basic project objectives while lessening or avoiding one or more of its significant impacts. Alternative 2 is a modified MICUP project that excludes the 20 ASR wells off the Mokelumne Aqueduct as means of avoiding the significant and unavoidable impacts associated with construction noise. Eliminating the ASR wells under Alternative 2 would avoid potential impacts related to nighttime drilling of wells in close proximity to sensitive receptors. The diversion capacity and recharge capacity associated with the ASR wells is 20 cfs and 13,400 AFY, respectively. This reduction in recharge capacity due to elimination of the ASR wells does not affect the feasibility of MICUP; as such Alternative 2 is considered to be a feasible alternative.

Based on the descriptions and analyses of these two alternatives included in Chapter 6, Alternative 2 was determined to be the environmentally superior alternative.

In addition, Chapter 6 includes a summary of three alternatives considered, but ultimately rejected from further consideration, because they would not meet most of the proposed project objectives, would not substantially reduce impacts compared to the proposed project, and/or were determined to be infeasible. Per CEQA Guidelines Section 15126.6(f)(1), factors that can be taken into consideration when determining feasibility include, but are not limited to, site suitability, economic viability, availability of infrastructure, general plan consistency, jurisdictional boundaries, or site access. Alternatives rejected include two presented during the EIR scoping process -- an Unimpaired Flow Objective and Amador/Calaveras Water Transfers – as well as the Original A023895 with Reservoir Storage.

Refer to Chapter 6.0, *Alternatives Analysis*, for the complete analysis of alternatives.

Areas of Known Controversy

Pursuant to *CEQA Guidelines* Section 15123(b)(2)*,* a lead agency is required to include areas of controversies raised by agencies and the public during the public scoping process for this Draft EIR. Areas of controversy have been identified for the proposed project, based on comments made during the 30-day public review period in response to information published in the Notice of Preparation (NOP). Eight comment letters were received during the NOP scoping period. Those comments are included in Appendix A. Commenting parties have requested the EIR evaluate impacts related to project alternatives, biological resources, hydrology, groundwater, water quality and water supply. The greatest areas of known controversy from an environmental perspective are potential impacts to fisheries in the Mokelumne River due to diversions of unappropriated flows associated with A029835, and adverse effects to water supply for existing senior water rights holders on the Mokelumne River.

[4] Eastern San Joaquin Groundwater Authority, 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan: Agency Information, Plan Area, and Communication..
[5] The ESJ GSP Category A projects are also included in this EIR as cumulative projects; see Table 4-1 in Chapter 4.0.

Summary of Impacts and Mitigation Measures

Table ES-2 summarizes the environmental impacts, mitigation measures, and residual impacts (the impact after application of mitigation, if required) associated with implementation of the proposed project. Impacts are categorized as follows:

- **Significant and Unavoidable.** An impact that cannot be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires a Statement of Overriding Considerations to be issued if the proposed project is approved pursuant to Section15093 of the CEQA Guidelines.
- **Less than Significant with Mitigation Incorporated.** An impact that can be reduced to below the threshold level given reasonably available and feasible mitigation measures. Such an impact requires findings under Section 15091 of the CEQA Guidelines.
- **Less than Significant.** An impact that may be adverse but does not exceed the threshold levels and does not require mitigation measures. However, mitigation measures that could further lessen the environmental effect may be suggested if readily available and easily achievable.
- **No Impact:** The proposed project would have no effect on environmental conditions or would reduce existing environmental problems or hazards.

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Table ES-2 Summary of Environmental Impacts, Mitigation Measures, and Residual Impacts

Impact Statement	Mitigation Measure(s)	Residual Impact
Aesthetics		
Impact AES-1. Operation of facilities associated with the proposed project could introduce contrasting elements within the site line of scenic vistas. Compliance with the San Joaquin County Municipal Code and General Plan and the City of Stockton Municipal Code and General Plan would ensure impacts to scenic vistas are less than significant.	No mitigation is required.	Less Than Significant
Impact AES-2. The proposed project could affect scenic resources within locally identified scenic roadways. however, facilities associated with the proposed project would not be within or visible from designated State scenic highways. No impact would occur.	No mitigation is required.	No Impact
Impact AES-3. Within the nonurbanized project area, MICUP facilities would not substantially degrade the existing visual character or quality of public views. Within the urbanized City of Stockton, MICUP facilities would not conflict with applicable City regulations governing scenic quality. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Impact AES-4. Facilities associated with the proposed project would create new sources of light or glare that could adversely affect daytime or nighttime views in the area. All light sources would be shielded and directed downward and utilize motion sensors and timers to minimize light spillover and light duration in accordance with San Joquin County and the City of Stockton Municipal Codes. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Agriculture & Land Use Planning		
Impact AG-1. Construction of MICUP project components would result in conversion of Important Farmland to non-agricultural use. Operation of MICUP would result in beneficial impacts to agricultural lands. However, construction impacts would be significant and unavoidable.	**Mitigation Measure AG-1: Restore Agricultural Topsoil After Construction.** During ground-disturbing construction activities in agricultural areas, agricultural topsoil shall be salvaged and stockpiled by the construction contractor during initial ground disturbance. Upon completion of project component installation, agricultural topsoil shall be spread across the disturbed ground surface where hardscaping has not been applied (e.g., pipeline corridors, well pad disturbance areas outside of the concrete pad). The top six to twelve inches of native topsoil shall be salvaged. **Mitigation Measure AG-2: Avoid Important Farmland.** Implementing agencies shall avoid siting new infrastructure in areas designated as Important Farmland whenever possible to minimize conversion of Important Farmland to non-agricultural use.	Significant and Unavoidable
Impact AG-2. Construction and operation of MICUP project components would be compatible with existing zoning for agricultural use and Williamson Act Contracts. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Impact AG-3. Implementation of MICUP would not physically divide an established community. There would be no impacts.	No mitigation is required.	No Impact
Impact AG-4. Implementation of MICUP would be consistent with applicable land use plans, policies, or regulations adopted to avoid or mitigate environmental effects. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Air Quality		
Impact AQ-1. The proposed project would not conflict with or obstruct implementation of an SJVAPCD air quality plan with the implementation of mitigation. Impacts would be less than significant with mitigation.	Mitigation Measure AQ-1 would be required.	Less Than Significant with Mitigation
Impact AQ-2. Implementation of MICUP would result in the generation of air pollutants during construction of individual components that in turn could affect local air quality. However, implementation of the proposed project would not result in a cumulatively considerable net increase of construction criteria pollutants. With implementation of mitigation, impacts would be less than significant.	**Mitigation Measure AQ-1: Utilize Tier 4 Final Equipment During Construction.** There are two (2) conditions incorporating Tier 4 Final construction equipment that will reduce emissions below significance thresholds for construction of proposed project components. All individual project components must identify and select one of the following emissions reductions strategies: 1. Incorporate a minimum of 55 percent Tier 4 Final equipment to the construction fleet for the duration of project construction; or 2. For individual project components that have scrapers as identified in Tables 3.7 through 3.10 of this Draft EIR, incorporate Tier 4 Final controls to all scraper equipment types for 100 percent of the project construction duration.	Less than Significant with Mitigation
Impact AQ-3. Construction activities for individual MICUP components lasting longer than two months and/or located within 1,000 feet of sensitive receptors could expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant with mitigation.	**Mitigation Measure AQ-2: Conduct Quantitative Construction Health Risk Assessment Prior to Construction.** A quantitative construction health risk assessment shall be prepared by the implementing agency for individual proposed project components that will be within 1,000 feet of a sensitive receptor for a period of greater than 2 months unless the project component includes 100-percent fleetwide use of Tier 4 Final equipment. Under these conditions, a quantitative HRA will be used to assess, determine, and mitigate toxic air contaminants to reduce and demonstrate that health risk impacts to any nearby sensitive receptors will be less than significant. A quantitative HRA will not be necessary for project components that incorporate 100% Tier 4 Final construction equipment for equipment greater than 50 horsepower.	Less Than Significant with Mitigation

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	Mitigation Measure AQ-3 Prepare Fugitive dust control plan prior to construction and Minimize Valley Fever exposure during construction. Prior to site preparation, grading activities, or ground disturbance, the Applicant shall prepare a Fugitive Dust Control Plan for the proposed project. The Fugitive Dust Control Plan shall include the following at a minimum: ▪ Equipment, vehicles, and other items shall be cleaned thoroughly of dust before they are moved off-site to other work locations. ▪ Wherever possible, grading, and trenching work shall be phased so that earth-moving equipment works well ahead or down-wind of workers on the ground. ▪ The area immediately behind grading or trenching equipment shall be sprayed with water before ground workers move into the area. ▪ If a water truck runs out of water before dust is dampened sufficiently, ground workers exposed to dust are to leave the area until a full truck resumes water spraying. ▪ All heavy-duty earth-moving vehicles shall be closed-cab and equipped with a High Efficiency Particulate Arrestance (HEPA) filtered air system. ▪ N95 respirators shall be provided to onsite workers for the duration of the construction period. ▪ Workers shall receive training to recognize the symptoms of Valley Fever and shall be instructed to promptly report suspected symptoms of work-related Valley Fever to a supervisor. ▪ A Valley Fever informational handout shall be provided to all on-site construction personnel. The handout shall provide, at a minimum, information regarding the symptoms, health effects, preventative measures, and treatment.	
Impact AQ-4. MICUP would not create objectionable odors that could adversely affect a substantial number of people. Impacts related to odors would be less than significant.	No mitigation is required.	Less Than Significant
Biological Resources		
Impact BIO-1. MICUP could have a substantial adverse effect, either directly or through habitat modifications, on species identified as a candidate, sensitive, or special-status species. Impacts would be less than significant with mitigation. incorporated.	Mitigation Measure GEO-1, SW-2, SW-3 would be required in addition the following mitigation measures. **Mitigation Measure BIO-1: Review and survey project area-specific biological resources prior to construction and avoid and minimize effects during construction.** For all MICUP components, prior to construction, the implementing agency shall assess the project area to determine if habitat types that may be suitable for sensitive biological resources are present in these areas. If suitable habitat types are anticipated to be present within the project area, the implementing agency will require a qualified biologist to conduct a field biological survey prior to proposed project activities. Field biological surveys will include a visual inspection for biological resources to (1) identify and document sensitive resources, such as riparian or other sensitive habitats, sensitive natural community, wetlands and waters, or wildlife nursery site or habitat (including bird nests); and (2) assess the suitability of habitat for special-status plant and animal species. Habitat assessments will be completed at a time of year that is appropriate for identifying habitat. Based on the results of the biological assessment, the implementing agency, in consultation with a qualified biologist, will determine which one of the following best characterizes the circumstances: **A. Suitable Habitat Is Present but Adverse Effects Can Be Clearly Avoided.** If, based on the survey, the qualified biologist determines that suitable habitat for sensitive biological resources is present but adverse effects on the suitable habitat can clearly be avoided through one of the following methods, the avoidance mechanism will be implemented prior to initiating construction and will remain in effect throughout the element implementation: ▪ by physically avoiding the suitable habitat, or ▪ by conducting proposed project activities outside of the season when a sensitive resource could be present within the suitable habitat or outside the season of sensitivity (e.g., outside of special-status bird nesting season, or outside of maternity and rearing season at wildlife nursery sites). ▪ Physical avoidance will include flagging, fencing, stakes, or clear, existing landscape demarcations (e.g., edge of a roadway) to delineate the boundary of the avoidance area around the suitable habitat. **B. Suitable Habitat Is Present and Adverse Effects Cannot Be Clearly Avoided.** Further review and surveys will be conducted to determine presence/absence of sensitive biological resources that may be affected (see resource-specific mitigation measures). **Mitigation Measure BIO-2: Best management practices for the protection of special-status species prior to and during construction.** For all MICUP components, based on site-specific biological conditions as determined from the survey conducted in Mitigation Measure BIO-1, the following activities shall be implemented. **A. Obtain and comply with all necessary permits and authorizations prior to construction.** The implementing agency and/or its contractor(s) shall acquire any necessary permits and authorizations prior to the start of any construction activities. Permits and authorizations may include any and all of the following: ▪ Obtaining a permit for the filling of wetlands and other waters of the United States (Section 404 of CWA) as well as CWA Section 401 certification if impacts on waters of the United States cannot be avoided. Any permit and certification will be obtained before any ground-disturbing activity begins within 50 feet of, or fill or dredged material is discharged into, any wetland or other water of the United States. All requirements of any permits obtained will be fulfilled in the time frames required by the permits. ▪ Consultation with USFWS and/or NMFS under Section 7 of the ESA to identify appropriate measures to avoid, minimize, and compensate for impacts to federally listed species, and, if necessary, obtain incidental take authorization. ▪ Securing a CDFW Section 1602 Streambed Alteration Agreement for all construction work to be performed in the vicinity of riparian habitat, and more specifically anywhere where trees would be removed in riparian habitat. ▪ Consulting with CDFW under Section 2081 / CESA to identify appropriate measures to avoid, minimize, and compensate for impacts to State-listed species, as well as candidate species, and, if necessary, obtain incidental take authorization.	Less Than Significant with Mitigation

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- Participation in the SJMSCP, for several covered plant and wildlife species, waters of the United States and State, and riparian habitat.

B. **Conduct a Worker Environmental Awareness Program (WEAP) Training for All Staff That Will be On-site During Project Activities.** A qualified biologist shall provide WEAP training to cover species identification, habitat, life history, and conservation measures for all special-status species with potential to occur within the project area. Training may consist of showing a video prepared by a qualified biologist, or an in-person presentation by a qualified biologist. In addition to the video or in-person presentation, training may be supplemented with the distribution of approved brochures and other materials that describe protected resources and methods for avoiding effects. The contractor shall be responsible for ensuring that all new personnel have received the WEAP training and are documented for reporting purposes. For multi-year projects, the WEAP shall be updated on a yearly basis to ensure proposed project applicability and any lessons learned. All personnel are required to re-take the WEAP yearly.

C. **Pre-construction Species Survey.** A designated and qualified biologist shall conduct a general pre-construction survey for all special-status species with potential to occur if suitable habitat is present within the project area. This survey will focus on the presence/absence of special-status species within areas where impacts will occur. This survey should occur no sooner than 24 hours before the start of construction and will include a 200-foot buffer to include suitable surrounding habitat. Surveys shall be repeated after any lapse in ground disturbing activity of two weeks or longer. Preconstruction surveys for special-status species will follow this guideline, unless otherwise specified in the species-specific measures below.

D. **Stop Work if Special-status Species are Observed in Project Area.** If any life stage of special-status species (plant or wildlife) are found in the project area, construction activities shall cease within 100 feet of the resource and USFWS, CDFW, and/or NMFS shall be notified within 48 hours, depending on species federal or state status. Construction activities will not be allowed within 100 feet of the species. If species is an animal, the biologist shall monitor the animal to make sure it is not harmed and that it leaves the site on its own unless handling is approved in consultation with USFWS and CDFW and such handling is done by a USFWS- and CDFW-approved biologist with appropriate handling permits to move the animal out of the work area to a USFWS- and/or CDFW-approved relocation site. If an animal can be relocated, it will be moved to the nearest available suitable habitat and placed down in the direction it was initially moving towards when picked up. Work may reconvene after a qualified biologist confirms that the species is no longer within 100-feet of active construction and is no longer in harm's way.

E. **Inspect Under Vehicles, Heavy Equipment, and Open Pipes.** Construction staff will inspect under and around all vehicles, heavy equipment, and open pipes for the presence of wildlife and other special-status species before the start of each workday. Wildlife found will be allowed to leave the project site on its own before work is to proceed.

F. **Prevent Wildlife Entrapment.** To prevent wildlife entrapment, all excavated, steep-walled holes or trenches more than 2 feet deep must be covered with plywood or similar material at the end of each workday. If trenches cannot be covered, one or more escape ramps of no more than a 45-degree slope must be constructed of earthen fill or created with wooden planks.

G. **Remove Refuse.** To eliminate sources that could attract wildlife, which may include predators, all trash, including food-related trash items such as wrappers, cans, bottles and food scraps, will be disposed of in closed containers and removed at the end of each workday.

H. **Vehicle Speed.** Project-related vehicles shall observe a 10-mile-per-hour speed limit within project areas and along haul/access routes, except on county roads and State and federal highways.

I. **Site Best Management Practices.** Appropriate site-specific best management practices (e.g., fencing and other erosion controls) shall be implemented to avoid accidental encroachment of vehicles and personnel to sensitive resources and to minimize and control runoff and erosion.

J. **Spill Protection.** Every reasonable precaution shall be implemented to protect soils and waters from pollution with fuels, oils, and other harmful materials. In the event of a spill, the spill shall be addressed immediately with appropriate equipment to contain and absorb the spilled material. Spill kits must be on-site the project area for the entirety of the proposed project construction implementation.

K. **Staging Areas.** Any and all heavy equipment, vehicles, and supplies shall be stored at the designated staging areas at the end of each daily work period. Vehicles and equipment shall be properly maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. Vehicles and equipment shall be checked daily for leaks. If leaks are found, the equipment shall be removed from the site and shall not be used until the leaks are repaired. Equipment shall be refueled and serviced at designated refueling and staging sites located where a spill shall not drain directly toward any aquatic habitat. Appropriate containment materials shall be installed to collect any discharge, and adequate materials for spill cleanup shall be maintained onsite.

L. **Erect and Maintain High-visibility Fencing during Ground Disturbing Activities as Feasible.** Before beginning ground disturbance activities, high-visibility fencing shall be erected to protect areas of sensitive biological resources (aquatic, riparian, sensitive habitat, etc.) that are located adjacent to proposed project activities that can be avoided. The fencing shall restrict encroachment of personnel and equipment into these areas. The fencing may be removed only when the ground disturbing activities within a given area is completed and shall be maintained by the contractor.

- If fencing is left up during a multi-year project, the bottom of the fencing should be rolled up, as to not impede movement or entangle wildlife during the off-season.

M. **Avoid Using Materials that may Entangle Snakes and Wildlife.** Products with plastic monofilament or cross-joints in the netting that are bound/stitches (such as straw wattles, fiber rolls, or erosion control blankets), which could trap giant garter snake or other wildlife will not be used.

N. **Revegetate All Disturbed Natural Surfaces.** After completion of ground disturbing activities, all disturbed soil surfaces shall be revegetated within the same implementation season that disturbance occurs. These areas shall be recontoured, if appropriate, and revegetated with appropriate native plant species to promote restoration of the area to pre-project conditions or better. The Project would incorporate nature-based solutions with the use of bioengineered natural

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and manmade materials to stabilize disturbed areas within the Project footprint including the use of biodegradable weed-free certified natural-fiber erosion control materials and native seed mix to revegetate the site.

O. Compensate for Permanent Loss of State or Federally listed Special-status Species Habitat. For all unavoidable adverse impacts to state or federally listed special-status species habitat, the implementing agency will coordinate with the CDFW, USFWS and/or NMFS to determine the appropriate type and amount of compensatory mitigation required, as necessary. Appropriate compensatory mitigation can include purchasing credits at an agency approved conservation bank, providing on-site mitigation, or establishing and/or protecting habitat for the species. Replacement habitat shall be commensurate with the type and amount of habitat lost.

Mitigation Measure BIO-3: Special-status plants surveys prior to construction and avoid and minimize effects during construction. For project components for NSJWCD, SEWD, and WID, if it is determined during implementation of Mitigation Measure BIO-1 that (1) suitable habitat for special-status plant species is present, (2) suitable habitat is present, but surveys were conducted during a time-frame when the special-status species could not be identified, and/ or (3) special-status species were identified and can be avoided, the agency implementing the proposed project component in consultation with a qualified biologist, shall implement the following:

A. Special-status Plant Surveys. A qualified botanist shall be retained to perform focused surveys for special-status plants. These surveys shall serve to document the presence/absence of these species in and adjacent to (within 100 feet, where appropriate) proposed impact areas, including new construction access routes.

- These surveys shall be conducted in accordance with CDFW Protocols for Surveying and Evaluating Effects on Special-Status Native Plant Populations and Sensitive Natural Communities,[6] or other current protocols.
- These guidelines require that special-status plant surveys be conducted at the proper time of year when target species are both evident and identifiable. Surveys shall be scheduled to coincide with known blooming periods, and/or during appropriate developmental periods that are necessary to identify the plant species of concern.
- If three (3) years has elapsed between the completion of the special-status plant surveys and the start of ground disturbance, these surveys shall be repeated.

B. Special-status Plants Are Present but Adverse Effects Can Be Avoided. If special-status species are determined to be present within 100 feet of areas of ground disturbance, the implementing agency will avoid and protect these species through one of the following:

- The implementing agency will avoid and protect these species by establishing a no-disturbance buffer around the area occupied and marking the buffer boundary with high-visibility flagging, orange construction fencing and/or silt fencing, stakes, and signage. The appropriate based on-site conditions will determine buffer boundary type. It is possible to use clear, existing landscape demarcations (e.g., edge of a roadway), only if the designated biologist determines that there is no chance of any project activities occurring in that area.
- The appropriate buffer size will be determined based on plant phenology at the time of treatment (e.g., whether the plants are in a dormant, vegetative, or flowering state), the individual species' vulnerability to the activity being implemented, and environmental conditions and terrain.

The only exception to avoidance of special-status plants will be in cases where it is determined by a qualified biologist, in consultation with CDFW and USFWS, as appropriate depending on species status and location that the listed plants would benefit from proposed project activities in the occupied habitat area even though some of the listed plants may be lost during proposed project activities.

C. Suitable Habitat is Present but Special-status Plants Are Not Present.

- No further mitigation measures needed for special-status plants.

Mitigation Measure BIO-4: Prepare special-status plants mitigation plan prior to construction and minimize effects and/or compensate for unavoidable loss prior to, during, and after construction. For project components for NSJWCD, SEWD, and WID, if it is determined during implementation of Mitigation Measure BIO-3B that special-status plant species are present and adverse effects cannot be avoided, the agency implementing the proposed project component, in consultation with a qualified biologist, shall determine and implement one of the following best characterizes the circumstances and plan:

A. **Minimize Effects Through the Development of a Mitigation Plan for Salvage and Transplant of Special-status Plants prior to, during, and after construction.** The development of a mitigation plan to minimize effects to special-status plants that are within the ground disturbing area would be developed by a qualified botanist.

- The program shall describe and identify means and methods to propagate affected special-status plants via vegetative or reproductive means (e.g., harvesting of seed or seed bank through topsoil collection, salvaging and transplanting or collecting of cuttings), as appropriate for the species, and transplant at suitable receiving sites as close to the existing population as possible.
- Propagation and transplantation would occur prior to construction.
- The receiving location would be evaluated and chosen based on similarity to conditions at the transplant source location, to the extent feasible. Site conditions to consider when choosing a receiving site would include aspect, substrate, hydrology, associated species, and canopy cover.
- The transplanted plants would be monitored for at least one (1) year following construction.
- The plan will also include success criteria and adaptive management measures or plans if performance criteria are not met.

B. Compensation for Unavoidable Loss of Special-status Plant Species prior to, during, and after construction. Alternative to salvage and transplant, mitigation could be satisfied through off-site preservation and/or restoration or via payment to an in-lieu fee program, if available.

[6] *Ibid*

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- The implementing agency will prepare a Compensatory Mitigation Plan that identifies the residual significant impacts that require compensatory mitigation and describes the compensatory mitigation strategy being implemented and how significant, unavoidable losses of special-status plants will be compensated.
- If the preservation option is chosen, preservation areas may include undisturbed and/or disturbed areas of the site that will be preserved and/or restored, respectively, and managed in perpetuity, offsite mitigation lands, or a combination thereof. The preserved habitat shall be of equal or greater habitat value to the areas affected in terms of soil features, extent of disturbance, vegetation structure, and contain extant and/or propagated populations of the same or greater size as the area affected.
- The actual level of mitigation may vary depending on the sensitivity of the species, its prevalence in the area, the location of the occurrence, and the current state of knowledge about overall population trends and threats to its survival; however, at a minimum, the species and habitat will be replaced at a minimum 1:1 ratio (individuals or acreage of occupied habitat).
- Mitigation ratio beyond 1:1 may be required by either USFWS or CDFW prior to any construction activities that would affect plant species.

Mitigation Measure BIO-5: Conduct crotch's bumble bee survey prior to construction and minimize effects during construction. For all MICUP components, if it is determined during implementation of Mitigation Measure BIO-1 that suitable habitat is present or the species is confirmed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall require that the measures described below are implemented to minimize for effects of the proposed project on Crotch's bumblebee.

A. **Conduct Pre-activity Survey for Crotch's Bumble Bee before Vegetation Removal.** If ground-disturbing activities are scheduled to begin between February 1 and October 31, preconstruction surveys shall be conducted by a CDFW-approved biologist following *CDFW's Survey Considerations for CESA Candidate Bumble Bee Species,*[7] or the most up-to-date CDFW survey protocol. If possible, three Crotch bumble bee foraging and/or nest surveys shall be conducted at two-to-four-week intervals during the colony active period (April-August).

- If Crotch bumble bees are detected, any remaining surveys will focus on nest locations.
- If no nests are found but the species is observed during preconstruction surveys, work crews should be informed of the possibility of Crotch bumble bees or their nests being present onsite.
- If a Crotch bumble bee is encountered during construction, work shall stop until the individual leaves of its own volition.
- If an active Crotch bumble bee nest is detected, an appropriate no disturbance buffer zone (including foraging resources and flight corridors essential for supporting the colony) shall be established around the nest to reduce the risk of disturbance or incidental take, and the designated biologist shall coordinate with CDFW to determine if an Incidental Take Permit (ITP) under Section 2081 of the California ESA will be required. Currently there are limited research resources on nest avoidance buffer sizes that would need to be implemented if a nest was identified. A minimum avoidance distance for this project shall be 100 feet unless the qualified biologist determines that construction activities and surrounding land cover types provide protection to this species and reduced nest buffer is appropriate. Buffer distances could be adjusted by CDFW in the ITP.
- Nest avoidance buffers may be removed at the completion of the flight season (October 31) and/or once the qualified biologist deems the nesting colony is no longer active.

Mitigation Measure BIO-6: Conduct monarch butterfly prior to construction and minimize effects during construction. If monarch butterfly is no longer a proposed species and is not formally listed under the ESA at the time ground-disturbing activities occur, then no additional protection measures are required.

If monarch butterfly is formally listed under the ESA at the time of ground-disturbing activities, for all MICUP components, if it is determined during implementation of Mitigation Measure BIO-1 that suitable habitat is present or the species is confirmed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are implemented to minimize for effects of the proposed project on monarch butterfly.

A. **Conduct Pre-activity Survey for Milkweed and Monarch before Vegetation Removal.** If work occurs during the monarch butterfly breeding season (March 1 to October 1), prior to the start of work, a qualified biologist shall conduct a pre-construction survey within all potential habitats where vegetation will be removed to search for individual monarch butterflies (mating or breeding) and identify all milkweed species present. If the results of the survey do not identify any milkweed plants or signs of mating/breeding, no further mitigation shall be required. If milkweed, breeding, or mating butterflies are observed in the project area, buffers may be used to avoid sensitive habitat (*i.e.,* milkweed).

- If monarch or milkweed are identified during the preconstruction survey, a qualified biologist will be onsite during all vegetation removal and initial ground disturbance to survey the work area for monarch butterfly before commencement of activities.
- If larvae are discovered on milkweed species, the milkweed plant will be avoided and buffered, at the discretion of the monitoring biologist, until monarch is no longer present on the milkweed.

Mitigation Measure BIO-7: Enforce federally listed vernal pool invertebrates buffer and minimize effects and/or compensate for unavoidable impacts prior to and during construction. For project components for NSJWCD or SEWD, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable habitat, or presence is confirmed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall require that the measures described below are implemented to minimize for effects of the proposed project on conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

[7] CDFW.2023. Survey Considerations for CESA Candidate Bumble Bee Species. Available at: https://wildlife.ca.gov/Conservation/Survey-Protocols.

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A. **Protection Buffer Delineations to Avoid Impacts to Vernal Pool Invertebrates.** If suitable vernal pool habitat is identified from field surveys in Mitigation Measure BIO-1 to be within 100 feet of ground disturbing construction activities, including maintenance areas, construction staging areas, and access routes, a qualified biologist shall take into consideration environmental factors such as site grade, construction activities, and more to determine an appropriate buffer distance to protect vernal pool invertebrates.
   - CDFW or USFWS may be consulted on buffer distances. A minimum buffer distance of 50-feet will be established, enforced, and maintained during construction.

B. **Compensate for Unavoidable Loss of Vernal Pool Invertebrates.** If impacts cannot be avoided, the implementing agency will coordinate with USFWS to develop and implement an appropriate mitigation strategy to compensate for unavoidable habitat loss.
   - Mitigation will likely include purchase of vernal pool habitat at a USFWS-approved mitigation bank. Appropriate mitigation ratios will be developed during consultation with USFWS but are anticipated to be based on 3 acres of habitat preservation and 1 acre of habitat creation for each acre of habitat loss.

Mitigation Measure BIO-8: Conduct valley elderberry longhorn beetle survey prior to construction and minimize effects during construction. For project components for NSJWCD, SEWD, and WID, if it is determined during implementation of Mitigation Measure BIO-1 that suitable habitat is present within 165-feet of a project component, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the following measures are implemented as described below.

A. **Conduct a Focused Survey for Presence of Elderberry Shrubs**. Prior to construction, a qualified biologist shall conduct a survey to map and flag all elderberry shrubs within the area of direct impacts, as well as adjacent areas within 165 feet (50 meters).
   - Access or haul routes in or adjacent to suitable habitat shall be included in this survey but may have a survey buffer reduction of 20 feet (6 meters), if the qualified biologist determines that there is no chance that shrubs outside this boundary will be impacted by project vehicles.

B. **Provide Protective Fencing around Elderberry Shrubs Prior to Construction and Monitor Shrubs to Ensure that Project Activities do not Result in Adverse Effects on Valley Elderberry Longhorn Beetle**. Elderberry shrubs that were identified within the project area, shall be protected in place with orange construction barrier fencing. The size of the buffer will depend on distance from the shrub to proposed project disturbance, as well as the type and intensity of disturbance.
   - A minimum buffer distance is 20 feet (6 meters) from the dripline of the shrub shall be installed under the supervision of the qualified biologist prior to the start of construction activities.
   - Shrubs identified along the haul or access routes shall receive a fencing buffer if the qualified biologist determines that there is a possibility of impacts to the shrubs from vehicles pulling off onto the shoulders of the road.
   - All temporary fences will be furnished, constructed, and maintained during construction by the contractor, and finally removed post-construction where there are no planned activities that could affect the shrubs.
   - Monitoring shall be conducted to confirm that proposed project activity is not resulting in detectable adverse impacts on elderberry shrubs. Buffer area fences around elderberry shrubs shall be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until proposed project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer.
   - The biological monitor shall be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction.

Mitigation Measure BIO-9: Conduct valley elderberry longhorn beetle survey prior to and minimize effects and/or compensate for unavoidable loss during construction. If the focused surveys described above in Mitigation Measure BIO-8 have been completed and elderberry shrubs cannot be avoided, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are implemented to avoid and minimize effects of the proposed project on valley elderberry longhorn beetle, such that there is no direct loss of individuals of this species.

A. **Conduct Shrub Suitability and Exit Hole and Beetle Presence Survey.** Surveys to identify suitable elderberry shrubs to be transplanted shall be conducted by a qualified biologist prior to transplantation.
   - Surveys will be conducted in accordance with the Framework for Assessing Impact to the Valley Elderberry Longhorn Beetle.8
   - The biologist will survey the area surrounding the shrub to be transplanted to ensure that there are not additional elderberry shrubs that need to be removed.
   - Surveys will estimate the canopy area of each shrub as well as associated riparian habitat and examine individual shrubs for presence of beetle exit holes.
   - Transplanting locations shall be surveyed and determined to be suitable to support the longevity of the shrubs.

B. **Development of Elderberry Transplanting Plan.** Prior to construction activities that will have effects on valley elderberry longhorn beetle's host plant, a transplanting plan shall be developed.
   - The plan will include an assessment of elderberry shrubs that are suitable for transplanting or shrubs that are not suitable and would require mitigation.
   - The plan will include the results of the exit hole and beetle presence per shrub inventoried.
   - The plan will include the assessments of the transplanting locations surveyed.

[8] USFWS. 2017. *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus).* U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.

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- A planting plan shall be specific about site selection, factors that will influence success, native associate planting, monitoring, success criteria and methods for intervention if success criteria are not met.
- The planting plan must be consistent with Assessing Impact to the Valley Elderberry Longhorn Beetle.9
- The elderberry planting plan may be combined with the special-status plant mitigation plan, described in Mitigation Measure BIO-4, if both are required.

C. **Transplanting Elderberry Shrubs.** Elderberry shrubs that are determined to have suitable health and vitality for a successful transplant shall follow the most current version of the ANSI A300 (Part 6) guidelines[10] for transplanting.

- Shrubs shall be transplanted when they are dormant (November through the first two weeks of February) and after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the shrub and increase transplantation success. Transplant locations and density of transplants

Mitigation Measure BIO-10: Conduct surveys for special-status reptiles and amphibians, and respective habitats, prior to construction and avoid and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable habitat, or presence is confirmed, for special-status reptiles and/or amphibians, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are implemented to avoid and minimize effects.

A. Conduct Preconstruction Survey to Mark and Map Burrows within the Project Boundary. A qualified biologist will identify all small mammal burrows or cracks (for western spadefoot) within suitable habitat for all special-status reptiles and amphibians with potential to occur in the project area. Cracks or burrows will be GPS mapped and marked in the field with stakes or pin flags.

- Cracks, burrows, and/or nests will be fenced off and avoided during the duration of project activities or until a qualified biologist can determine that it is no longer active.
- Depending on the species discovered, USFWS and/or CDFW will be consulted to determine the next best appropriate steps and to confirm appropriate buffer size.
- A minimum buffer of 100-feet shall be used in the interim.

B. Install, Inspect, and Maintain Wildlife Exclusion Fencing. Where site conditions allow, installation of fencing along the project area boundaries as a way to divert moving reptiles and amphibians away from active construction zones.

- Installation of fencing locations shall be conducted under the supervision of the qualified biologist.
- The project area, including the fencing, will be inspected by a qualified biologist daily or weekly depending on project activities, time of year, and disturbed or undisturbed land cover within the boundary of where project activities are occurring.
- Fencing materials, height, and installation method shall be appropriate for the species being excluded. The use of the Animex *The Wildlife Fencing Guide – Amphibians, Reptiles, & Small Mammals*[11] shall be utilized for specifications.

C. Retain a Qualified Biologist to Be Present during All Initial Ground Disturbance and In-water Work and Regularly Inspect the Project Area for the Presence of Special-status Reptiles and Amphibians. The qualified biologist shall be present during the entirety of initial ground disturbing activities in suitable habitat for special-status reptiles and amphibians. Following the initial ground disturbance, the biological monitor will be onsite daily and available for the duration of construction while activities have the potential to impact special-status reptiles and amphibians.

- Monitoring will also include any activities involving in-water work in suitable habitat.

D. Dewatering Suitable Habitat. If dewatering of suitable aquatic habitat for any special-status reptile or amphibian species is to occur, monitoring will be required for the duration of the dewatering event.

- Species will be actively relocated (with prior CDFW and/or USFWS approval) to nearby suitable habitat or above or below the diversion, once water levels are low enough to safely do so.
- If the dewatering cannot remove all water, potential prey (i.e., fish and tadpoles) will be removed so that special-status reptile and amphibian species and other wildlife are not attracted to the project area.

E. Unintentional Nests or Burrows Uncovered. If an active nest or burrow is unintentionally uncovered during project activities, work shall stop in the vicinity of the nest and/or burrow and appropriate next steps, depending on the circumstances, shall be determined by a qualified biologist. These may include fencing and buffering the nest or burrow and/or rescue, rehabilitation, and relocation of affected species.

Mitigation Measure BIO-11: Conduct Giant Garter Snake survey prior to construction and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for giant garter snake or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

[9] USFWS. 2017. *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus).* U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.
[10] TCIA. 2025. *Part 6 – Planting and Transplanting.* Accessed on January 21, 2025 via: https://treecareindustryassociation.org/business-support/ansi-a300-standards/part-6-planting-and-transplanting/
[11] Animex. 2021. The Wildlife Fencing Guide: Amphibians, Reptiles & Small Mammals. Version 1.1. Accessed on January 21, 2025 via: https://animexfencing.com/installation-guides

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A. Conduct a Pre-activity Survey for Giant Garter Snake. Prior to construction, a qualified biologist shall conduct a survey to delineate suitable aquatic habitat and suitable uplands habitat within 200 feet that are anticipated to be impacted by project activities.

- Access or haul routes in or adjacent to suitable habitat shall be included in this survey but may have a survey buffer reduction of 20 feet (6 meters). If the qualified biologist determines that there is a chance that vehicles could impact suitable uplands habitat (e.g., suitable burrowing locations), measures listed below shall apply.

B. Clearance Surveys 24 Hours Prior to Ground Disturbing Activities. Suitable upland habitat for giant garter snake within the project footprint shall be surveyed by a qualified biologist within 24 hours before on-site project activities begin. Additional surveys shall be conducted within 24 hours before initial ground disturbance begins. Surveys shall be repeated after any lapse in ground disturbing activity of 2 weeks or longer.

C. Conduct Initial Earth-movement Activities within Suitable Upland Habitat between May 1 and October 1. When possible, the implementing agency shall complete ground-disturbing activities within suitable upland habitat for the giant garter snake between May 1 and October 1.

- Initial earth-moving is expected to correspond with the snake's active season (as feasible in combination with minimizing disturbance of nesting birds).
- Work in giant garter snake upland habitat may also occur between October 2 and November 1 or between April 1 and April 30, provided maximum daily air temperatures have exceeded approximately 75ºF for at least 3 consecutive days immediately preceding work and ambient air temperatures exceed approximately 75ºF during work. During these periods, giant garter snakes are more likely to be active in aquatic habitats and less likely to be found in upland habitats

D. Conduct Initial In-water Activities within Suitable Aquatic Habitat for Giant Garter Snake between October 1 and May 1. When possible, the implementing agency shall complete in-water activities within suitable aquatic habitat for giant garter snake between October 1 and May 1. Initial in-water activity is expected to correspond with the giant garter snake's inactive season. During these periods, this species would be in upland habitat and highly unlikely to be present in aquatic habitat.

E. Variances in Work Windows. If the above Mitigation Measures do not cover the work windows, habitat or conditions that the agency implementing the proposed project is requesting, coordination with the qualified biologist first to determine if there are suitable work arounds or additional mitigation measures that can be implemented. If there are no other mitigation measures that can be implemented to protect giant garter snake, then USFWS and CDFW shall be consulted to determine acceptable methods for minimizing effects on giant garter snake shall occur prior to construction activities.

Mitigation Measure BIO-12: Conduct northwestern pond turtle survey prior to construction and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for northwestern pond turtle or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

A. Conduct a Pre-activity Survey for Northwestern Pond Turtle. Prior to construction, a qualified biologist shall conduct a survey to delineate suitable aquatic habitat and suitable uplands habitat within 500 feet that are anticipated to be impacted by project activities.

- Access or haul routes in or adjacent to suitable habitat shall be included in this survey but may have a survey buffer reduction of 20 feet (6 meters). If the qualified biologist determines that there is a chance that vehicles could impact suitable uplands habitat (e.g., suitable nesting locations), measures listed below shall apply.

B. Conduct Initial In-water Activities within Suitable Aquatic Habitat for Northwestern Pond Turtle between March 1 and October 31. When possible, the implementing agency shall complete in-water activities within suitable aquatic habitat for northwestern pond turtle between March 1 and October 31. Initial in-water activity is expected to correspond with the turtle's active season. During these periods, northwestern pond turtles are more likely to be active and able to move out of harm's way.

C. Conduct Initial Ground Disturbing Activities within Suitable Upland Habitat for Northwestern Pond Turtle in April. When possible, the implementing agency shall conduct initial ground disturbance within suitable uplands habitat within 500 feet of suitable aquatic habitat in April. April is the only month in which both adult turtles, hatchlings, and nests are not within suitable uplands habitat.

D. If Initial Ground Disturbance Activities Cannot Occur within April, a Full-time Biological Monitoring Shall be Present During Initial Activities. If initial ground disturbance within 500 feet of suitable uplands habitat cannot be fully disturbed in the month of April, then a full-time biological monitor shall be present to monitor initial ground disturbance.

E. Daily In-water Work Timing and Disturbance. Prior to in-water activities, water disturbance shall occur to allow turtles to move out of the area on their own accord. Water disturbance may include the use of an excavator bucket gently disrupting the surface of the water, it shall not include activities that could cause direct harm to aquatic species. Disturbance shall occur around 8 a.m. when turtles are about to begin basking. Wait at least 10 minutes after disturbance before beginning in-water activities to allow turtle movement out of area. If in-water activities stop for more than 45 min, in-water disturbance shall occur again to enable turtles to move out of harm's way.

F. Direct Impact Avoidance. Measures shall be implemented to minimize potential for heavy equipment to destroy northwestern pond turtle nests and to encounter hatchling turtles. Feasible measures may vary depending on site-specific circumstances and could include, but not be limited to:

- Minimizing heavy equipment operation in upland habitat within 500 feet of aquatic habitat in February and March, when hatchling turtles emerge from nests and travel to aquatic habitat.

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- Placing artificial ground cover that prevents female turtles from excavating nests in most likely nesting areas where ground disturbing activities shall occur before the following hatchling turtle emergence period.
- Fencing most likely nesting areas to exclude access by female turtles and/or enclose hatchlings after emergence. If active nests and hatchlings may be present, the fenced area shall be inspected daily by a qualified biologist and hatchling turtles shall be captured and relocated to suitable habitat at a pre-determined location.

Mitigation Measure BIO-13: Conduct California tiger salamander prior to construction and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for California Tiger Salamander or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

A. **Conduct All Earth-movement Activities within Suitable Upland Habitat During Dry and Daytime Conditions.** When possible, the implementing agency shall complete ground-disturbing activities within suitable upland habitat for the California tiger salamander during dry and daylight conditions.
   - Initial earth-moving is expected to correspond with the salamanders active season (as feasible in combination with minimizing disturbance of nesting birds).
   - All ground-disturbing work will occur during daylight hours in coordination with USFWS and depending on the level of rainfall and site conditions.

B. **Forecasted Rain Events.** The implementing agency will monitor the National Weather Service (NWS) 72-hour forecast for the work area. If a 70 percent or greater chance of rainfall is predicted within 72 hours of any project activity, all activities in areas within 1.3 miles of potential or known tiger salamander breeding sites will cease until no further rain is forecast.
   - If work must continue when rain is forecast, a qualified biologist will survey the project site before construction begins each day rain is forecast. If rain exceeds 0.25 inch during a 24-hour period, work will cease until no further rain is forecast.
   - This restriction is not applicable for areas located greater than 1.3 miles from potential or known breeding sites once they have been encircled with exclusion fencing.
   - However, even after exclusion fencing is installed, this condition would still apply to construction related traffic moving though areas within 1.3 miles of potential or known breeding sites but outside of the salamander exclusion fencing (e.g., on roads).

C. **Survey After Significant Precipitation Event.** For work conducted during the migration season (November 1 to May 31), a qualified biologist will survey the active work areas (including access roads) in mornings following measurable precipitation events.
   - Construction may commence once the biologist has confirmed that no California tiger salamanders are in the work area.

D. Minimize Night Lighting. If nighttime work occurs within 1.3 miles of potential or known California tiger salamander breeding sites the use of directional lighting pointing downward to avoid illuminating adjacent riparian and oak woodland habitat shall be implemented.

Mitigation Measure BIO-14: Conduct western spadefoot survey prior to construction and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for western spadefoot or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

A. Survey After Significant Precipitation Event. For work conducted during the western spadefoot breeding season (October 1 to May 31), a qualified biologist will survey the active work areas (including access roads) in mornings following measurable precipitation events. Construction may commence once the biologist has confirmed that no spadefoots are in the work area.

Mitigation Measure BIO-15: Consult with CDFW and/or USFWS regarding unavoidable reptile and amphibian burrow/nests disturbance prior to construction and avoid and minimize effects during construction. For all MICUP components, if complete avoidance of active special-status reptile and amphibian (giant garter snake, northwestern pond turtle, California tiger salamander, or spadefoot toad) burrows or underground nests is not feasible, the agency implementing the proposed project component shall consult with CDFW and/or USFWS to determine the best approach to avoid and minimize potential impacts.

- Such measures may include hand excavating burrows and passive relocation of special-status reptiles and amphibians.
- Passive relocation of species shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW and/or USFWS.
- The relocation plan shall describe methods for passive relocation of the reptiles and amphibians, excavation of suitable burrows, and maintenance of the site to prevent reoccupation.

Mitigation Measure BIO-16: Conduct nesting special-status bird survey prior to construction and avoid effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable nesting habitat for special-status birds or common birds or the presence of special-status species is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are implemented to avoid and minimize effects.

A. **Conduct Vegetation Removal between September 16 and January 31 to the Extent Feasible.** Vegetation removal shall be conducted between September 16 and January 31, to the extent feasible, to minimize potential loss of active bird nests.

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- If all construction activities (not just vegetation removal) occurring within suitable nesting habitat for special-status and common species can be conducted outside of the nesting season, no further mitigation measures for birds are required.

B. **Conduct Pre-construction Surveys for Active Nests of Special-status Birds in Areas of Suitable Habitat before Starting Construction During Nesting Bird Season.** If construction activities that could directly or indirectly affect suitable habitat for special-status birds cannot be conducted outside of the respective nesting seasons, the implementing agency shall, in coordination with a qualified biologist, shall complete pre-activity surveys for nesting birds.

- Surveys of all potential nesting habitat in the area shall be conducted by a qualified biologist during the nesting season, which is typically February 15 to September 1.
- Surveys shall be conducted within suitable nesting habitat that could be affected by construction activities and shall include a 0.5-mile buffer area (or larger area if required by established survey protocol) surrounding these areas.
- Where appropriate, pre-activity surveys shall follow established survey protocols or guidelines. These protocols include the following:
  - Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley[12]
  - Tricolored Blackbird Survey Methods[13]
  - Appendix D of the Staff Report on Burrowing Owl Mitigation[14]
- If no established survey protocol exists, the qualified biologist shall complete surveys no more than 1 week prior to the start of construction activities or more than 1 week prior to the restart of construction after a lapse of 14 days. If no nesting birds are detected during pre-activity surveys, no additional mitigation measures are required.
- A letter report documenting the survey methods and results shall be prepared and submitted to CDFW.

Mitigation Measure BIO-17: Consult with CDFW regarding unavoidable special-status bird nest disturbance prior to construction and avoid and minimize effects during construction. For all MICUP components, if the measures described above in Mitigation Measure BIO-16 have been completed and ground disturbance or vegetation clearing must be initiated during the bird nesting season then the implementing agency shall ensure that the measures described below are implemented to minimize effects of the proposed project on nesting special-status birds, such that there is no direct loss of individuals of these species or proposed project-related nest failure.

A. **Establish and Maintain Buffers Around Active Nest Sites to Avoid Nest Failure.** If any active nests, or behaviors indicating active nests are present, or observed, the implementing agency shall establish appropriate-sized avoidance buffers around the nest sites, as determined by a qualified biologist in coordination with CDFW to avoid nest failure resulting from proposed project activities.

- The size and shape of the buffer shall depend on the species, nest location, nest stage, and specific construction activities to be performed while the nest is active. Primarily, CDFW follows the below-specified buffers in their *Appendix I CDFW's Conservation Measures for Biological Resources That May be Affected by Program-level Actions:*[15]
  i. Bald eagle: A 0.5 mile no disturbance buffer during the breeding season (December 30 through July 1) shall be enforced.
  ii. Swainson's hawk or white-tailed kite: A 0.5 mile no disturbance buffer shall be enforced.
  iii. Burrowing owl: If burrowing owls are detected, disturbance to burrows will be avoided during the nesting season (February 1 through August 31). The qualified biologist will establish buffers around occupied burrows in accordance with guidance provided in the *Staff Report on Burrowing Owl Mitigation*.[16] Buffers around occupied burrows will be a minimum of 656 feet during the nesting season and 160 feet during the non-breeding season.
  iv. Other raptors (non-special-status and special-status, if not specified above): A 500-foot no disturbance buffer shall be enforced.
  v. Other non-raptor birds (non-special-status and special-status, if not specified above): A 250-foot buffer shall be enforced.
- The buffer shall be expanded if the birds are exhibiting agitated behavior, or the buffers may be adjusted (reduced) if a qualified biologist determines it would not be likely to adversely affect the nest, in coordination with CDFW.
- If required, buffers shall be marked in the field by a qualified biologist using temporary fencing, high-visibility flagging, or other means that are equally effective in clearly delineating the buffer.

B. **Monitor Nest Sites to Confirm that Project Activities Are Not Adversely Affecting Nesting Birds or Their Young.** Monitoring shall be conducted by a qualified biologist, either continuously or periodically during work, to confirm that proposed project activity is not resulting in detectable adverse impacts on nesting birds or their young.

- The qualified biologist shall be empowered to stop construction activities that, in the biologist's opinion, threaten to cause unanticipated and/or unpermitted adverse effects on special-status wildlife (e.g., nest abandonment).

[12] Swainson's Hawk Technical Advisory Committee. 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley.
[13] Airola, D., E. C. Beedy, S. Sanders, and J. Medley. 2024. Tricolored blackbird survey methods. California Fish and Wildlife Journal 110:e6.
[14] CDFW. 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency.
[15] CDFW. Unknown. Appendix I CDFW's Conservation Measures for Biological Resources That May Be Affected by Program-level Actions.
[16] CDFW. 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency.

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- If construction activities are stopped, the qualified biologist shall consult with CDFW to determine appropriate measures that shall implement to avoid adverse effects.
- No proposed project activity shall commence within the buffer areas until a qualified biologist has determined that the young have fledged or the nest site is otherwise no longer in use.

Mitigation Measure BIO-18: Conduct burrowing owl survey prior to construction and avoid and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable burrows in suitable habitat for burrowing owl or their presence is observed, the agency implementing the proposed project component shall implement Mitigation Measure BIO-16, BIO-17, and ensure that the measures described below are implemented to avoid and minimize effects.

A. **Breeding and Non-breeding Pre-activity Surveys for Burrowing Owl.** The focused take avoidance survey for burrowing owl will be conducted within 14 days before on-site proposed project activities begin in each portion of the site regardless of nesting bird season guidelines stated above in Mitigation Measure BIO-16.
   - Burrowing owls are known to utilize burrows as over wintering sites. Over wintering burrows shall be protected to the greatest extent feasible.

B. **Active Nest Buffers.** Burrows occupied during the breeding season (February 1 through August 31) and nonbreeding season shall be provided with a protective buffer until a qualified biologist verifies through noninvasive means that either (1) the birds have not begun egg-laying, or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival.
   - The size of the buffer, which may range from 50 meters to 500 meters, will depend on distance from the nest to area of proposed project disturbance, type and intensity of disturbance, presence of visual buffers, time of year, and other variables that could affect susceptibility of the owls to disturbance17 project.18
   - Monitoring shall be conducted to confirm that proposed project activity is not resulting in detectable adverse impacts on nesting burrowing owls.

Mitigation Measure BIO-19: Consult with CDFW regarding unavoidable burrowing owl disturbance prior to construction and avoid and minimize effects during construction. For all MICUP components, if complete avoidance is not feasible for active burrowing owl burrows, the agency implementing the proposed project component shall consult with CDFW to determine the best approach to avoid and minimize potential impacts.

- Activities such as passive relocation during non-breeding season may be permitted. Which may include installation of one-way doors, providing artificial burrows, and burrow excavation.
- Passive relocation of owls shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW.
- A Relocation Plan and/ or Burrowing Owl Exclusion Plan shall describe methods for passive relocation of the owls, destruction of suitable burrows, and maintenance of the site to prevent owl reoccupation.

Mitigation Measure BIO-20: Conduct an assessment of suitable bat roosting and ringtail denning habitat prior to construction and avoid and minimize effects during construction. For all MICUP components, to avoid effects of construction activities on roosting bats and denning ringtail, the agency implementing the proposed project component shall require that the following measures are implemented.

A. **Conduct a Pre-tree Removal Assessment of Suitable Roosting and Denning Habitat within the Project Site.** For all trees that are anticipated to be removed plus a 250-foot buffer an assessment of suitable bat roosting or ringtail denning habitat shall be conducted.
   - The qualified biologist shall tag and record locations of trees that either have signs of bat presence (*i.e.,* guano) or have the potential to be suitable roosting or denning habitat for bats and ringtail.

B. **Provide a Protective Buffer for Occupied Ringtail Dens during the Breeding Season.** If active ringtail dens are discovered during a den survey, or incidentally, a no-disturbance buffer of at least 0.25 mile will be implemented around the den, and tree removal will not proceed within the buffer until at least the end of the ringtail maternity season (June 30).
   - If an active den is discovered, CDFW will be notified of the den and buffer location.
   - The qualified biologist will confirm that the den is unoccupied before construction activities resume.

C. **Monitor Dens to Ensure that Project Activities do not Result in Adverse Effects on Denning Ringtails.** The qualified biologist shall monitor the active den during the proposed project activities to ensure that it is not resulting in detectable adverse impacts.

D. **Provide a Protective Buffer for Occupied Bat Roosts during the Breeding and Overwintering Season.** If active bat roosts are discovered during an emergence survey, or incidentally, a no-disturbance buffer of at least 250 feet will be implemented around the roost, and tree removal will not proceed within the buffer until at least the end of the maternity or overwintering season.
   - If an active maternity roost is discovered, CDFW will be notified of the location and buffer distance.
   - The qualified biologist will confirm that the roost is unoccupied before tree removal activities resume.

[18] CDFW. 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency. 3

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E. **Monitor Roosts to Ensure that Project Activities do not results in Adverse Effects on Roosting Bats.** The qualified biologist shall monitor the active nest during the proposed project activities to ensure that it is not resulting in detectable adverse impacts.

Mitigation Measure BIO-21: Consult with CDFW regarding unavoidable tree with suitable bat roosting habitat removal prior to construction and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 and Mitigation Measure BIO-20 that avoiding effects on suitable bat roosting habitat is infeasible, the agency implementing the proposed project component shall require that the measures described below are implemented.

A. **Tree Removal Timing between August 16 and December 1 OR between February 28 and May 1.** Tree removal shall be conducted between August 16 and December 1 or between February 28 and May 1, to the extent feasible, to minimize potential loss of maternity roosts.

B. **Conduct Emergence Surveys for Trees to be Removed after March 1.** If tree removal is not possible during the winter and summer months, dates stated above, avoid removal of potential roost habitats until after March 1, or whenever weather conditions are suitable for conducting emergence surveys.
   - Conduct dusk emergence surveys of all trees that will be removed that are deemed to be suitable roosting habitat. that will be removed.
   - If active roosts are discovered during an emergence survey, buffers will be enforced, see Mitigation Measure BIO-20 above.

C. **Two-step Tree Removals.** If trees identified as providing suitable roosting habitat must be removed but do not support an active maternity or overwintering roost, implementation of the following measures shall occur during tree removal.
   - Conduct removal of potential roost trees in the presence of a qualified bat biologist.
   - Remove trees and/or brush surrounding potential roost trees before felling potential roost trees.
   - Remove limbs without potential roosting habitat from the tree and leave the remaining trunk and limbs overnight (Step 1 – Day 1).
   - Fell the remaining trunk and limbs the following day and leave all fallen material on the ground at least 1 night prior to removal from the project site (Step 2 – Day 2).
   - As feasible, fell all affected trees and limbs slowly and gently, to minimize the likelihood of crushing bats that may be inside.
   - As feasible, the qualified bat biologist will inspect all potential roost habitat for bats after felling and before removal from the project site.
   - If any injured bats are found, the qualified bat biologist will collect and deliver the bat(s) to a bat rehabilitator permitted by CDFW.
   - If bats are detected at any point, stop work immediately, leave the tree site and a surrounding 200-foot buffer, and consult with the qualified bat biologist.

D. **If active roosts are discovered in trees that require removal and full avoidance is not possible, implement the following measure.** The agency implementing the proposed project component shall consult with CDFW to determine the best approach to avoid and minimize potential impacts.
   - Such measures may include full exclusion of bats during the non-maternity and overwintering seasons.
   - Exclusion of bats shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW.
   - The relocation plan shall describe methods for exclusion of bats and placement of alternative roosting habitat (i.e., roost boxes).

Mitigation Measure BIO-22: Consult with CDFW regarding unavoidable tree with suitable ringtail denning habitat removal and minimize effects during construction. For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 and Mitigation Measure BIO-20 that avoiding effects on suitable ringtail denning habitat is infeasible, the agency implementing the proposed project component shall ensure that the measures described below are implemented.

A. **Tree Removal Timing between June 30 and April 15.** Tree removal shall be conducted between June 30 and April 15 of the following year to the extent feasible, to minimize potential loss of breeding ringtail dens.

B. **Conduct Denning Surveys for Trees to be Removed after April 15 and Before June 30.** If tree removal is not possible during the fall and winter months, dates stated above, a qualified biologist shall conduct denning surveys of all trees that are planned for removal that have been deemed suitable denning habitat.
   - Within seven days prior to the start of nearby construction activities during the ringtail maternity season (April 15 to June 30), a den search shall be conducted.
   - The qualified biologist will search for large trees (i.e., greater than 12 inches diameter at breast height) with appropriate cavities (i.e., holes larger than 3 inches in diameter, cavities extending approximately 12 inches down from the cavity hole).
   - If found, the qualified biologist will inspect the cavity using a cell phone with a flash, or other tools (e.g., borescopes) to determine whether ringtails are present.
   - The qualified biologist will also search for dens in dense brush habitat and will note any sightings of fleeing adult ringtails.
   - If active dens are discovered during a denning survey, buffers will be enforced as stated in Mitigation Measure BIO-20.

C. **Two-step Tree Removal Outside Maternity Season.** If trees identified as providing suitable denning habitat are planned for removal outside of the maternity season (from July 1 – April 14), the following measures shall be implemented.
   - Perform tree removal in the presence of the qualified biologist.
   - Remove limbs without potential roosting habitat from the tree and leave the remaining trunk and limbs overnight (Step 1 – Day 1).
   - Fell the remaining trunk and limbs the following day and leave all fallen material on the ground at least 1 night prior to removal from the project site (Step 2 – Day 2).

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- As practical, fell all affected limbs slowly and gently, to minimize the likelihood of crushing ringtail that may be denning inside.
- If any injured ringtail are found, the qualified biologist will collect and deliver the ringtail(s) to a rehabilitator permitted by CDFW.
- If ringtail are detected at any point, stop work immediately, leave the tree site and surrounding 200-foot buffer, and consult with the qualified biologist.

D. If active dens are discovered in trees that require removal and full avoidance is not possible, implement the following measure. The agency implementing the proposed project component shall consult with CDFW to determine the best approach to avoid and minimize potential impacts.

- Such measures may include full exclusion of ringtail during the non-breeding seasons.
- Exclusion of ringtail shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW.
- The relocation plan shall describe methods for relocation of ringtails.

Mitigation Measure BIO-23: Prepare a special-status fish rescue and relocation plan prior to construction and avoid and minimize effects during construction and operation. For project components for NSJWCD, SEWD, or WID, to avoid and minimize effects of construction and maintenance activities on all special-status fish species prior to any in-water work for MICUP construction or O&M, the agency implementing the project component shall do the following:

A. Create and Implement a Fish Rescue and Relocation Plan. The implementing agency shall design a comprehensive fish rescue and relocation plan to be submitted to NMFS for approval no less than 30 days prior to any isolation of in-water work areas and implement the plan during in-water construction and operation activities.

B. Schedule In-water Activities to Avoid Times When Species May Be Present. Construction activities will be scheduled for periods when salmonids do not have access to the project area (*i.e.,* during periods when flood control releases and/or river flooding due to heavy rain or snow melt are not projected to occur) or during key life-history periods (refer to Table 4.4-6).

- Based on the timing of potential presence alone, the period between mid-June to mid-September would provide the greatest protection for special-status species.
- Provisions will be made to allow migrating salmonids to bypass work areas in the channel in the event that unanticipated flood control releases or freshets occur.

Table 4.4-6 Recommended Salmonid In-Water Work Windows

Species	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Steelhead (adult)											X	X	X	X	X	X	X	X						
Steelhead (juvenile)													X	X	X	X	X	X	X	X				
Spring-Run Chinook salmon (adult)	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spring-Run Chinook salmon (juv.)	X	X											X	X	X	X	X	X	X	X	X	X	X	X
Fall-Run Chinook salmon (adult)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Fall-Run Chinook salmon (juv.)	X	X											X	X	X	X	X	X	X	X	X	X	X	X

sDPS = southern Distinct Population Segment
White boxes= potentially present in the proposed project area
Gray Boxes with X = species is unlikely to be present in the proposed project area, in-water work is preferred; the months are split into two work windows, occurring on the 15th of each month

C. Install NMFS-approved Fish Screens to any Expanded Pump Stations. All fish screens installed at expanded pump stations or used during dewatering activities would be fitted with NMFS-approved fish screens.

D. Monitor Water Turbidity Levels During In-Water Construction Activities. A qualified monitor would be present during all in-water construction activities. Monitoring would ensure that increases in turbidity over background conditions would not exceed levels specified by the Central Valley RWQCB and/or NMFS for the project. If turbidity exceeds the determined turbidity threshold during in-water construction activities, work will stop until turbidity thresholds are below the limit. Section 401 permits require preparation and implementation of an erosion control plan and/or a stormwater pollution prevention plan (SWPPP). At a minimum, the plan would contain the following types of BMPs:

- Complete revegetation and stabilization of disturbed soils in the proposed project footprint, including stream banks.
- Placement of interceptor ditches to direct water away from the tops of cut-and-fill slopes.
- Implementation of Central Valley RWQCB approved BMPs for sediment catch basins or traps to prevent sediment from being transported away from construction sites. These would be designed to minimize impacts to riparian, wetland, and open-water areas. Traps to be considered could include filter berms, straw-bale barriers, filter inlets, vegetative filter strips, culvert risers, coir and straw logs, and other erosion control BMPs as approved by the Central Valley RWQCB.
- Provisions of the erosion control plan and SWPPPP (if required) would be included in conditions of the Lake and Streambed Alteration Agreement pursuant to Sections 1600-1606 of the CFGC.

Impact Statement	Mitigation Measure(s)	Residual Impact
Impact BIO-2. MICUP could adversely impact riparian habitat, other sensitive natural communities, or protected wetlands in the project area. Impacts would be less than significant with mitigation incorporated.	Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, SW-2, and SW-3 would be required in addition to the following mitigation measures. **Mitigation Measure BIO-24: Conduct wetland delineation, aquatic resources, and sensitive natural communities mapping prior to construction and avoid and minimize effects to sensitive aquatic or natural community resources during construction and operation.** If it is determined during implementation of Mitigation Measure BIO-1 that potentially jurisdictional aquatic resources or sensitive natural communities are present within the construction area, the agency implementing the proposed project component in consultation with a qualified biologist, will conduct focused aquatic and sensitive habitat mapping. No net loss of aquatic or sensitive resources would be achieved through impact avoidance, minimization, and/or compensatory mitigation. A. **Conduct a Wetland Delineation and Aquatic Resource Mapping.** Conduct wetland delineation and aquatic resources mapping prior to the start of construction. All aquatic habitat within the study area will be delineated to determine extent and type of jurisdictional features potentially qualifying as Waters of the U.S. and/or State. Aquatic habitat that will be temporarily or permanently impacted by the project will be quantified. If aquatic resources can be avoided, follow Mitigation Measure BIO-1 for avoidance methods. B. **Conduct Sensitive Habitat Mapping.** Conduct sensitive habitat mapping prior to the start of construction. All sensitive habitat within the study area will be delineated to determine extent of habitat and potential impacts. Special focus will be made on sensitive habitat that will be temporarily or permanently impacted by the project. If sensitive habitat can be avoided, follow Mitigation Measure BIO-1 for avoidance methods. C. **Compensate for Wetlands, Aquatic Resources, and Sensitive Habitats.** If wetlands, aquatic resources, or sensitive habitats cannot be avoided, follow Mitigation Measure BIO-2, Mitigation Measure BIO-26, and/or Mitigation Measure BIO-27 for unavoidable loss of habitats. **Mitigation Measure BIO-25: Conduct tree survey and obtain removal permits prior to construction-related removal or trimming.** If tree removal cannot be avoided, the agency implementing the proposed project component shall ensure a tree survey is conducted by a qualified biologist or by an International Society of Arboricultural Certified Arborist, prior to removal or trimming. This survey will document tree location, species, trunk size, and health for all trees to be removed. If only trimming is to occur, documentation of number and size of branches to be removed and species will be noted. Any tree removal permits or necessary approvals from the County or local jurisdictions shall occur prior to any tree removals. **Mitigation Measure BIO-26: Mitigate unavoidable loss of riparian habitat at minimum 1:1 ratio prior to operation.** Mitigation for permanent impacts on sensitive communities shall be provided at a minimum 1:1 ratio. Mitigation can be achieved through on-site restoration, in-lieu fee payment, or purchase of mitigation credits at a USACE- and/or CDFW-approved mitigation bank. Mitigation, as required in regulatory permits issued through CDFW, USACE, and/or the RWQCB, may be applied to satisfy this measure. **Mitigation Measure BIO-27: Mitigate unavoidable loss of aquatic resources is at minimum 1:1 ratio prior to operation.** Mitigation for permanent impacts on aquatic resources shall be provided at a minimum 1:1 ratio. Mitigation can be achieved through on-site restoration, in-lieu fee payment or purchase of mitigation credits at a USACE- and/or CDFW-approved mitigation bank. Mitigation, as required in regulatory permits issued through CDFW, USACE, and/or the RWQCB, may be applied to satisfy this measure.	Less Than Significant with Mitigation
Impact BIO-3. MICUP construction and operation would have minimal impacts to fish and wildlife movement corridors. Impacts would be less than significant.	Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2 would be required.	Less Than Significant with Mitigation
Impact BIO-4. MICUP would be required to conform with applicable local policies and ordinances protecting biological resources. Impacts would be less than significant with mitigation incorporated.	Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, BIO-8, BIO-9, BIO-10, BIO-11, BIO-12, BIO-13, BIO-14, BIO-15, BIO-16, BIO-17, BIO-18, BIO-19, BIO-20, BIO-21, BIO-22, BIO-23, BIO-24, BIO-25, BIO-26, BIO-27, GEO-1, SW-2, and SW-3 would be required.	Less Than Significant with Mitigation
Impact BIO-5. MICUP would not conflict with an adopted HCP, NCCP, or other approved local, regional, or State habitat conservation plan. No impact would occur.	No mitigation is required.	No Impact
Cultural & Tribal Cultural Resources		
Impact CR-1. Implementation of the proposed project has the potential to result in significant impacts due to construction of water infrastructure that could cause a substantial adverse change in the significance of a historical resource. This impact would be significant and unavoidable even with mitigation.	The following mitigation measure is required for construction activities associated with project components for NSJWCD and SEWD. **Mitigation Measure CR-1: Prepare Historical Resources Evaluation Prior to Approval of Projects Involving Structures 45 years or Older and Implement Mitigation Prior to and During Construction.** Prior to construction activities that would modify an existing facility that is 45 years or older, the following steps shall be undertaken: ▪ Prior to proceeding with the historical resources evaluation (HRE) described below, a qualified architectural historian or historian (who meets the Secretary of the Interior's Professional Qualifications Standards in architectural history and/or history as defined in Code of Federal Regulations, Title 36, Part 61) shall conduct a review of the applicable registers of historical resource to determine the presence of qualifying resources within a proposed project component site and its immediate surroundings and to confirm that its condition is consistent with that presented in associated designation documentation. This effort, which may include a field survey, shall be documented in a report (that may be combined with the report described in the third bullet below as necessary and appropriate) that shall be submitted to the applicable Partner Agency for review and approval prior to initiation of a project component. ▪ Based on guidance provided by the California Office of Historic Preservation (OHP), not all built environment resources merit recordation. Therefore, the professional judgement of an architectural historian (that meets the Secretary of the Interior's Professional Qualification Standards (SOI PQS) in architectural history or history as defined in Code of Federal Regulations, Title 36, Part 61) shall be relied upon to determine if built environment resources with potential significance requiring recordation are present within a given project component site or its immediate surroundings. If a project component site or property in its immediate	Significant and Unavoidable

Impact Statement	Mitigation Measure(s)	Residual Impact
	surroundings includes a building, structure, or other built environment feature that is 45 years of age or older that merits recordation and has the potential to be significantly impacted by the project, the applicable Parter Agency shall prepare a HRE for the property containing said building, structure, or feature. The evaluation shall consider the eligibility of the feature for listing in the National Register of Historic Places and California Register of Historical Resources, in addition to any applicable local register of historical resources. ▪ The HRE shall be prepared by a SOI PQS architectural historian or historian. The HRE shall include an intensive-level evaluation prepared in accordance with the guidelines and best practices promulgated by the California OHP. The building, structure or other built environment feature shall be evaluated within an appropriate historic context and documented in a report that meets the California OHP guidelines. All evaluated resources shall be documented on California Department of Parks and Recreation Series 523 Forms (DPR forms) in accordance with the guidance included in the California Office of Historic Preservation's instruction for Recording Historical Resources The report with attached DPR forms shall be submitted to the applicable Partner Agency for review and approval prior to proceeding with construction of the project component. ▪ If qualifying built environment historical resources with the potential to be significantly impacted by a proposed project component are identified within a proposed project component site or its immediate surroundings, efforts shall be made to ensure that impacts are mitigated. In such instances, the above-noted HRE report shall be amended or supplemented with a report that identifies the resource's character-defining features and recommends treatment methods for character-defining features. The report shall demonstrate how the proposed project component complies with the Secretary of the Interior's Standards for the Treatment of Historic Properties (SOI Standards) and avoids impacts to historical resources pursuant to CEQA. The report shall be submitted to the applicable Partner Agency for review and approval prior to proceeding with construction of the project. ▪ If built environment historical resources are identified and compliance with the SOI Standards is not possible, appropriate site-specific mitigation measures that reduce impacts to historical resources to the greatest extent feasible shall be established and undertaken. Mitigation measures may include, but would not be limited to, documentation of the historical resource in the form of a Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) report that complies with the Secretary of the Interior's Standards for Architectural and Engineering Documentation, or development of an interpretative display that relates the history and significance of the resource to the public.	
Impact CR-2. Implementation of the proposed project has the potential to result in significant impacts due to construction of water infrastructure that could cause a substantial adverse change in the significance of an archaeological resource, including those that qualify as historical resources. This impact would be significant and unavoidable even with mitigation.	The following mitigation measures are required for construction activities associated with project components for MICUP components that have the potential to damage, destroy, or alter an archaeological resource. **Mitigation Measure CR-2: Prepare Archaeological Resources Assessment Prior to Project Approval and Implement Mitigation Prior to and During Construction.** Prior to approval of a project component that involves ground disturbance activities, the implementing agency shall prepare an archaeological resources assessment under the supervision of an archaeologist that meets the Secretary of the Interior's Professional Qualification Standards in either prehistoric or historic archaeology (qualified archaeologist) as defined in Code of Federal Regulations, Title 36, Part 61). ▪ Archaeological Resources Assessments shall include a California Historical Resources Information System records search at the Central California Information Center (CCAIC) with a minimum 0.5-mile radius and a Sacred Lands File search maintained by the Native American Heritage Commission. The records searches will characterize the results of previous cultural resource surveys and disclose any cultural resources that have been recorded and/or evaluated in and around a project site. A Phase I pedestrian survey shall be undertaken at a project site to locate any surface cultural materials. A geoarchaeological review (examination of CHRIS and ethnographic data, historical, geological, and soil maps, aerial imagery, geotechnical reports) shall be conducted to assess the potential for the project to encounter unknown archaeological resources during construction. A qualified archaeologist shall identify known archaeological resources and classify the project site as having high, medium, or low sensitivity for unknown archaeological resources. The assessment shall also include recommendations for additional studies and/or mitigation, as necessary, such as monitoring during construction-related ground disturbance. Construction monitoring shall be recommended when archaeological resources are present and/or the assessment identifies a high likelihood of archaeological resources being present. ▪ If the CHRIS search or Phase I archaeological survey identifies resources that may be affected by a project, the archaeological resources assessment shall also include Phase II testing and evaluation. If resources are determined significant (i.e., eligible for the CRHR and/or NRHP) or unique the City shall first consider whether avoidance and preservation in place is feasible. and If resource avoidance and preservation in place is not possible, appropriate site-specific mitigation measures shall be identified in the Phase II evaluation. ▪ For archaeological resources found eligible under CRHR Criterion 4/NRHP Criterion D (data potential) that cannot be avoided and will be impacted by the project, mitigation shall include, but would not be limited to, a Phase III data recovery program. The data recovery program shall make provisions for adequately recovering the scientifically consequential information from and about the resource. For archaeological resources that are found eligible under CRHR Criteria 1/NRHP Criteria A (events), 2/B (persons), and/or 3/C (design/craftsmanship) that cannot be avoided and will be impacted by the project, other appropriate mitigation shall be determined by a qualified archaeologist in consultation with the implementing agency and, if the resource is of indigenous origin, local interested Tribes. Mitigation may include but would not be limited to development of interpretive or educational materials or preservation of all or portions of the archaeological site. ▪ Final disposition of any recovered artifacts or samples, which could include but would not be limited to curation or onsite reburial, shall occur as specified by the qualified archaeologist in consultation with the City and, if the resource is of indigenous origin, local interested Tribes. Artifacts and samples include material recovered from all phases of work, including the Phase I survey, Phase II testing, Phase III data recovery, and construction monitoring.	Significant and Unavoidable

Impact Statement	Mitigation Measure(s)	Residual Impact
Impact CR-3. The discovery of human remains is always a possibility during ground-disturbing activities. Ground disturbance associated with implementation of the proposed project may disturb or damage known or unknown human remains. This impact would be less than significant with adherence to existing regulations.	No mitigation is required.	Less Than Significant
Impact CR-4. Implementation of the proposed project would not impact tribal cultural resources. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Geology and Soils		
Impact GEO-1. MICUP project components and facilities would not be located within an Alquist Priolo Earthquake Fault Zone, and therefore, the proposed project would not be subject to effects involving rupture of a known earthquake fault. There would be no impact.	No mitigation is required.	No Impact
Impact GEO-2. MICUP project components and facilities could expose people or structures to a risk of loss, injury, or death from seismic events and/or could result in risk due to placement on unstable geologic units, including expansive soils. However, Project components would be designed using results of detailed geotechnical engineering studies conducted for the project components and facilities, as required under the California Building Code, which would reduce potential impacts associated with risks associated with seismic and geologic hazards. This impact would be less than significant.	No mitigation is required.	Less Than Significant
Impact GEO-3. MICUP project components and facilities would include ground disturbing activities, such as excavation and grading, that would result in loose or exposed soil. Disturbed soil could be eroded by wind or rain during a storm event, which could result in the loss of topsoil. In addition, during periods of non-recharge, the recharge basins would be subject to wind erosion. Adherence to existing regulatory requirements would reduce impacts for projects over 1 acre. Projects less than 1 acre could result in significant erosion. Impacts would be less than significant with mitigation.	**Mitigation Measure GEO-1: Prepare and Implement an Erosion Control Plan for Project Components Disturbing Less-than-1-Acre During Construction**. The agency implementing the project component shall prepare and implement an Erosion Control Plan to prevent and control pollution by minimizing and controlling erosion and runoff. A copy of the Erosion Control Plan shall be kept with the construction crew and modified as necessary to suit specific site conditions. The Erosion Control Plan shall identify the activities that may cause erosion or sedimentation during storms or strong wind events, and BMPs that will be employed to control erosion during both construction and operation. Techniques that will be identified and implemented to reduce erosion and sedimentation may include but would not be limited to silt fences, staked straw bales/wattles, silt/sediment traps, geofabric, water bars, soil stabilizers, and re-seeding with native species and mulching to revegetate disturbed areas. If suitable vegetation cannot reasonably be expected to become established, non-erodible material will be used for such stabilization.	Less Than Significant with Mitigation
Impact GEO-4. MICUP project components and facilities would not require the use of septic tanks or alternative wastewater disposal systems. There would be no impact.	No mitigation is required.	No Impact
Impact GEO-5. MICUP project components and infrastructure have the potential to impact paleontological resources during ground-disturbing activities. However, with the Preparation and implementation of a paleontological mitigation and monitoring plan, impacts would be reduced to less-than-significant levels. Impacts would be less than significant with mitigation incorporated.	**Mitigation Measure GEO-2: Prepare and Implement a Paleontological Mitigation and Monitoring Plan.** Prior to the start of excavation activities (defined as construction work conducted below surface soils) within high-sensitivity geologic units (i.e., Quaternary alluvium [Qa], Modesto Formation [Qm], Riverbank Formation [Qr], and Turlock Lake Formation [Qt]) and 5 feet or more below the ground surface within unnamed Holocene alluvium (Qha), the lead agency shall retain a qualified paleontologist as defined by the SVP Impact Mitigation Guidelines Revision Committee (SVP 2010:10) to prepare a Paleontological Mitigation and Monitoring Plan (PMMP). This plan shall identify the areas mapped as high paleontological sensitivity, outline the procedures for construction staff Worker Environmental Awareness Program (WEAP) training, paleontological monitoring extent and duration, salvage and preparation of fossils, curation, monitoring and salvage report, and paleontological staff qualifications. The requirements of such a plan are discussed further below. **Worker Environmental Awareness Program** The lead agency shall require paleontological resources awareness training, as part of an overall WEAP, for all construction personnel, conducted by a Qualified Professional Paleontologist (QPP) who meets the SVP Professional Qualifications Standards (SVP 2010:10). The training shall be conducted before personnel begin any stages of project construction requiring ground disturbing activities in areas not previously disturbed by construction. The WEAP training shall include information on the physical appearance of fossils that may be encountered and the procedures for notifying paleontological staff should fossils be discovered by construction personnel. **Paleontological Monitoring** Previously undisturbed areas identified in the PMMP as having high paleontological sensitivity (refer to the units enumerated above) will be monitored on a full-time basis by a Qualified Paleontological Resource Monitor (SVP 2010) during ground-disturbing activity. If no fossils are observed during the first 50 percent of excavations, which would indicate that the likelihood of uncovering significant paleontological resources from a particular excavation site is lower, paleontological monitoring may be reduced to weekly spot-checking, or eliminated entirely, based on the expert opinion of (i.e., at the discretion of) the QPP (SVP 2010:6). **Salvage of Fossils** If fossils are discovered, the lead agency shall require the Qualified Paleontological Resource Monitor to recover, or salvage, them. Typically, fossils can be safely salvaged by a single paleontologist so as not to disrupt construction activity. In some cases, larger fossils (such as complete skeletons or large mammals) require more extensive excavation and longer salvage periods. In the latter case, the Qualified Paleontological Resource Monitor shall have the authority to temporarily re-direct, divert, or halt construction activity in the immediate area to ensure that fossils can be removed in a safe and timely manner.	Less Than Significant with Mitigation

Impact Statement	Mitigation Measure(s)	Residual Impact
	Preparation and Curation of Recovered Fossils Once salvaged, the lead agency shall require the QPP to identify fossils to the lowest possible taxonomic level (e.g., genus and/or species) and to skeletal element, prepare fossils to a curation-ready condition, and curate fossils in a scientific institution with a permanent paleontological collection. All curated fossils shall be accompanied by field notes, photographs, maps, and other relevant data. **Final Monitoring and Salvage Report** Once ground-disturbing activities are complete and fossils have been curated (if applicable), the lead agency shall require the QPP to prepare a final monitoring and salvage report describing the results of the monitoring program. The report shall include discussion of the locations, durations, and methods of the monitoring, stratigraphic sections, any recovered fossils, the scientific significance of those fossils, and where the fossils were curated.	
Greenhouse Gas Emissions & Energy		
Impact GHG-1. Implementation of the proposed project would not generate GHG emissions in a manner that would have a significant impact on the environment. The project would support applicable plans, policies, and regulations intended to reduce emissions of GHGs. This impact would be less than significant.	No mitigation is required.	Less Than Significant
Impact GHG-2. The proposed project would not result in wasteful, inefficient, or unnecessary consumption of energy. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Impact GHG-3. The proposed project would be consistent with applicable energy efficiency goals and regulations, including relevant provisions of CALGreen and California Energy Code Title 24. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Hazards and Hazardous Materials		
Impact HAZ-1. MICUP construction activities could result in the release of potentially hazardous materials, which may occur within 0.25 mile of a school. However, compliance with local, regional, State, and federal regulations related to hazardous materials would minimize the risk of releases and exposure to these materials. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Impact HAZ-2. Construction and operation of project components may result in the disturbance of sites contaminated with hazardous materials. However, compliance with applicable regulations relating to site remediation and implementation of mitigation measures would minimize impacts from construction activities on contaminated sites, resulting in a less than significant impact with mitigation incorporated.	**Mitigation Measure HAZ-1 Prepare Phase I and Phase II ESAs prior to Construction.** For project components located within or near a hazardous materials site, prior to the start of construction activities involving ground disturbance, the applicable Partner Agency, shall retain a qualified environmental professional (EP), as defined by ASTM E-1527 to prepare a project-specific Phase I Environmental Site Assessment (ESA) in accordance with standard ASTM methodologies, to assess the land use history of the project component site. If the Phase I ESA identifies recognized environmental conditions or potential areas of concern, the applicable Partner Agency shall retain a qualified environmental consultant, California Professional Geologist (PG) or California Professional Engineer (PE), to prepare a Phase II ESA for the project site to determine whether the soil or groundwater has been impacted at concentrations exceeding regulatory screening levels. The Phase II ESA shall be completed prior to the issuance of building permit(s) authorizing construction and shall be based on the results of the Phase I ESA. If the Phase II ESA for the project component site indicates that contaminants are present at concentrations exceeding hazardous waste screening thresholds for contaminants in soil and/or groundwater (California Code of Regulations [CCR] Title 22, Section 66261.24 Characteristics of Toxicity), the applicable Partner Agency shall take appropriate steps to protect site workers and the public. This may include the completion of remediation and require regulatory agency oversight. Based on the results of the Phase I and Phase II ESAs, the applicable Partner Agency shall comply all regulatory requirements related to hazardous materials and coordination with oversight agencies, which may include DTSC, SWRCB, or the San Joaquin County Environmental Health Department. The applicable Partner Agency also may be required to enter into voluntary agreements with the applicable oversight agencies and/or prepare and implement a Soil and Groundwater Management Plan, which includes an environmental health and safety plan for contractors.	Less Than Significant with Mitigation
Impact HAZ-3. The MICUP project components would not be located within an airport land use plan nor within two miles of a public or private airstrip and so would not contribute to a safety hazard or result in excessive noise to people residing or working in the Place of Use. There would be no impact.	No mitigation is required.	No Impact
Impact HAZ-4. Project construction could temporarily result in changes to emergency evacuation routes such that the use of an evacuation route would be hindered during construction activities. Implementation of a construction transportation management plan would reduce potentially significant impacts to a less than significant level.	Mitigation Measure TRA-1 would be required.	Less Than Significant with Mitigation
Impact HAZ-5. MICUP would not expose people or structures to significant risk, loss, injury of death involving wildland fires, including downslopes or downstream flooding. The project would also not exacerbate fire risk. Impacts would be less than significant.	No mitigation is required.	Less Than Significant

Impact Statement	Mitigation Measure(s)	Residual Impact
Hydrology and Water Quality – Surface Water		
Impact SW-1. MICUP project components and facilities could degrade surface water quality and conflict with the Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin (Basin Plan) during construction if the mobilization of sediment, contamination, or inadvertent spills or leaks occur. However, implementation of Erosion and water pollution control plans, and additional BMPs for in-water work would reduce impacts. Impacts would be less-than-significant with mitigation. Operation and maintenance activities associated with MICUP project components and facilities Could degrade surface water quality or conflict with the Basin Plan. However, implementation of Flood-MAR initial site assessments and hazardous soil remediation activities, Pre-operational Flood-MAR design strategies, as well as the preparation and implementation of a MICUP Operations Plan would reduce impacts. Operation impacts would be less-than- significant with mitigation.	Mitigation Measures GEO-1 and HAZ-1 would be required in addition to the following mitigation measures. **Mitigation Measure SW-1 Prepare and Implement a Water Pollution Control Plan for Project Components Disturbing Less than 1 Acre During Construction.** For MICUP components disturbing less than one acre, prior to and during construction, the agency implementing the project component shall prepare and implement a Water Pollution Control Plan to prevent and control pollution by minimizing and controlling the runoff of pollutants. A copy of the Water Pollution Control Plan shall be kept with the construction crew and modified as necessary to suit specific site conditions. The Water Pollution Control Plan shall identify the activities that may cause pollution of surface waters, and BMPs that will be employed to control runoff during both construction and operation. **Mitigation Measure SW-2 Obtain Coverage and Comply with Requirements of the NPDES Limited Threat Discharges to Surface Waters Prior to and During Construction.** Prior to and during construction dewatering activities, construction involving dewatering would be subject to CVRWQCB's Waste Discharge Requirement (WDR) R5-2022-0006-03 requirements for managing wastewater produced during dewatering activities or drainage collected during construction. To obtain coverage under this Order, which also serves as the NPDES Permit (refer to Mitigation Measure GEO-1), the lead agency must submit a complete Notice of Intent and provide samples for analysis to determine the quality of the discharge (using tiers) and assign appropriate controls that would apply to the permit. **Mitigation Measure SW-3 Implement Additional Best Management Practices for In-Water Construction.** This mitigation measure is required for construction activities associated with new pumps/pump stations and fish screening along the Mokelumne River and pipelines that would cross the Calaveras River. When applicable, BMPs will be implemented throughout construction for project components within a water feature to protect water quality. BMPs could include but are not limited to the following: ▪ Except for installation of dewatering components, work to be conducted in the river channels will only be done during dry conditions—when surface water is not flowing or has been conveyed around the construction area. ▪ Filter fabric will be installed before temporary rip-rap or other materials are installed in the river channel for dewatering. ▪ An upstream barrier/coffer dam with dewatering components (basins, culverts, pumps, etc.) will be installed to ensure an isolated and dry work area is provided within the river channel throughout construction. ▪ Culverts and pumps will be sized to manage surface flow resulting from direct runoff into the river during the dry season. ▪ No work will occur downstream of the dewatering outlet. ▪ Rock or other material will be temporarily installed at the dewatering outlet to dissipate the velocity of the discharge and prevent erosion/souring of the river channel at the outlet. ▪ The outlet will be inspected and maintained regularly. ▪ Turbidity curtains will be installed above the coffer dam/inlet and below the outlet. The screens will be installed before the coffer dam is set in place and removed after the in-water work is done and the coffer dam removed. The curtains will be adjusted as needed with changes in flow conditions. Discharge back into the wetted portion of the channel will be located upstream of the silt curtain. ▪ Structures used to isolate the in-water work area and/or diverting the water flow (e.g., coffer dam, geotextile silt curtain) will not be removed until disturbed areas are stabilized. **Mitigation Measure SW-4 Flood-MAR Design Parameters to Prevent Surface Water Runoff.** Prior to the use of lands for Flood-MAR, the following design parameters shall be incorporated into Flood-MAR facilities to prevent surface water runoff on and off-site: ▪ Avoid Flood-MAR recharge on lands with slopes greater than 15 percent. ▪ On lands containing slopes greater than 5 percent, berms will be placed at the downslope end of the Flood-MAR area where runoff would be conveyed. ▪ On lands less with slopes less than 5 percent, if berms are not used, then site runoff shall be evaluated to demonstrate that ponding and runoff would not result in localized flooding to adjacent roadways, properties, and surface waters. ▪ The height of the berm shall be determined as appropriate for each site based on the amount of ponded water estimated water elevations onsite, such that the berms provide 1-foot of freeboard. The water levels on berms shall be monitored during Flood-MAR recharge and application of recharge water shall be reduced or stopped to maintain 1-foot of freeboard on the berms. ▪ Berms are not required where it can be demonstrated that ponding and runoff would not be conveyed offsite. Topography, slopes, historic drainage patterns, and property size shall be considered in evaluating runoff and offsite flooding potential. This evaluation shall be approved by the implementing MICUP agency. **Mitigation Measure SW-5 Flood-MAR Initial Site Assessment and Hazardous Soil Remediation Prior to Operation.** Diversion to or recharge of Flood-MAR areas will not occur on known hazardous materials sites as identified by the Department of Toxic Substances Control (DTSC) Cortese List, as well as DTSC EnviroStor and SWRCB Geotracker databases. Prior to recharge via Flood-MAR, the implementing agency will collect representative samples of soils to be analyzed for total petroleum hydrocarbons and pesticides. The implementing agency will avoid if feasible or otherwise remove from the site soils identified as containing hazardous quantities of contaminants and disposal of such soils in accordance with applicable hazardous waste regulations.	Less Than Significant with Mitigation

Impact Statement	Mitigation Measure(s)	Residual Impact
Impact SW-2. MICUP project components and facilities could result in erosion or siltation during construction. However, implementation of Erosion and water pollution control plans, and additional BMPs for in-water work would reduce impacts. Construction Impacts would be less-than-significant with mitigation. Operation of MICUP project components and facilities would not result in increased erosion or siltation, increase the rate of surface runoff, exceed capacities of stormwater drainage systems, or impede or redirect flood flows. Operation impacts would be less than significant.	Mitigation Measures GEO-1, HAZ-1, SW-1, SW-3, SW-4, and SW-5 would be required.	Less Than Significant with Mitigation
Impact SW-3. MICUP project components and facilities could release pollutants due to inundation; however, implementation of Mitigation Measures would reduce impacts to Less-than-significant levels. Construction and Operation Impacts would be less than significant with mitigation.	Mitigation Measures GEO-1, HAZ-1, SW-1, SW-3, SW4, and SW-5 would be required.	Less Than Significant with Mitigation
Hydrology and Water Quality – Groundwater		
Impact GW-1. MICUP project components and facilities could violate water quality standards, water quality objectives identified in the Basin Plan, waste discharge requirements, or degrade groundwater quality during construction if the mobilization of sediment, contamination, or inadvertent spills or leaks occur. However, implementation of Erosion and water pollution control plans, Phase I and II environmental Site Assessment Recommendations, and additional Best Management Practices for in-water work would reduce impacts. Construction Impacts would be less-than-significant with mitigation. Operation of Flood-MAR and ASR Wells in the Project area could violate water quality standards, water quality objectives identified in the Basin Plan, waste discharge requirements or degrade groundwater quality. However, implementation of Flood-MAR design parameters, initial site assessments, and hazardous soil remediation, as well compliance with General Waste Discharge Requirements for ASR wells would reduce impacts. Operational impacts would be less-than-significant with mitigation.	Mitigation Measures GEO-1, HAZ-1, SW-1, SW-2, SW-3, SW-4, and SW-5 would be required in addition to the following mitigation measure.	Less Than Significant with Mitigation
Impact GW-2. MICUP project components and facilities would not decrease groundwater supplies or interfere with groundwater recharge such that the proposed project would impede sustainable groundwater management of the Eastern San Joaquin Subbasin. Impacts would be less than significant.	No mitigation is required.	Less Than Significant
Impact GW-3. Construction and operation of MICUP would directly facilitate implementation of the Eastern San Joaquin Subbasin Groundwater Sustainability Plan (GSP). MICUP is included as a project in the GSP; therefore MICUP would not conflict with or obstruct implementation of the GSP. There would be no impact.	No mitigation is required.	No Impact
Noise		
Impact NOI-1. Construction and operation of MICUP project components would increase noise levels, potentially affecting nearby noise-sensitive land uses. Operational and daytime construction noise impacts would be mitigated; however nighttime well drilling impacts would remain significant and unavoidable.	**Mitigation Measure NOI-1 Prepare Project-Specific Construction Noise Management Plan Prior to Construction and Implement during Construction.** Once the precise locations of project components and construction work areas have been finalized, the implementing agency shall determine whether construction noise will exceed the applicable standards of the local jurisdiction at the nearest sensitive receptor. If construction noise will exceed the noise standards, then the implementing agency shall retain a qualified acoustical expert to prepare a construction noise management plan. The plan shall detail expected durations of construction activities, construction equipment lists, and resulting noise levels at nearby sensitive land uses. Measures to reduce construction noise shall be provided. Construction noise reduction measures may include, but are not limited to, the following: ▪ **Mufflers.** All construction equipment, fixed or mobile, shall be operated with closed engine doors and shall be equipped with properly operating and maintained mufflers consistent with manufacturers' standards. ▪ **Stationary Equipment.** All stationary construction equipment shall be placed so that emitted noise is directed away from the nearest sensitive receptors. ▪ **Equipment Staging Areas**. Equipment staging shall be located in areas that will create the greatest distance feasible between construction-related noise sources and noise-sensitive receptors. ▪ **Smart Back-up Alarms**. Mobile construction equipment shall have smart back-up alarms that automatically adjust the sound level of the alarm in response to ambient noise levels. Alternatively, back-up alarms shall be disabled and replaced with human spotters to ensure safety when mobile construction equipment is moving in the reverse direction in compliance with applicable safety laws and regulations. ▪ **Electrically Powered Tools and Facilities**. Electrical power shall be used to run air compressors and similar power tools and to power any temporary structures, such as construction trailers or caretaker facilities, where feasible.	Significant and Unavoidable

Impact Statement	Mitigation Measure(s)	Residual Impact
	▪ **Noise Disturbance Coordinator.** The Partner Agency of the respective project component shall designate a "noise disturbance coordinator" responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of any noise complaint and shall require that reasonable measures be implemented to correct the problem. A telephone number for the disturbance coordinator shall be posted at the construction site. ▪ **Notification of Nearby Residents**. At least 21 days prior to the start of construction activities, all residents within 500 feet of the project site shall be notified of the planned construction activities. The notification shall include a brief description of the project, the activities that would occur, the hours when construction would occur, and the overall duration of the construction period. The notification shall include the telephone number of the designated noise disturbance coordinator. ▪ **Temporary Noise Barriers**. Erect temporary noise barriers, where feasible, when construction noise is predicted to exceed the acceptable standards (e.g., 80 dBA Leq (8-hour) at noise-sensitive land uses during the daytime or applicable County thresholds during the nighttime) and when the anticipated construction duration is greater than is typical (e.g., two years or longer). Heights of temporary noise barriers shall be determined based on the location and orientation of construction work areas relative to nearby sensitive receptors. Temporary noise barriers shall be constructed with a solid material with a density of at least 1.5 pounds per square foot with no gaps from the ground to the top of the barrier. If a sound blanket is used, barriers shall be constructed with solid material with a density of at least 1 pound per square foot with no gaps from the ground to the top of the barrier and be lined on the construction side with acoustical blanket, curtain or equivalent absorptive material rated sound transmission class (STC) 32 or higher. **Mitigation Measure NOI-2: Conduct Project-Specific Operational Noise Analyses and Reduce Noise to Standards at Proximate Sensitive Receptors Prior to Operation.** Once the layout and locations of the ASR wells have been finalized, the implementing agency shall determine whether operational noise will exceed the applicable standards of the local jurisdiction at the nearest sensitive receptor. If operational noise will exceed the noise standards, then the implementing agency shall be required to implement additional feasible measures to reduce noise generated at nearby sensitive receptors. Such additional measures may include, but are not limited to, selecting quieter equipment, installing equipment in sound-attenuating enclosures, installing acoustical louvers, and/or constructing noise barriers (consisting of a barrier, berm, or combination of the two). The implementing agency shall verify that these additional measures are included on the final site plan prior to issuing construction permits.	
Impact NOI-2. Construction of MICUP components may temporarily generate groundborne vibration, potentially affecting nearby structures located within certain distances. To reduce vibration impacts during construction, preparation of a vibration control plan would be required. This impact would be less than significant with mitigation.	**Mitigation Measure NOI-3: Prepare and Implement a Vibration Control Plan during Construction.** For construction activities involving large earthmoving equipment within 21 feet of a fragile/historic structure or within 15 feet of any residential structure (including non-engineered timber and masonry buildings without plaster) and construction activities involving a roller within 37 feet of a fragile/historic structure or within 26 feet of a residential structure (including non-engineered timber and masonry buildings without plaster), the implementing agency shall prepare a Vibration Control Plan prior to the commencement of construction activities. The Vibration Control Plan shall be prepared by a qualified acoustical consultant or engineer and shall include methods required to minimize vibration during construction, including, but not limited to: ▪ Use of alternative construction equipment for compaction activities (e.g., use of a static/pneumatic roller in lieu of a vibratory roller) within 37 feet of a fragile/historic structure and within 26 feet of a residential structure to reduce vibration impacts to these structures. ▪ Use of alternative construction equipment for earthmoving activities (e.g., use of equipment limited to 100 hp or less) within 21 feet of a fragile/historic structure and within 15 feet of a residential structure to reduce vibration impacts to these structures. ▪ Vibration monitoring prior to and during demolition, earthmoving, and compaction operations occurring within 15 feet of a building. ▪ Use of rubber-tired equipment rather than metal-tracked equipment. ▪ Avoiding the use of vibrating equipment when allowed by best engineering practices. The Vibration Control Plan shall include a pre-construction survey letter establishing baseline conditions at extremely fragile buildings/historical resources and/or residential structures where potential impacts cannot be avoided using alternative equipment and construction techniques. The survey letter shall determine conditions that exist prior to the commencement of construction activities for use in evaluating potential damages caused by construction. Fixtures and finishes susceptible to damage shall be documented photographically and in writing prior to construction. The survey letter shall provide a shoring design to protect such buildings and structures from potential damage. At the conclusion of vibration-causing activities, the qualified acoustical consultant or engineer shall issue a follow-up letter describing damage, if any, to impacted buildings and structures. If historical, the letter shall include recommendations for any repair, as necessary, in conformance with the Secretary of the Interior Standards. Repairs shall be undertaken and completed by the contractor and monitored by a qualified structural engineer in conformance with all applicable codes including the California Historical Building Code (Part 8 of Title 24). The Vibration Control Plan, prepared as outlined above, shall be documented by a qualified acoustical consultant or engineer and shall be provided to the County upon request.	Less Than Significant with Mitigation
Impact NOI-3. Project components facilitated by MICUP would be located outside of the noise contours for all nearby airports and would not expose workers to excessive aircraft-related noise. No impacts related to exposure to airport-related noise would occur.	No mitigation is required.	No Impact

Impact Statement	Mitigation Measure(s)	Residual Impact
Transportation		
Impact TRA-1. Implementation of the proposed project could conflict with a program, plan, ordinance, or policy addressing the circulation system during construction. Operational activities would not conflict with a program, plan, ordinance, or policy addressing the circulation system. This impact would be less than significant with the implementation of mitigation.	**Mitigation Measure TRA-1 Prepare and Implement Construction Transportation Management Plan.** Prior to the start of construction, the Partner Agency implementing the project component that requires off-site staging, lane closures, or substantial hauling of cut and fill on a local street (i.e., not under Caltrans' jurisdiction) shall prepare a Construction Transportation Management Plan (TMP) and shall implement the plan during construction. The plan shall conform to the requirements of the agency with roadway jurisdiction and may include, but not be limited to, the following: ▪ **Construction Traffic Routes and Staging Locations**: The TMP shall identify construction staging site locations and potential road closures, alternate routes for detours, and planned truck routes for construction-related vehicle trips, including but not limited to haul trucks, material delivery trucks, and equipment delivery trucks. The TMP shall also identify alternative safe routes and policies to maintain safety along bicycle and pedestrian routes during construction. Construction vehicle routes shall avoid local residential streets and avoid peak morning and evening commute hours to the maximum extent practicable. Staging locations, alternate detour routes, and construction vehicle routes shall avoid other active construction projects within 0.25 mile of the project construction sites to the maximum extent practicable. ▪ **Coordination with Emergency Services**: The TMP shall include requirements to notify local emergency response providers, including relevant police and sheriff departments, ambulance services, and paramedic services at least one week prior to the start of work within public rights-of-way if lane and/or road closures are required. To the extent practicable, the duration of disruptions/closures to roadways and critical access points for emergency services shall be minimized. ▪ **Coordination with Active Transportation Facilities**: The TMP shall require coordination with owners/operators of any affected active transportation facilities to minimize the duration of disruptions/closures to bike paths, pedestrian trails, and adjacent access points. ▪ **Coordination with Transit Providers**: If the proposed project affects access to existing transit stops, the TMP shall also include temporary, alternative transit stops and directional signage, as determined in coordination with SJRTD, the City of Lodi, and SJRRC. ▪ **Coordination with Caltrans**: If the proposed project requires lane and/or road closures on State highways or State highway ramps, the TMP shall require coordination with Caltrans to ensure the TMP conforms with Caltrans' Transportation Management Plan Guidelines. ▪ **Coordination with Nearby Construction Sites**: The TMP shall identify all active construction projects within 0.25 mile of project construction sites and require coordination with the applicants and/or contractors of these projects during all phases of construction regarding the following: ▫ All temporary lane and/or roadway closures shall be coordinated to limit overlap of roadway closures. ▫ All major deliveries and haul truck trips shall be coordinated to limit the occurrence of simultaneous deliveries and haul truck trips. ▫ Partner Agencies, their contractor(s), or their representative(s) shall meet on a regular basis with the applicant(s), contractor(s) or their representative(s) of active construction projects within 0.25 mile of the project construction sites during construction to address any outstanding issues related to construction vehicles. ▪ **Transportation Control and Safety**: The TMP shall provide for roadway vehicle control measures including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage of vehicular, bicycle, and pedestrian circulation and access by emergency responders. ▪ **Plan Approval**: The TMP shall be submitted to the respective jurisdiction's community development departments for review and approval.	Less Than Significant with Mitigation
Impact TRA-2. The proposed project would meet OPR's Screening Threshold for Small Project and, thus, would not conflict or be inconsistent with *CEQA Guidelines*, Section 15064.3(b). This impact would be less than significant.	No mitigation is required.	Less Than Significant
Impact TRA-3. Construction of the proposed project could create incompatible uses that introduce hazards to roadways. Operational activities would not substantially increase hazards because of a geometric design feature or incompatible uses. This impact would be less than significant with mitigation.	Mitigation Measure TRA-1 would be required.	Less Than Significant with Mitigation
Impact TRA-4. Construction of the proposed project could impact emergency services and response times, and could impede access to emergency evacuation routes. Operational activities would not affect emergency vehicle access. This impact would be less than significant with the implementation of mitigation.	Mitigation Measure TRA-1 would be required.	Less Than Significant with Mitigation

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1 Introduction

San Joaquin County, as the Lead Agency and pursuant to the California Environmental Quality Act (CEQA), has prepared this Environmental Impact Report (EIR) to assess the potential environmental impacts associated with implementation of the Mokelumne River Integrated Conjunctive Use Program (MICUP or proposed project). MICUP refers to the suite of project components to put unappropriated Mokelumne River water to beneficial use on lands in the Eastern San Joaquin Groundwater Subbasin (Subbasin) upon State Water Resources Control Board (SWRCB) approval of Mokelumne River Water & Power Authority (MRWPA) Water Right Application 29835 (A029835). North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), and City of Stockton are the MICUP Partner Agencies. The Partner Agencies and MRWPA are also CEQA Responsible Agencies. The primary purpose of MICUP is to secure a supplemental surface water supply to help achieve groundwater sustainability in the Subbasin.

This chapter provides an overview of the purpose of the EIR; the scope and content of the EIR; the lead, responsible, and trustee agencies, as defined in Section 1.2; and the environmental review process required under CEQA. Further background and details related to MICUP, the County, MRWPA, and Partner Agencies are provided in Chapter 2, *Project Background* and Chapter 3, *Project Description*. A summary of the format, approach and methodology of the analysis included in this EIR is included at the beginning of Chapter 4, *Environmental Impact Analysis*.

1.1 Purpose of the EIR

San Joaquin County, as the Lead Agency, has prepared this Draft EIR in compliance with CEQA of 1970 (as amended), codified at *California Public Resources Code* Sections 21000 et. seq., and the State *CEQA Guidelines* codified at Title 14, Division 6, Chapter 3 of the *California Code of Regulations*. The purpose of the Draft EIR is to provide the public and pertinent agencies with information about the potential effects on the local and regional environment associated with construction and operation of the proposed project. This Draft EIR describes the environmental impacts of the proposed project and suggests mitigation measures where necessary to avoid or reduce any significant impacts. The impact analyses are based on a variety of sources, including publicly available documents, public agency consultation, and technical studies.

In addition, this Draft EIR has been prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA).

This EIR is intended to serve as an informational document for the public and San Joaquin County decision makers. San Joaquin County Board of Supervisors, as the decision-making body for the Lead Agency independently shall consider and certify this EIR prior to approving the proposed project. The Lead Agency shall certify that this EIR has been completed in compliance with CEQA and that the EIR reflects its independent judgment and analysis (*CEQA Guidelines* Section15090(a)). The decision-making bodies for the Partner Agencies, as Responsible Agencies, shall separately consider the Lead Agency's EIR prior to approving the project, and shall certify that it reviewed and considered the information contained in this EIR (*CEQA Guidelines* §15050(b)).

1.2 Lead, Responsible, and Trustee Agencies

The CEQA Guidelines define lead, responsible and trustee agencies. San Joaquin County is the lead agency for MICUP because it holds principal responsibility for approving the proposed project.

A responsible agency refers to a public agency other than the lead agency that has discretionary approval over a project or plan. The State Water Resources Control Board (SWRCB) and the MRWPA are responsible agencies under CEQA for the proposed project. In addition, the Partner Agencies (NSJWCD, SEWD, and City of Stockton) are also responsible agencies with discretionary approval over their respective MICUP components.

A trustee agency refers to a State agency having jurisdiction by law over natural resources affected by a project or plan. The SWRCB and California Department of Fish and Wildlife (CDFW) are trustee agencies for the proposed project.

1.3 CEQA Environmental Review Process

1.3.1 CEQA Process Overview

The basic purposes of CEQA are to (1) inform decision makers and the public about the potential, significant adverse environmental effects of proposed governmental decisions and activities, (2) identify the ways those environmental effects can be avoided or significantly reduced, (3) prevent significant, avoidable and adverse environmental effects by requiring changes in projects through the use of alternatives or mitigation measures when feasible, and (4) disclose to the public the reasons why an implementing agency may approve a project even if significant unavoidable environmental effects are involved.

An EIR uses a multidisciplinary approach, applying social and natural sciences to make a qualitative and quantitative analysis of all the foreseeable environmental impacts that a proposed project would exert on the surrounding area. As stated in *CEQA Guidelines* Section 15151:

> An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible.

This Draft EIR has been prepared to comply with CEQA and the *CEQA Guidelines* and is to be used by local regulators and the public in their review of the potential significant adverse environmental impacts of the proposed project and alternatives, and mitigation measures that would minimize or avoid those potential environmental effects. San Joaquin County will consider the information presented in this Draft EIR, along with other factors, prior to considering and making any final decisions regarding the proposed project.

Federal Crosscutting and CEQA-Plus

As noted above, this Draft EIR has been prepared with guidance from the CEQA-Plus requirements of the U.S. Environmental Protection Agency (USEPA) to support the requirements of potential federal funding partners to comply with NEPA. The CEQA-Plus requirements are intended to supplement CEQA and the *CEQA Guidelines* for environmental documents. They are not intended to supersede or replace *CEQA Guidelines*.

This Draft EIR demonstrates compliance with federal laws and crosscutter regulations, including but not limited to the Federal Endangered Species Act (FESA), Section 106 of the National Historic Preservation Act, and Clean Air Act. Chapter 7 of this Draft EIR addresses key federal laws and regulations, including an analysis of Environmental Justice.

1.3.2 Notice of Preparation and Public Scoping

Pursuant to *CEQA Guidelines* Section 15082, the lead agency is required to send a Notice of Preparation (NOP) stating that an EIR will be prepared to the State Office of Planning and Research (OPR), Responsible and Trustee agencies, and federal agencies involved in funding or approving the project. The NOP must provide sufficient information in order for responsible agencies to make a meaningful response. At a minimum, the NOP must include a description of the project, location of the project, and probable environmental effects of the project (*CEQA Guidelines* Section 15082(a)(1)). Within 30 days after receiving the NOP, Responsible and Trustee agencies and OPR shall provide the lead agency with specific detail about the scope and content of the environmental information related to that agency's area of statutory responsibility that should be included in this Draft EIR (*CEQA Guidelines* Section 15082(b)).

For MICUP, San Joaquin County distributed a Notice of Preparation (NOP) of the EIR for a 30-day agency and public review period starting on July 2, 2024 and ending on July 31, 2024. The NOP was mailed on July 2, 2024 to Responsible and Trustee agencies, including local, state, and federal agencies; local tribes; and interested parties including groups or individuals who had previously expressed interest in MICUP. The NOP was also posted by the County Clerk in San Joaquin County and published in a local newspaper of general circulation, the *Stockton Record*. A Notice of Completion (NOC) was prepared by San Joaquin County and posted on the State Clearinghouse website with the NOP. The proposed project was given a State Clearinghouse number of SCH#2024070107, and the project information was posted in the CEQAnet Database. The NOP was made available for public review online on the San Joaquin County Public Works website at the following link: https://www.sjgov.org/department/pwk/home/news-and-updates.

In addition, the County held an in-person EIR Scoping Meeting on July 16, 2024 at the City of Stockton Delta Water Treatment Plant. The meeting was aimed at providing information about the proposed program to members of public agencies, interested stakeholders, and community members, and at receiving input on the scope of the environmental review.

During the scoping period, San Joaquin County received a total of eight comment letters on the proposed project via e-mail. The organizations and agencies that submitted comments include but are not limited to: Native American Heritage Commission, State Water Resources Contral Board, California Department of Fish and Wildlife, and California Sportfishing Protection Alliance/Center for Biological Diversity. CEQA does not require the County to formally respond to these comments, but rather to consider these comments during preparation of the EIR. The comment letters are included in Appendix A.

Areas of Known Controversy

Pursuant to *CEQA Guidelines* Section 15123(b)(2), a lead agency is required to include areas of controversies raised by agencies and the public during the public scoping process for this Draft EIR. Areas of controversy have been identified for the proposed project, based on comments made during the 30-day public review period in response to information published in the NOP. Eight comment letters were received during the NOP scoping period. Those comments are included in Appendix A. Commenting parties have requested the EIR evaluate impacts related to project

alternatives, biological resources, hydrology, groundwater, water quality and water supply. The greatest areas of known controversy from an environmental perspective are potential impacts to fisheries in the Mokelumne River due to diversions of unappropriated flows associated with Water Right Application A029835, and adverse effects to water supply for existing senior water rights holders on the Mokelumne River.

1.3.3 Draft EIR

This Draft EIR has been prepared pursuant to the requirements of *CEQA Guidelines* Section 15126 and provides an analysis of reasonably foreseeable impacts associated with the construction, operation, and maintenance of the proposed project. The environmental baseline for determining potential impacts is the date of publication of the NOP for the proposed project unless otherwise indicated (*CEQA Guidelines* Section 15125(a)). The baseline setting for each environmental topic assessed in this Draft EIR describes the existing conditions as of the publication of the NOP. The impact analysis is based on changes to existing conditions that would result due to implementation of the proposed project.

In accordance with the *CEQA Guidelines* Section 15126, Chapter 4 of this Draft EIR describes the proposed project area and the existing baseline environmental setting, identifies potential short-term, long-term, and cumulative adverse environmental impacts associated with project implementation, and identifies mitigation measures for potentially significant adverse impacts. Significance criteria are defined at the beginning of each impact analysis section for each environmental topic analyzed in this Draft EIR. In addition, Chapter 5.0 of this Draft EIR analyzes potential growth-inducing impacts, and Chapter 6.0 of this Draft EIR provides an analysis of alternatives to the project. In accordance with Section 15126.6 of the *CEQA Guidelines,* this Draft EIR focuses on alternatives that can eliminate or reduce significant adverse effects associated with the project while feasibly attaining most of the basic project objectives. In addition, the alternatives chapter identifies the "environmentally superior" alternative among the alternatives assessed. The alternatives evaluated include the CEQA-required "No Project" alternative and two alternative development scenarios for the Place of Use.

Scope and Adequacy

This Draft EIR addresses impacts related to all topics listed in 2024 *CEQA Guidelines* Appendix G.

In preparing this EIR, use was made of pertinent County policies and guidelines, certified EIRs and adopted CEQA documents, and other background documents. References are included as footnote citation references where relevant throughout this EIR document.

The level of detail contained throughout this EIR is consistent with the requirements of CEQA and applicable court decisions. Section 15151 of the *CEQA Guidelines* provides the standard of adequacy on which this document is based. The Guidelines state:

> An EIR should be prepared with a sufficient degree of analysis to provide decision-makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of the proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection, but for adequacy, completeness, and a good faith effort at full disclosure.

Draft EIR Public Review

In accordance with Section 15105 of the *CEQA Guidelines*, this Draft EIR has been submitted to the OPR State Clearinghouse for review by State agencies. In addition, this Draft EIR has been circulated to federal, State, and local agencies and interested parties who may wish to review and provide comments on its contents. A minimum 45-day public review period is required for a Draft EIR submitted to the OPR State Clearinghouse. The Draft EIR is available for public review from **May 18, 2026 to July** 10**, 2026**. Please submit all comments to:

Ashley Couch, PE, CFM
Water Resources Manager
San Joaquin County
1810 East Hazelton Ave./PO Box 1810
Stockton, CA 95201
acouch@sjgov.org

During the 45-day public review period, the County will hold one public meeting to receive public comments on the environmental analysis in the Draft EIR. The meeting will include a brief presentation providing an overview of the proposed project and findings of the Draft EIR. After the presentation, verbal comments will be accepted. Written comments also may be submitted anytime during the 45-day review period. The public meeting will be held as follows:

Time: May 26, 2026, at 5:30 PM
Location: Lodi Grape Festival Grounds – Burgundy Hall
413 E. Lockeford St, Lodi, CA 95240

1.3.4 Final EIR Publication and Certification

Once this Draft EIR public review period has ended, the County will prepare written responses to all comments. The Final EIR will be comprised of this Draft EIR, responses to comments received on this Draft EIR, and any changes or corrections to this Draft EIR that are made as part of the responses to comments. The County will make the Final EIR available for public review prior to considering any final decision regarding approval of the proposed project (*CEQA Guidelines* Section 15089(b)). The Final EIR must be available to commenting agencies at least 10 days prior to certification (*CEQA Guidelines* Section 15088(b)).

Prior to considering the proposed project for approval, the County will review and consider the information presented in the Final EIR and will certify that the Final EIR has been adequately prepared in accordance with CEQA. Once the Final EIR is certified, the County Board of Supervisors may proceed to consider any final decisions regarding the proposed project (*CEQA Guidelines* Sections 15090, 15096(f)). Prior to approving the proposed project, the County must make written Findings in accordance with Section 15091 of the *CEQA Guidelines*. In addition, the County must adopt a Statement of Overriding Considerations (SOC) concerning each significant environmental effect identified in the Final EIR (if any) that cannot be fully mitigated to a less than significant level. If one is needed, then the SOC will be included in the record of the proposed project's approval and mentioned in the Notice of Determination (NOD) following *CEQA Guidelines* Section 15093(c). Pursuant to *CEQA Guidelines* Section 15094, the County will file an NOD with the State Clearinghouse and County Clerk within five working days, if the proposed project is approved.

1.3.5 Mitigation Monitoring and Reporting Program

The *CEQA Guidelines* require the lead agency to "adopt a program for monitoring or reporting on the revisions which it has required in the project and the measures it has imposed to mitigate or avoid significant environmental effects" (*CEQA Guidelines* Section 15097(a)). The mitigation measures, if any, adopted as part of the Final EIR will be included in a Mitigation Monitoring and Reporting Program (MMRP) and implemented by the County and Partner Agencies.

1.4 Organization of this EIR

The chapters of this Draft EIR are as follows:

- **Executive Summary.** This chapter summarizes the contents of this Draft EIR. This includes a summary of: the proposed project, project purpose, and objectives; the CEQA environmental review process; the environmental impacts of the proposed project, recommended mitigation measures, and level of significance after mitigation; the alternatives to the proposed project; areas of controversy and issues of concern; and the organization of the Draft EIR.
- **Chapter 1 Introduction.** This chapter introduces the purpose of the EIR; identifies the lead agency as well as responsible and trustee agencies; provides an overview of the CEQA environmental review process for this EIR; and explains the organization of this EIR document.
- **Chapter 2 Project Background.** This chapter includes pertinent background information and context for the purpose and need for the proposed project.
- **Chapter 3 Project Description.** This chapter provides an overview of the proposed project, describes the project purpose and objectives, provides a detailed discussion of the characteristics of the proposed project as required by CEQA Guidelines Section 15124, and defines the potential discretionary actions and approvals for implementation of the proposed project.
- **Chapter 4 Environmental Setting, Impacts and Mitigation Measures.** This chapter describes the environmental setting and identifies the direct, indirect, and cumulative impacts of the proposed project for each of the following environmental topics: Aesthetics; Agriculture and Land Use; Air Quality; Biological Resources; Cultural Resources and Tribal Cultural Resources; Geology and Soils; Greenhouse Gas Emissions and Energy; Hazards, Hazardous Materials and Wildfire; Hydrology and Water Quality for Surface Water and Groundwater; Noise; and Transportation. Measures to mitigate the impacts of the proposed project are presented for each resource area where significant potential impacts have been identified. This chapter also evaluates the effects found not to be significant for the following environmental topics: Forestry Resources, Population and Housing, Public Services, Mineral Resources, Recreation and Utilities and Service Systems.
- **Chapter 5, Other CEQA Sections.** This chapter describes the potential for the proposed project to induce growth (*CEQA Guidelines* Section 15126.2(e)) and also includes irreversible environmental effects (*CEQA Guidelines* Section 15126(c)).
- **Chapter 6, Alternatives Analysis.** This chapter presents an overview of the process used to identify and develop the potential alternatives to the proposed project, an analysis of the alternatives to the proposed project that were identified for evaluation in this Draft EIR, describes the potential impacts of feasible alternatives relative to the significant impacts of the proposed project; and discusses environmental superior alternatives to the proposed project.

- **Chapter 7, Federal Crosscutting.** This chapter summarizes the proposed project's compliance with CEQA-Plus guidance of the U.S. Environmental Protection Agency, to support future federal funding partners to comply with NEPA.
- **Chapter 8, Report Preparers.** This chapter identifies the parties involved in preparing this Draft EIR, including persons and organizations consulted.
- **Appendices.** The appendices include supporting materials related to the NOP scoping process, as well as technical data or analyses for: air quality emissions modeling, greenhouse gas emissions and energy use, agricultural land conversion, hazardous materials, hydrology and groundwater modeling, noise modeling, and tribal cultural resources.

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2 Project Background

In 1980, the California Department of Water Resources (DWR) determined that the Eastern San Joaquin Groundwater Subbasin (Subbasin) was in a state of critical overdraft. The Subbasin continues to be in an overdraft condition due to the over reliance on groundwater supply to meet demand. To address this overdependence on groundwater, local agencies in San Joaquin County have long sought to appropriate water from the Mokelumne River to meet current and future demand and reduce overdraft. The Mokelumne River Integrated Conjunctive Use Program (MICUP or proposed project) is a regionally coordinated effort to put unappropriated Mokelumne River water to beneficial use in the Subbasin through approval of Mokelumne River Water & Power Authority (MRWPA) Water Right Application 29835 (A029835) and implementation of related projects by the following Partner Agencies: North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), and City of Stockton. A map of the Eastern San Joaquin Groundwater Subbasin and the Partner Agencies is shown in Figure 2-3. This chapter provides context for MICUP, including background about existing Mokelumne River water rights and the history of A029835. A detailed description of MICUP is included in Chapter 3, *Project Description*.

2.1 Existing Mokelumne River Water Rights

Mokelumne River Watershed Overview

The Mokelumne River Watershed is divided into the upper Mokelumne River Watershed, which stretches from the headwaters to the Mokelumne River gage above Pardee Reservoir, and the lower Mokelumne River Watershed, which includes Pardee and Camanche Reservoirs in the Sierra foothills and the portion of the river below Camanche Dam that flows westward to the eastern edge of the Sacramento-San Joaquin River Delta. Above the Mokelumne River gage, the upper watershed drains about 600 square miles of mountains and foothills. The lower watershed, downstream of Camanche Dam, is flatter and extends through agricultural areas. It is approximately 80 square miles in size and drains to the confluence of the Mokelumne and Consumnes rivers.

The Mokelumne River Watershed runoff is modified by various diversions and regulated by reservoir storage operations, including a network of facilities operated by Pacific Gas & Electric (PG&E) in the upper watershed and East Bay Municipal Utility District (EBMUD). EBMUD diverts Mokelumne stream flow at Pardee and Camanche reservoirs. A portion of the water diverted at Pardee Reservoir is then conveyed to the EBMUD service area via the Mokelumne Aqueduct. EBMUD also regulates or stores water in Pardee and Camanche that is released to meet downstream water right and other flow obligations.[1]

EBMUD's Mokelumne River flow commitments are determined by hydrology, water rights priorities, agreements with state and federal regulatory agencies, State Water Resources Control Board (SWRCB) orders and decisions, federal directives, court decrees, and numerous agreements between EBMUD and other Mokelumne River users, both upstream and downstream of EBMUD's Mokelumne River facilities.

[1]San Joaquin County Resource Conservation District, Lower Mokelumne River Watershed Stewardship Planning Committee. 2002. Lower Mokelumne River Watershed Stewardship Plan. Available: http://sjcrcd.com/articles/MokP.pdf. Accessed January 21, 2025.

Upper Watershed and PG&E System

PG&E's system on the upper Mokelumne River consists of seven reservoirs having a combined capacity of about 220 thousand acre-feet (TAF), tunnels, stream diversions, canals, regulating reservoirs, and four powerhouses with a total capacity of about 194 megawatts. Water purveyors within Amador and Calaveras counties upstream of Pardee Reservoir hold prior rights to water, as follows:

- Prior rights in Amador County total 20,000 acre-feet for Amador Water Agency for the Amador Water System and Central Amador Water Project, and Jackson Valley Irrigation District.
- Prior rights in Calaveras County total 27,000 acre-feet for Calaveras Public Utility District and Calaveras County Water District.

As proposed, MICUP would not change or affect the systems or diversions upstream of the Mokelumne River gage above Pardee Reservoir and would not affect water rights or hydropower generation.

East Bay Municipal Utilities District System

EBMUD serves approximately 1.4 million customers in a 332-square-mile area that includes major cities like Oakland and Berkeley. The district's infrastructure includes six water treatment plants and numerous reservoirs, aqueducts, and distribution facilities. The Mokelumne Aqueduct is a critical component of this system, ensuring a reliable supply of high-quality water to the East Bay.

EBMUD holds water rights for up to 325 million gallons per day from the Mokelumne River watershed. This water is primarily sourced from the Pardee Reservoir. EBMUD also has a water supply contract from the US Bureau of Reclamation to divert Central Valley Project water from the Sacramento River, which is used during dry years. Mokelumne River water is transported through a network of aqueducts, including the Mokelumne Aqueduct, which consists of three steel pipelines that carry untreated water from the Sierra Nevada and Sacramento River to the East Bay.

EBMUD operates its facilities on the Mokelumne River, including Pardee and Camanche Reservoirs (approximately 204 TAF and 417 TAF gross storage, respectively), as an integrated system to deliver municipal water supply benefits of up to 325 MGD from Pardee and Camanche Reservoirs to the EBMUD service area, while meeting all other operating goals, objectives, and requirements such as fish and wildlife preservation and enhancement, and recreation in the reservoirs. Additional operating goals, objectives, and requirements include bypassing/releasing water from Pardee and/or Camanche Reservoirs for downstream senior water rights users, meeting downstream fishery flow requirements, regulating streamflow, using best efforts to manage water temperatures to protect fishery/public trust interests, and meeting U.S. Army Corps of Engineers flood control requirements per the Flood Control Manual for the Mokelumne River Basin. Consistent with all other operating objectives and obligations, releases from the two reservoirs also are planned to provide hydropower benefits.

To accomplish this tandem operation, EBMUD operates Pardee and Camanche Reservoirs to fill by the end of spring, hydrology permitting, and strives to hold Pardee Reservoir elevation high throughout the summer while drawing down Camanche Reservoir. Operating in this manner improves reliability, allows EBMUD to deliver water through the Mokelumne Aqueducts under gravity flow (thereby minimizing energy consumption), and preserves a cold-water pool in Pardee Reservoir for release to Camanche Reservoir during late summer/early fall to benefit the lower Mokelumne River anadromous fishery.

EBMUD Water Rights

EBMUD holds water right License 11109 (A004228), which allows for diversion of water from the Mokelumne River at Pardee Dam, as follows:

- Direct diversion of 310 cfs from January 1 to December 31 of each year;
- Diversion of 209,950 AF to storage from October 1 of each year to July 15 of the succeeding year;
- The total amount of water to be taken from the source (direct diversion plus collection to storage) shall not exceed 316,250 AFY. The total amount of water to be placed to beneficial use (direct diversion plus withdrawal from storage) shall not exceed 224,037 AFY;
- Water may be used for municipal use within the boundaries of EBMUD and for recreation at Pardee Reservoir.

EBMUD also holds water right Permit 10478 (A013156), which allows for diversion of water from the Mokelumne River at Pardee Reservoir and Camanche Reservoir, including the terms described below. SWRCB Order WR 2016-0019-EXEC granted an extension of time for Permit 10478 to allow complete application of the water to the authorized use to December 31, 2040.

- Direct diversion of 194 cfs and collection to storage of 353,000 AF from December 1 of each year to July 1 of the succeeding year;
- The total amount of water to be placed to beneficial use (direct diversion plus withdrawal from storage) shall not exceed 140,000 AFY;
- The allowed purposes of use are municipal and industrial within EBMUD's service area and other nearby lands as specified, recreation at the reservoirs, and fish and wildlife enhancement at the reservoirs and Mokelumne River Fish Hatchery:
- A term referring to a 1965 Agreement and 1983, 2003, and 2009 Supplementary Agreements with Woodbridge Irrigation District (WID), which provide the basis for the WID Permanent Regulated Base Supply (PRBS) discussed below.
- Terms requiring releases from Camanche Dam for instream resources per State Water Board Decision 1641 and a 1998 Joint Settlement Agreement (JSA) among EBMUD, California Department of Fish & Game (now Wildlife), and U.S. Fish & Wildlife Service (see below);
- Terms regarding adaptive management, cold water temperature management, and additional flows below WID Dam, for the protection of fish.

Channel Losses

Channel losses to the groundwater basin occur in the Lower Mokelumne River. EBMUD, under water rights agreements with other water users on the river, is obligated to release sufficient water to ensure that entitlements are delivered to the senior water right users at their points of diversion. Channel losses deplete the amount of water in the river, thus requiring EBMUD to increase the releases from Camanche Dam to compensate for the losses.

1998 Joint Settlement Agreement and Water Rights Decision 1641

The 1998 Joint Settlement Agreement was a collaborative effort between the East Bay Municipal Utility District (EBMUD), the California Department of Fish and Game (now California Department of Fish and Wildlife – CDFW), and the U.S. Fish and Wildlife Service (USFWS). This agreement aimed to

protect and enhance the anadromous fishery resources of the lower Mokelumne River.[2] Key components included:

- **Flow Measures:** Specified minimum flow releases from Camanche Dam and expected flows below the Woodbridge Irrigation District Dam, based on water year types.
- **Non-Flow Measures:** Included habitat restoration and fishery management practices to support the fish populations.
- **Monitoring and Adaptive Management:** A comprehensive program to monitor and adaptively manage reservoir operations based on changing river conditions.
- **Water Quality and Resource Management Program (WQRMP):** Defined reasonable goals, measures, performance criteria (such as water temperature) and responsive actions.

Water Rights Decision 1641 (D-1641), adopted by the SWRCB in 1999, addressed implementation of water quality objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary.[3] It included:

- **Water Quality Objectives:** Established to protect the beneficial uses of water in the Delta, including municipal, industrial, and agricultural uses.
- **Changes in Points of Diversion:** Allowed changes in the points of diversion for the Central Valley Project and the State Water Project in the Southern Delta.
- **Conditions for Water Rights:** Imposed conditions on water rights to ensure compliance with the water quality objectives and to protect fish and wildlife.

These agreements and decisions were significant steps towards sustainable water management and environmental protection in the region. In D-1641,[4] the SWRCB amended EBMUD's Mokelumne River water rights to require it to provide specified JSA flow requirements at Camanche Dam and made corresponding changes to the water rights of WID to ensure a specified portion of the Camanche Dam releases passed below Woodbridge Dam. D-1641 adopted the JSA flows as the Mokelumne River's contribution to meet the Bay-Delta flow dependent objectives and found that "it would not be in the public interest to require more water from the Mokelumne River system than will be provided under the JSA."[5] Figure 2-1 summarizes annual JSA fish flow release requirements based on Attachment 1 to the JSA.

[2] Lower Mokelumne River Project Joint Settlement Agreement Ten-Year Review, 2008. Partnership Steering Committee: EBMUD, CDFG, USFWS: https://www.ebmud.com/download_file/force/1895/568?JSA_Partnership_10-year_review_final_9-10-08_1.pdf, Accessed February 26, 2025.
[3] State Water Resources Control Board, Revised Water Right Decision 1641, March 15, 2000. Revised in accordance with Order WR-2000-02:https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1600_d1649/wrd1641_1999dec29.pdf, Accessed February 26, 2025.
[4] State Water Resources Control Board. 1999. Water Rights Decision 1641. December 29, 1999. https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/decisions/d1600_d1649/wrd1641.pdf. Accessed January 20, 2025.
[5] *Ibid*.

Figure 2-1 JSA Fish Release Requirements in cubic feet per second (cfs)

Year Type	Requirements	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (TAF)
Normal & Above	Minimum Camanche Release	325	325	325	325	325	325	325	325	325	100	100	100	194
Below Normal		250	250	250	250	250	250	250	250	250	100	100	100	154
Dry		220	220	220	220	220	220	220	220	100	100	100	100	130
Critically Dry		115	130	130	130	130	130	130	100	100	100	100	100	80
Normal & Above	Expected Flow below Woodbridge Diversion Dam	100	100	100	100	100	100	150	300	300	25	25	25	86
Below Normal		100	100	100	100	100	100	150	200	200	20	20	20	73
Dry		80	80	80	80	80	80	150	150	20	20	20	20	52
Critically Dry		45	75	75	75	75	75	75	15	15	15	15	15	34

Healthy Rivers and Landscapes (Voluntary Agreements)

The Agreements to Support Healthy Rivers and Landscapes in California, also previously known as the "Voluntary Agreements," are a collaborative effort involving state, federal, and local agencies. The Agreements' primary purpose is to provide a substitute flow regime proposed by the Draft Sacramento/Delta Updates to Bay-Delta Plan; it will increase river flows, restore ecosystems, and strengthen water supply reliability across the state, in particular in the Sacramento and San Joaquin Rivers, their tributaries, and the Bay-Delta.[6] This approach aims to create a more resilient future for California's water systems, balancing environmental protection with economic needs. The goals and objectives of the Agreements to Support Healthy Rivers and Landscapes in California (HRL) include:

1. **Increase River Flows:** Dedicate a significant amount of water to the environment, with flexible management based on real-time conditions to benefit native fish populations and habitats.
2. **Restore Ecosystems:** Restore tens of thousands of acres of aquatic habitat for fish and other wildlife.
3. **Strengthen Water Supply Reliability:** Adapt water management operations to ensure a reliable water supply while meeting environmental needs.
4. **Collaborative Decision Making:** Use scientific monitoring and collaborative decision-making to adapt operations and manage flows for maximum benefits.

San Joaquin County coordinated with EBMUD in the preparation of the water availability for A029835 to account for the Mokelumne River flow measures being considered in the Draft Strategic Plan for the Proposed Agreements to Support Healthy Rivers and Landscapes (Draft HRL Plan) as an implementation pathway for an updated Bay-Delta Plan. The Mokelumne River HRL flow assets are a volume of minimum Mokelumne River flows to be released by EBMUD from Camanche Dam above the volume of water that EBMUD is currently required to release from Camanche Dam. Existing release requirements include releases (1) needed to satisfy demands of senior downstream water users and (2) required to meet instream flow requirements imposed by the JSA. The SWRCB incorporated the minimum release requirements and other flow measures of the JSA into D-1641 and thereby also into EBMUD's applicable water rights.

In addition to existing release requirements, under the proposed HRL, EBMUD would operate to provide releases from Camanche Dam, above existing minimum release flow requirements, of 10

[6] Agreements to Support Healthy Rivers and Landscapes, https://resources.ca.gov/Initiatives/Voluntary-Agreements-Page, Accessed April 24, 2026.

TAF, 20 TAF, and 45 TAF in Dry, Below Normal, and Normal and Above modified JSA year-types, respectively.[7] Figure 2-2 summarizes EBMUD's monthly distribution of HRL flows.

Figure 2-2 EBMUD's Monthly Distribution of HRL flows

		Mokelmne VA Proposal Monthly Flow Addition [cfs]			Mokelmne VA Proposal Monthly Volume Addition [AF]		
		Normal and Above	Below Normal	Dry	Normal and Above	Below Normal	Dry
31	Jan	0.0	0.0	0.0	0	0	0
28	Feb	0.0	0.0	0.0	0	0	0
31	Mar	54.9	54.6	24.4	3378	3359	1500
30	Apr	327.2	108.5	56.7	19469	6454	3375
31	May	266.0	81.4	42.7	16357	5005	2625
30	Jun	0.0	0.0	0.0	0	0	0
31	Jul	0.0	0.0	0.0	0	0	0
31	Aug	0.0	0.0	0.0	0	0	0
30	Sep	0.0	0.0	0.0	0	0	0
31	Oct	94.3	84.3	40.7	5796	5183	2500
30	Nov	0.0	0.0	0.0	0	0	0
31	Dec	0.0	0.0	0.0	0	0	0

Lower Watershed Water Rights

Water right diversions made downstream of Camanche Dam include the following diverters: NSJWCD, WID, City of Lodi pursuant to the Lodi Decree, and other senior water right appropriators and riparian claimants.

North San Joaquin Water Conservation District (NSJWCD) Water Rights

NSJWCD holds water right Permit 10477 (A012842), amended March 30, 2015, with a priority date of 1949. Permit 10447 allows NSJWCD to directly divert, or divert to underground storage or storage at Camanche Dam, from December 1 through July 1 at a rate of up to 80 cfs, with total annual diversions not to exceed 20,000 AF. For water that is diverted to storage in Camanche, NSJWCD has an agreement with EBMUD and is allowed to call upon that water from storage until November 5th of the same year. NSJWCD directly diverts or rediverts from storage at several points of diversion on the River downstream of Camanche Dam.

NSJWCD may use the water diverted under Permit 10447 for irrigation, domestic, municipal, industrial, water quality, and fish and wildlife preservation and enhancement within NSJWCD's service area, and for recreational uses in Camanche Reservoir. NSJWCD's jurisdictional area is

[7] California Water Boards, DRAFT STRATEGIC PLAN FOR THE PROPOSED AGREEMENTS TO SUPPORT HEALTHY RIVERS AND LANDSCAPES, Appendix G1 Voluntary Agreement Proposal, September 2023. Accessed April 2026: https://www.waterboards.ca.gov/bay_delta/docs/2023/staff-report/app-g1.pdf

approximately 150,000 acres, including about 79,000 acres of irrigated agriculture and a portion of the City of Lodi.

Woodbridge Irrigation District (WID) Water Rights

WID holds both pre- and post-1914 appropriative rights to divert from the Mokelumne River at the WID dam in Woodbridge. In 1928, WID acquired the surface water rights that had been held by its predecessor – a private enterprise – since the mid-1880s. WID later acquired Licenses 5945 and 8214.

WID provides water service within its geographic boundaries, an area of approximately 63 square miles that constitutes approximately 4 percent of the area of San Joaquin County. The WID service area includes the unincorporated communities of Woodbridge and Thornton and small portions of the incorporated municipalities of Lodi and Stockton. WID provides untreated surface water to agricultural users and the Cities of Lodi and Stockton.

WID diverts its water primarily from the Mokelumne River at the Woodbridge Diversion Dam under pre-1914 and post-1914 appropriative rights as follows:

- WID's Licenses 5945 and 8214 (A005807 and A010240) collectively allow for the direct diversion of up to 414.4 cfs. The season of diversion for A005807 (300 cfs) is February 1 to October 31. The season of diversion for A010240 (114.4 cfs) is May 1 to August 31 and November 1 to January 31. The places of use are within the boundaries of WID.
- WID also claims a pre-1914 right of up to 420 cfs under Statement of Water Diversion and Use 15557 (S015557).
- WID and EBMUD entered into agreements in 1965, 1983, 2003, and 2009 to quantify EBMUD's obligation to make releases from Camanche Dam to WID. These Agreements define WID's "Permanent Regulated Base Supply" (PRBS) as 60,000 acre-feet to be released from March 1 to October 31 of each year, with provision for reduction in dry years to no more than 39,000 acre-feet based on inflow to Pardee Reservoir. WID's actual demand may exceed 60 TAF. When water in excess of the PRBS is available in the Mokelumne River for diversion, WID may and has diverted quantities in excess of the PRBS pursuant to its licenses and pre-1914 claim of right.

City of Lodi Water Supply

The City of Lodi, with a population of 68,642 in 2024, draws its water supply from the regional groundwater basin and surface water supplies from the Mokelumne River purchased from WID. The City of Lodi's well field is replenished, in part, by seepage from the Mokelumne River. Under the "Lodi Decrees," EBMUD is required to ensure that up to 3,600 acre-feet per year is available to certain of the City of Lodi's groundwater wells, as specified in the Lodi Decrees. This may require EBMUD to make additional releases if certain groundwater and pumping conditions cannot be met. Historically, the City of Lodi has not made a call on EBMUD to make these additional releases pursuant to the Lodi Decrees.

Other Senior Water Right Appropriators and Riparian Claimants

The lower Mokelumne River includes additional water right holders and claimants, including senior riparian and individual appropriative rights. When total natural flow of the river is greater than 250 TAF during the October to June period, EBMUD estimates annual diversions by these other water right holders and claimants to be 20,618 AF and ensures it bypasses sufficient flow to meet this demand. If the total natural flow is less than or equal to 250 TAF during the October to June period,

EBMUD assumes the diversion amounts for these water right holders and claimants in July, August and September are reduced by a factor of 50 percent (based on assumed water conservation practices) and the annual amount EBMUD bypasses is reduced to 16,068 acre-feet.[8]

2.2 Water Right Application 29835

The following information regarding Water Right Application 29835 is based on information provided in Appendix B, Petition for Change.

Original Application 29835

Application 29835 (A029835), filed by MRWPA, was accepted by the SWRCB on October 4, 1990, and publicly noticed on September 27, 1996. A029835 proposed the following:

- Diversions from Mokelumne River and from Duck Creek tributary to Calaveras River.
- Various points of diversion and/or rediversion on the Mokelumne River, Calaveras River, and Duck Creek.
- A proposed Middle Bar Dam and Reservoir located on the Mokelumne River above Pardee Reservoir (Alternative A), and a proposed Duck Creek Dam and Reservoir located on Duck Creek (Alternative B).
- A diversion season of December 1 to June 30 for the Mokelumne River and December 1 to April 30 for Duck Creek.
- Direct diversion of 620 cfs up to 110,000 acre-feet and diversion to storage of up to 434,000 acre-feet annually. A total amount of 544,000 acre-feet to be taken by direct diversion and storage during any one year. Conveyance capacity to Duck Creek Reservoir to be 620 cfs for Alternative A and 1,000 cfs for Alternative B.
- Use of water for municipal, industrial, irrigation and incidental hydroelectric power generation.

A029835 was protested by 16 entities. Most of the protests are unresolved.

2014 Amended Application 29853

The MRWPA submitted an Amended Application in 2014, which was not formally accepted by SWRCB staff and was not noticed. The most significant changes requested in the 2014 Amended Application were the replacement of the proposed 150,000-acre-foot Duck Creek Dam and Reservoir with underground storage. Middle Bar Dam was also removed from A029835 prior to the 2014 Amendment.

2014 Protest Dismissal Agreement

The original A029835 was protested by EBMUD and others based on potential injury to prior rights and public interest concerns. In 2000, EBMUD filed a Petition for Extension of Time of its Permit 10478 (A013156). San Joaquin County, Stockton East Water District (SEWD), and NSJWCD protested EBMUD's Petition, as did several other regional water entities. EBMUD's protest of A029835 and

[8] The values for downstream water users were also stated in the testimony of John W. Skinner dated June 1998 titled *EBMUDSIM Model Description, Assumptions, Verification, and Output*, in connection with SWRCB Bay-Delta Water Rights Hearing (EBMUD Exhibit No. 4 at page 22).

protests of EBMUD's Petition were resolved in a Protest Dismissal Agreement (PDA) executed in late 2014.

The PDA includes provisions allowing San Joaquin County to temporarily store up to 48,000 acre-feet annually under A029835 during each storage season from December 1st to the following June 30th in EBMUD's Camanche or Pardee reservoirs, subject to EBMUD determining that storage surplus to EBMUD's water needs and its releases for senior water rights and downstream fishery flows is available for County. The PDA limits stored water available for rediversion to the stored water that is in excess of EBMUD needs and that has to be released from EBMUD's reservoirs by October 31 of each year to meet U.S. Army Corps of Engineers Flood Control requirements. The PDA allows for the County to convey A029835 water through EBMUD's Mokelumne Aqueducts when there is unused capacity in the Aqueducts, as determined by EBMUD, subject to execution of a wheeling agreement The PDA also contemplates a groundwater banking project in the NSJWCD and/or SEWD services areas in the County utilizing EBMUD water under existing EBMUD water rights.

2026 Petition for Change and MICUP

The Mokelumne River Integrated Conjunctive Use Program (MICUP) is a regionally coordinated effort to identify projects for putting the water available from a permit issued on A029835 to beneficial use in the Eastern San Joaquin Groundwater Subbasin. MICUP planning activities have been led by the County in partnership with the Partner Agencies. Thus, the water available under A029835 is sometimes referred to as "MICUP Water" and the projects that will use this water are called MICUP project elements.

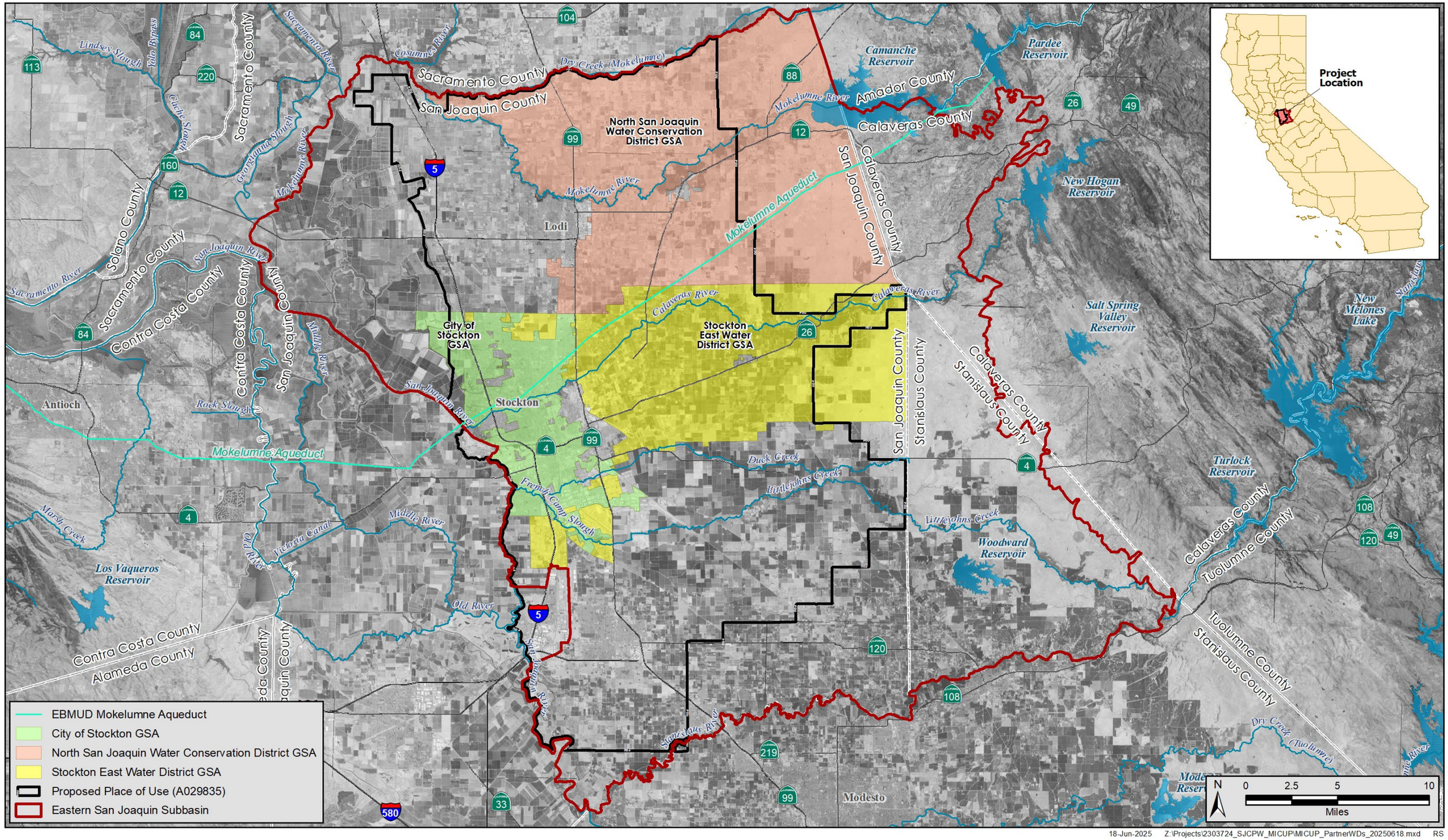
The development of MICUP project elements has necessitated changes to A029835 that are set forth in a Petition for Change that is in the process of being submitted to the SWRCB. Because the 2014 Amended Application 29835 was never formally recognized by the SWRCB, the Petition for Change is based on changes relative to the original A029835 as publicly noticed. A summary of changes to A029835 is provided below:

- The direct diversion rate of 620 cfs and seasonal direct diversion amount of 110,000 acre-feet proposed in the original application are maintained. The amount diverted to underground storage is constrained by the original application's limitation of 620 cfs by direct diversion, seasonally not to exceed 110,000 acre-feet.
- The original Application's total diversion amount of 544,000 acre-feet is reduced to 158,000 acre-feet. Of this amount, 110,000 acre-feet will be by combined direct diversion and diversion to underground storage, and 48,000 acre-feet will be by diversion to storage in EBMUD facilities (Camanche and/or Pardee reservoirs) pursuant to the PDA.
- As a practical matter, EBMUD is already diverting as much water as is physically and legally allowed to be stored in these facilities based on the facility sizes, downstream release requirements for senior water rights, fishery flow releases, flood control requirements, and other regulatory constraints. This existing condition of diversion to storage is within the scope of EBMUD's existing rights. Once the water is in storage by July 1, EBMUD assesses how much of the stored water it needs to meet its own needs and downstream obligations. If there is stored water in excess of EBMUD's needs and downstream obligations, some of that stored water is released for NSJWCD under Permit 10477 and consistent with the contract between NSJWCD and EBMUD. The operating agreement to be jointly developed by the County and EBMUD related to water storage under A029835 will be similar such that if there is stored water in excess of EBMUD needs, NSJWCD needs, and other downstream obligations, then some of the

water stored by July 1 may be released for rediversion under A029835 (subject to the terms of the EBMUD/County Wheeling Agreement). Consequently, the storage of up to 48,000 acre-feet in the EBMUD reservoirs for rediversion under A029835 will not result in a further draw on the water supply of the river during the December 1 through June 30 diversion season for this Application .

- Duck Creek is removed as a source.
- Changes have been made to some of the Points of Diversion and Rediversion on the Mokelumne River as previously described in the original application:
  - Point of Diversion at Duck Creek was eliminated.
  - Points of Diversion and Rediversion within the Calaveras River system were eliminated.
  - The original A029835 named various Points of Direct Diversion and Points of Rediversion along the Mokelumne River from Camanche Dam to the intersection of the River with Interstate Highway 5. The Petition identifies four Points named in other water rights held by NSJWCD or Woodbridge Irrigation District, and eight yet-to-be-identified Points within NSJWCD between Camanche Dam and Highway 99.
  - The Petition adds a Point of Rediversion on Pixley Slough in NSJWCD. MICUP water diverted at NSJWCD's South System Pump Station would be conveyed through the South System and released into Pixley Slough. Such flows would be rediverted at the Pixley Pump Station located about 1.7 miles downstream of the point of release.
  - The Petition adds a Point of Rediversion at the City of Stockton's Delta Pump Intake located on the San Joaquin River within the Legal Delta. The Delta Pump Intake is named in the City's water right Permit 21176 (A030531A). It is anticipated that the presence of Mokelumne River water at this location would be based on hydrodynamic analysis of in-Delta Channels.

Figure 2-3 Eastern San Joaquin Groundwater Subbasin and MICUP Partner Agencies



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3 Project Description

This chapter provides an overview of the proposed project (MICUP) location and setting as well as the proposed project's objectives and components. This chapter also provides an overview of proposed MICUP components under each Partner Agency's purview, including descriptions of construction methods and operational criteria. The information in this project description is based on the report prepared by GEI Consultants for the County, *MICUP: Final Project Identification (2026).*[1] In addition, required permits and approvals are discussed.

3.1 MICUP Regional Location and Setting

The proposed project would be implemented in California's Central Valley in San Joaquin County, within the Place of Use for Water Right Application 29835 (A029835) as shown in Figure 3-1 (Regional Location). The Place of Use is defined as the geographic area where the water diverted under A029835 would be beneficially used, including the lower Mokelumne River, areas within the jurisdictional boundaries of San Joaquin County and portions of the Eastern San Joaquin Groundwater Subbasin (Subbasin) where Mokelumne River water is recharged and put to beneficial use. The Place of Use includes land located within the identified Partner Agency jurisdictions and is geographically located within the larger Subbasin.[2] The Subbasin is located to the north, northeast, and east of the Modesto, Delta-Mendota, and Tracy Subbasins and to the southeast and south of the Solano, South American, and Cosumnes Subbasins. The Subbasin is located to the east of the Sacramento-San Joaquin River Delta (Delta) and is bounded by the Sierra Nevada foothills to the east, the San Joaquin River to the west, Dry Creek to the north, and Stanislaus River to the south. In the eastern portion of the Subbasin, groundwater flows from east to west and generally mirrors the eastward sloping topography of the geologic formations. In the western portion of the Subbasin, groundwater flows eastward toward areas with relatively lower groundwater elevations. Surface water generally flows from mountains in the east towards the Delta in the west, with the major river systems – the Calaveras, Mokelumne, and Stanislaus rivers – traversing the Subbasin. Multiple smaller streams flow into the San Joaquin River, which flows from south to north.

Regional access to the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas) is provided via Interstate 5 (I-5) and Interstate 205 (I-205). Local access is provided via State Route (SR) 26, SR 4, SR 88, SR 99, SR 120, SR 108, and SR 219.

3.2 MICUP Objectives

San Joaquin County currently relies on groundwater for approximately half of its water supply, with surface water meeting the remaining demands. The 2024 Amended Eastern San Joaquin Groundwater Sustainability Plan Update (ESJ GSP) notes that the Subbasin, which is shown in Figure 3-2, is critically overdrafted.[3] The ESJ GSP estimates that an additional 95,000 acre-feet (AF) of supply per year is necessary to achieve a modeled net –zero change in storage, thereby reducing

[1] GEI Consultants, 2026. MICUP: Final Project Identification, submitted to San Joaquin County, May 12, 2026.
[2] Eastern San Joaquin Subbasin is one subbasin within the San Joaquin Valley Groundwater Basin. A subbasin is a smaller area of land within a larger basin and is determined by drainage patterns of a river, in this case the Mokelumne River and associated tributaries.
[3] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan.

groundwater pumping and/or recharging groundwater supplies.[4] Under climate change conditions this number increases to 166,000 AF per year to achieve the same modeled net-zero change in storage.[5]

While real world conditions and observed groundwater levels will dictate exactly how much pumping must be reduced to achieve sustainability, the additional water supplies from MICUP are intended to help meet demands in the Subbasin as reliance on native groundwater is reduced to achieve sustainability.

MICUP is a proposed coordinated effort to put unappropriated Mokelumne River water to beneficial use in the Subbasin through approval of Water Right Application 29835 (A029835). MICUP would implement a comprehensive set of project components and actions to assist in meeting the adopted goals and objectives of the ESJ GSP. The proposed MICUP goals include:

- Develop a supplemental Mokelumne River surface water supply to meet existing demands;
- Use surface water and groundwater conjunctively to respond to drought and climate change;
- Increase groundwater levels in the Eastern San Joaquin Groundwater Subbasin;
- Achieve integrated water supply and environmental benefits in the lower Mokelumne watershed.

3.3 Proposed MICUP Project

MICUP would entail diverting unappropriated Mokelumne River water either to serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply demands, or to recharge surface water to underground storage for later extraction from existing production wells to meet existing demands. Under A029835, as amended pursuant to the Petition, MICUP would directly divert up to 110,000 acre-feet per year (AFY) (at a rate of up to 620 cubic feet per second (cfs)) between December 1 and June 30, using a combination of existing and proposed infrastructure. In addition, up to 48,000 AFY of water stored in Camanche and/or Pardee Reservoir by EBMUD under existing operations could be allocated to MICUP if EBMUD determines it has stored water in excess of EBMUD's needs and legal and/or operational obligations, including contract obligations to WID and NSJWCD. The additional up to 48,000 AFY of MICUP water would be released from storage and available for re-diversion by the MICUP Partner Agencies between July 1st and October 31st. In years when EBMUD determines there is stored water available for MICUP, the MICUP Partner Agencies would need to release and use that stored water prior to October 31st of the same year. MICUP stored water cannot remain in storage after October 31st or be carried over in storage to the next year.

The MICUP overview is shown in Figure 3-3. MICUP is a coordinated effort among the Partner Agencies in the defined Place of Use to divert water from the Mokelumne River. The MICUP components are summarized in Table 3-12 and described below. MICUP will not use MICUP surface water to serve new demands, or for recharge to meet new pumping demands. Water available under MICUP would serve existing Partner Agency irrigated agriculture and municipal and industrial demands currently met with pumped groundwater.

[4] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan: Executive Summary.
[5] Ibid.

Figure 3-1 Regional Location

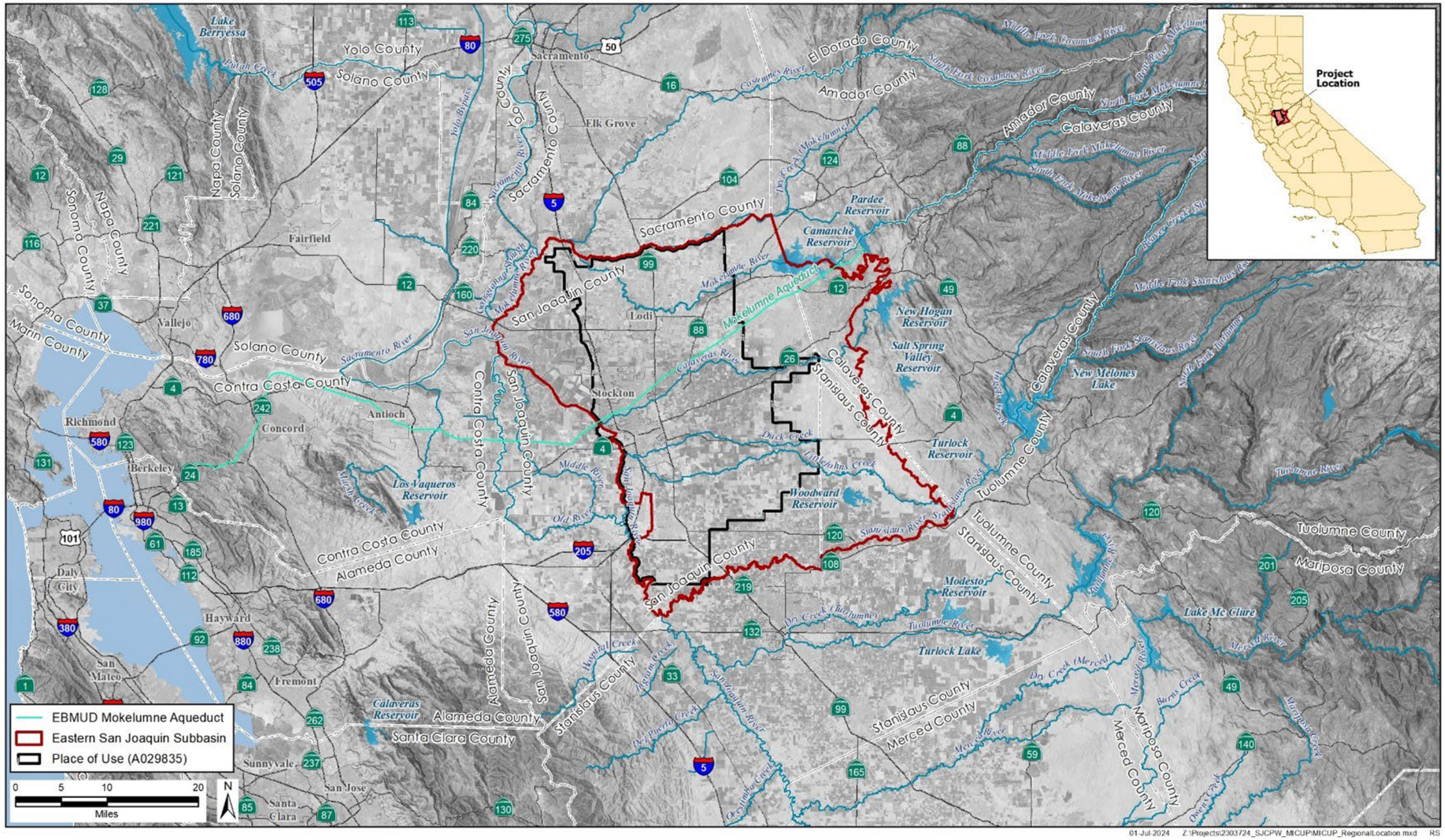


Figure 3-2 MICUP Groundwater Sustainability Agencies (GSA) within the Subbasin

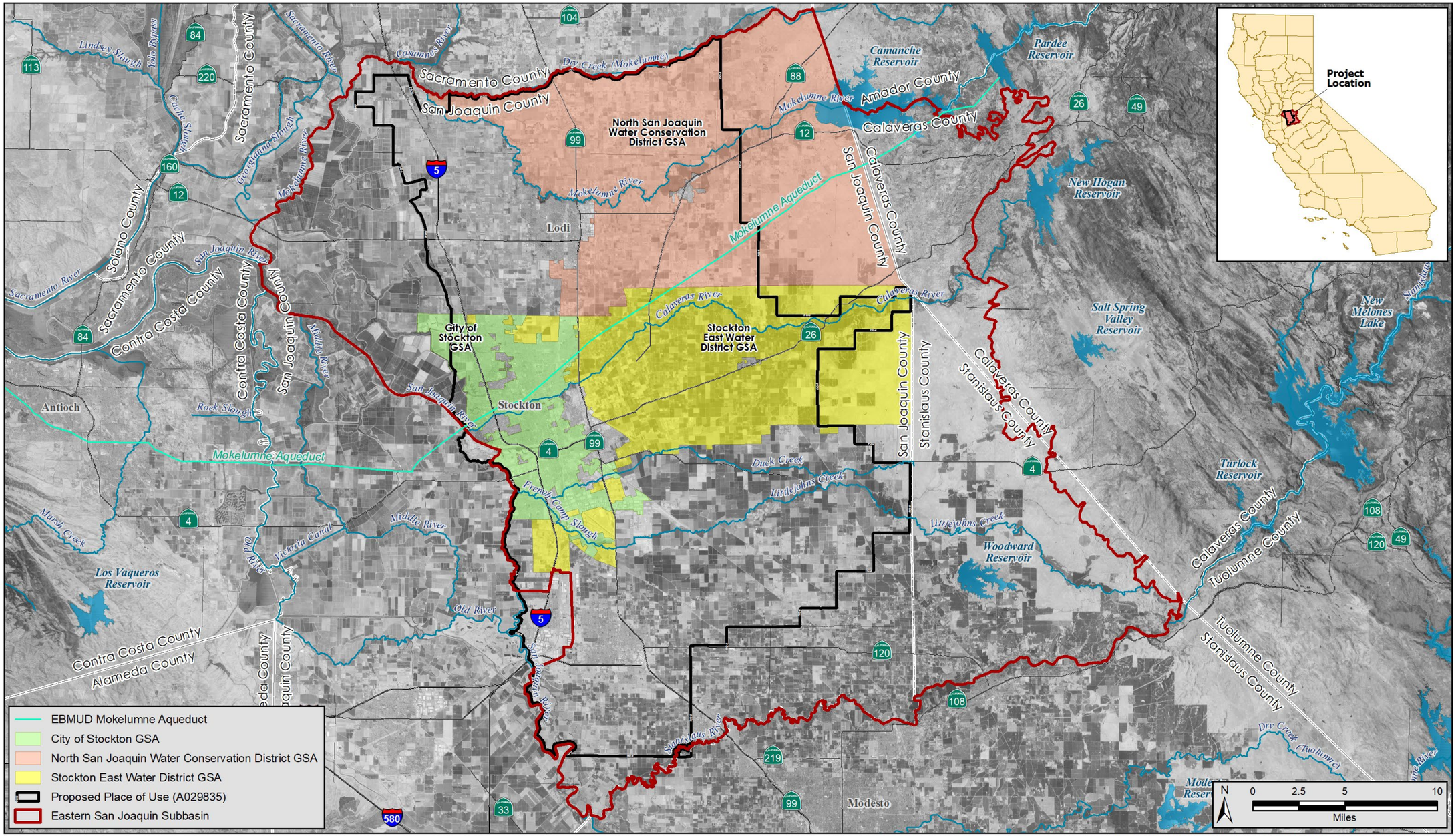
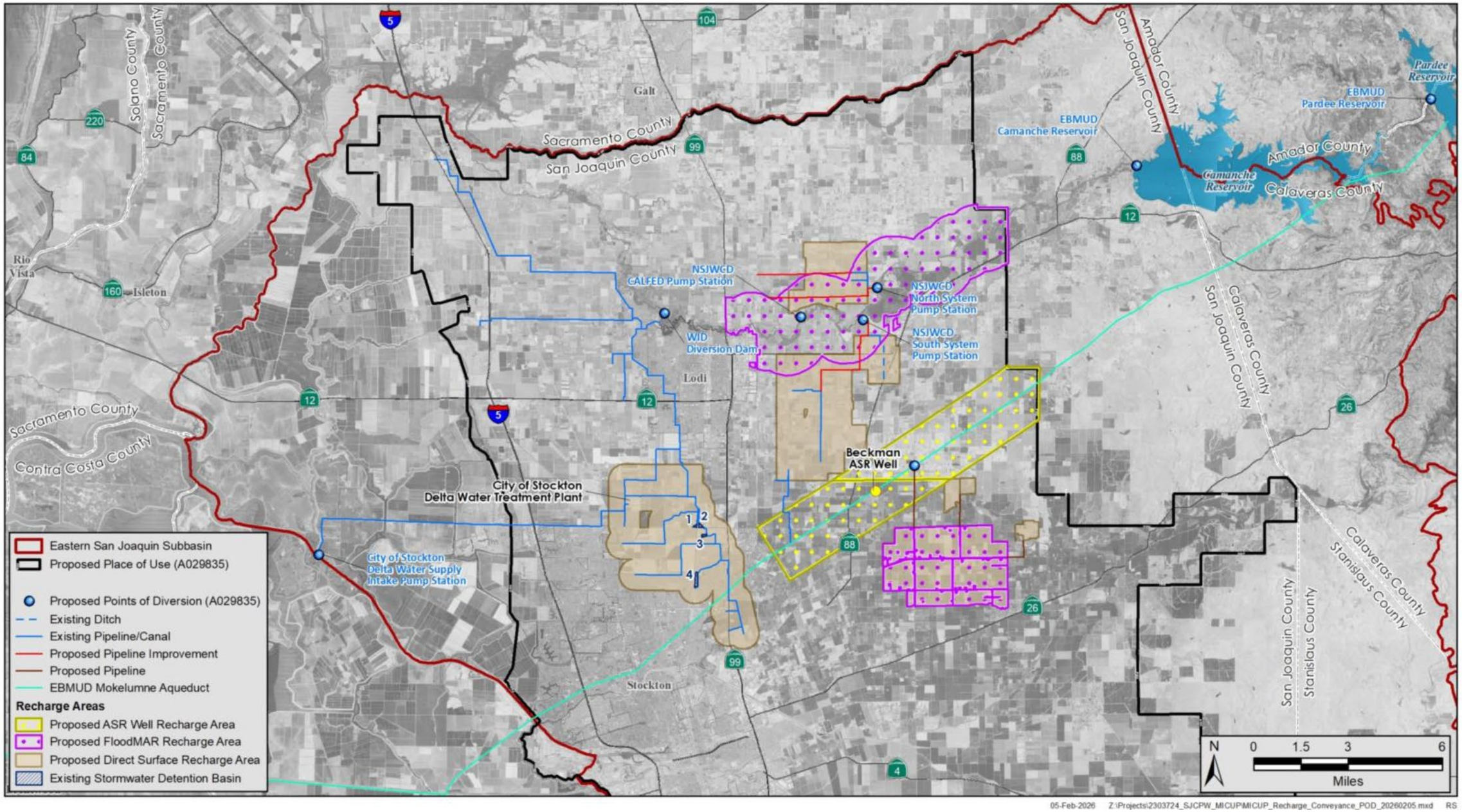


Figure 3-3 MICUP Overview



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As explained in Chapter 2, existing water right holders for Mokelumne River water include WID, NSJWCD, Amador County, Calaveras County, EBMUD, and riparian, pre-1914 and post-1914 appropriative rights along the river. The proposed MICUP diversions would be junior to all existing water rights on the Mokelumne River. Under A029835, the MRWPA prepared a Water Availability Analysis (WAA) for MICUP using the Mokelumne-Calaveras Rivers Simulation Model (MOCASIM).[6] The MOCASIM model is a hydrologic model of the Mokelumne River system including Pardee and Camanche Reservoirs and accounts for all water rights, obligations, flood releases, instream flow, historic hydrology and future demands. The model results were then further processed to identify unappropriated water available for diversion below Camanche Dam.

The proposed points of diversion or re-diversion as identified in A029835 include the following, which are shown in Figure 3-3[7] and Figure 3-6:

- Diversion at Pardee Dam on Pardee Reservoir
- Diversion and re-diversion at Camanche Dam on Camanche Reservoir
- Diversion and re-diversion at various locations along the Lower Mokelumne River between Camanche Dam and the intersection of the Mokelumne River with State Route 99, including:
  - NSJWCD North System Pump Station
  - NSJWCD South System Pump Station
  - NSJWCD CalFed Diversion and Pump Station
  - WID Diversion Dam
  - Up to 8 existing private pump sites with fish screens
- Diversion and re-diversion at Stockton Delta Water Supply Project Intake
- Re-diversion from a point on Pixley Slough

As described in *Chapter 2, Project Background*, EBMUD operates the Pardee and Camanche Dams and Reservoirs on the Mokelumne River for its own water rights and water supply needs, for hydropower and flood control purposes, to manage required fishery flow requirements and associated cold water temperatures, and to satisfy existing water rights obligations in the upper and lower Mokelumne watersheds including providing a Permanent Regulated Base Supply (PRBS) to WID and to temporarily store water for NSJWCD under Permit 10477. EBMUD's water rights on the Mokelumne River are subject to regulatory requirements, including fishery releases and activities required by the Joint Settlement Agreement (JSA) between EBMUD, the United States Fish and Wildlife Service and the California Department of Fish and Wildlife. EBMUD collects and coordinates operational data, including forecasted precipitation and runoff, projected PG&E operations, river flow, and reservoir storage/elevation throughout the year to continuously identify the required amount of water to be released from Pardee and Camanche Dams into the lower Mokelumne River and the Mokelumne Aqueducts.

With the addition of diversions and re-diversions associated with MICUP, EBMUD's operations, including diversions to Pardee and Camanche Reservoirs, would not change. The availability of storage and released flows for MICUP would be determined solely by EBMUD as excess to its water

[6] Mokelumne River Water and Power Authority. 2026. Updated Water Availability Analysis for Application 29835 of Mokelumne River Water and Power Authority. March 30, 2026.

[7] Note: The connection shown between the Mokelumne Aqueduct and the West Linden Project and Recharge Area represents a proposed intertie connection and not a point of diversion.

needs and existing operational, permitting or contractual requirements including releases for senior water rights and required fishery flows. Under A029835, MICUP Partner Agencies would allow any water bypassed or released from Camanche Reservoir by EBMUD for the protection and/or enhancement of fish and wildlife to continue downstream, such that MICUP diversions of natural flow or releases from storage in the Mokelumne River would be limited to flows in excess of the JSA releases. In addition, MICUP would be operated to bypass releases from Camanche Dam made by EBMUD in accordance with the Agreements to Support Healthy Rivers and Landscapes in California (HRL, a.k.a. Voluntary Agreements) if adopted, as described in *Chapter 2, Project Background*. Under the proposed Agreements to Support Healthy Rivers and Landscapes in California, EBMUD would operate to provide releases from Camanche Dam, above existing minimum release requirements, of 10,000 AF, 20,000 AF, and 45,000 AF in Dry, Below Normal, and Normal and Above modified JSA year-types, respectively. These proposed releases have been included as demands taking priority over A029835 in the estimation of water available for diversion under MICUP. In addition, MICUP would be operated in accordance with the SWRCB's Standard Term 91, such that no diversions would occur during periods when the Delta is determined to be in "balanced conditions". [8,9]

Up to 48,000 AFY of water stored by EBMUD in Pardee and Camanche Reservoirs would be potentially available for use under A029835 and re-diversion by MICUP. The availability of 48,000 AFY would be limited by the operating criteria for Pardee and Camanche Reservoirs described above, including projected inflow and reservoir evaporation, projected diversions and releases for WID and NSJWCD or other senior rights, projected releases per JSA requirements, and, if adopted, the requirements of the Agreements to Support Healthy Rivers and Landscapes in California , and projected diversions to the Mokelumne Aqueducts for EBMUD.

3.3.1 Diversion Periods

The MICUP Partner Agencies would divert water available under A029835 in the following diversion periods:

- **MICUP Direct Diversion (DD) Window.** This diversion window occurs from December 1 to June 30 for direct diversions to agricultural irrigation, municipal use, or recharge areas for underground storage, and for diversion to storage in Pardee or Camanche pursuant to the agreement with EBMUD.
- **MICUP Rediversion from Storage (RFS) Window.** This diversion window occurs from July 1 to October 31 for rediversion from storage for water stored in Pardee/Camanche and assigned to MICUP. Rediversions from storage would be used for agricultural irrigation, municipal use, or direct recharge for underground storage.

[8] The SWRCB's Standard Term 91 requires permits and licenses granted after 1965 in the Delta watershed to cease diverting when the SWRCB gives notice that water is not available for diversion under those permits and licenses. This occurs at times when the Central Valley Project (CVP) and the State Water Project (SWP) are releasing previously stored water to meet water quality and flow requirements in the Delta and the Delta is termed to be in "balanced conditions." The SWRCB will also give notice when Term 91 is no longer in effect. When the CVP and SWP are not releasing previously stored water to meet water quality and flow requirements, the Delta is termed to be in "excess conditions."

[9] State Water Resources Control Board. 2012. State Water Resources Control Board, Board Meeting Session – Office of Delta Watermaster, December 4, 2012. Available: https://h8b186.p3cdn2.secureserver.net/wp-content/uploads/2012/04/120412_10.pdf. Accessed January 20, 2025.

3.3.2 Groundwater Recharge Methods

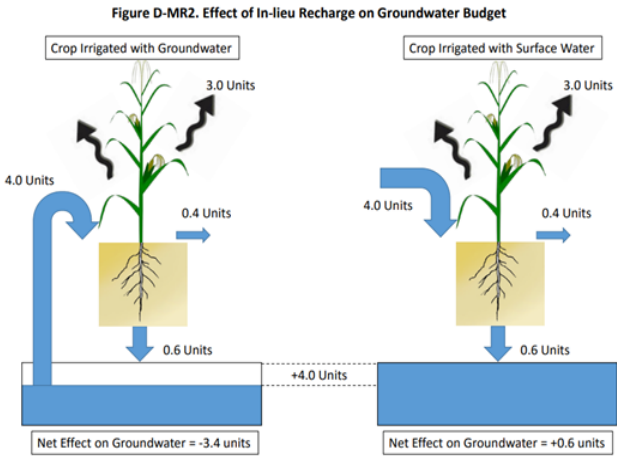
There are several methods to recharge MICUP water based on available facilities, land use and crop type, and near surface soil conditions and hydrogeologic conditions. Different recharge methods may be used to meet different recharge opportunities for MICUP based on the monthly availability of water and capabilities of the diversion and conveyance facilities. Groundwater recharge methodologies that would be used include various types of direct surface recharge, as well as in-lieu recharge/direct agricultural irrigation.

Direct surface recharge methods include flood managed aquifer recharge (Flood-MAR) and surface detention basins such as recharge basins, storm detention basins, and unlined canals. Direct surface recharge methods also include aquifer storage and recovery (ASR) wells and dry wells.

The recharge method(s) used for MICUP would vary based on monthly availability of water and the capacity of the diversion, conveyance and recharge facilities when the water would be available. A general summary of the monthly opportunity using each irrigation or recharge method for the two diversion windows is provided in Table 3-1.

In-Lieu Recharge

In-Lieu Recharge is the use of surface water for agricultural irrigation "in-lieu" of groundwater pumping for beneficial use. Using surface water instead of pumping groundwater keeps water in the aquifer that would otherwise be pumped and delivered for irrigation. This is considered a form of recharge and requires that surface water be available during periods when groundwater would otherwise be used. The figure to the right shows the effect of in-lieu recharge on the groundwater budget. In-lieu recharge occurs during the irrigation season. For planning purposes, this recharge method may occur during March to October period within the DD Window and RFS Window.



Source: GEI Consultants, 2026

Table 3-1 MICUP Diversion Windows by Recharge/Irrigation Method

Irrigation or Recharge Method	MICUP Rediversion from Storage Window			MICUP Direct Division Window							MICUP Rediversion from Storage Window	
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
In-Lieu	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Direct Surface Recharge	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Flood-MAR	Yes[1]	No	Yes	Yes	Yes	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]	Yes[1]
ASR Wells and Dry Wells	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

[1] Flood-MAR may not occur as often during the growing season (March-October). During these months, its use will be based on water availability, landowner interest, and available land.

Direct Surface Recharge

Direct surface recharge facilities are designed to suit both geologic and hydrologic conditions. Surface water is diverted to recharge underground storage through surface-based recharge or wells. These facilities are described in detail below.

Dedicated Surface Based Recharge

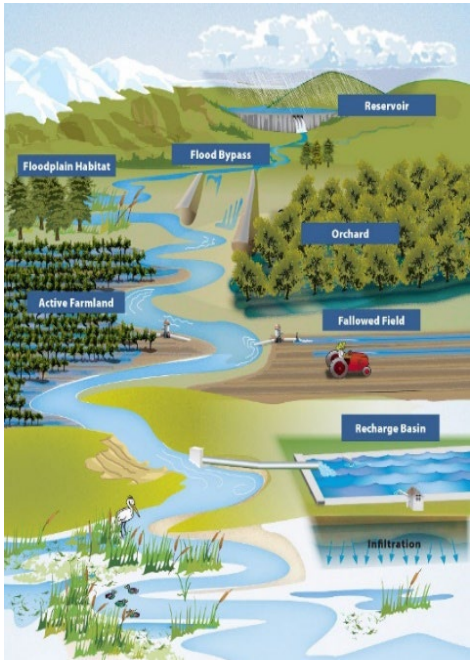
Dedicated Surface Based Recharge can be done in many types of facilities, including recharge basins, storm drains, and unlined canals that provide surface area for water to infiltrate. Recharge is highly dependent on the geologic conditions near the surface and can vary drastically from about 0.1 ft to 1.0 ft or more per day depending on conditions. Dedicated recharge basins are sited in areas to maximize recharge potential, while storm drains and unlined canals typically do not prioritize recharge potential and typically see lower infiltration rates.



Source: DWR, 2023

Flood Managed Aquifer Recharge (Flood-MAR)

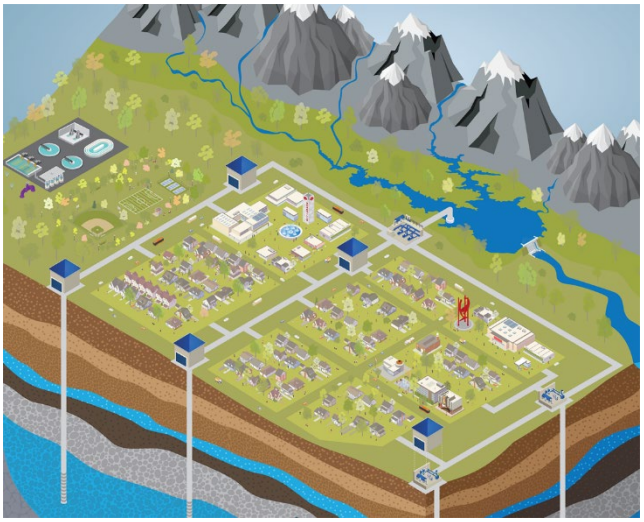
Flood-MAR, a form of direct recharge, is the managed aquifer recharge accomplished by intentionally flooding agricultural fields with excess surface water available during high flow or flood conditions. Benefits of this specific type of recharge are: it does not require significant modifications to the existing land or agricultural practices of the land; it is relatively cost effective; and it utilizes existing water infrastructure. However, recharge is restricted based on existing infrastructure, agricultural practices, as flooding cannot interfere with crop production, as well as the amount of moisture crops can handle, and recharge rate of the shallow soil layers. For planning purposes, this recharge method may occur during the December to February period within the DD Window and the RFS Window but may occur at other times based on water availability. Flood-MAR is also dependent on landowner participation and understanding of soil conditions.



Source: DWR 2020

Aquifer Storage and Recovery (ASR) Wells and Dry Wells

There are two types of wells used in MICUP – dry wells and ASR wells. A dry well is an underground, man-made structure completed above the groundwater aquifer. A dry well allows water to bypass impermeable layers near the surface, facilitating infiltration into more permeable subsurface layers to enhance groundwater recharge. Dry wells require maintenance to clean out debris to maintain the infiltration rates. Dry wells can be paired with recharge basins.



Source: City of Roseville 2019

ASR wells recharge water directly into the aquifers in the subsurface. These wells can be dedicated to recharge or dual-purpose wells capable of extracting stored water. ASR wells can be drilled in the target aquifer, providing direct recharge, and take up a small footprint, not being restricted by overlying land use. ASR wells can recharge whenever water is available but require pressurized water, maintenance, and specific infrastructure, including possible pretreatment or filtration. ASR wells are the most expensive recharge option. Both types of wells may operate during the December to October period within the DD Window and the RFS Window.

3.3.3 North San Joaquin Water Conservation District

NSJWCD Background

NSJWCD, established in 1948 under the provisions of the Water Conservation District Act of 1931, spans approximately 150,000 acres in eastern San Joaquin County, California, as shown in Figure 3-2. NSJWCD is situated east and north of the City of Lodi, encompassing a diverse landscape including approximately 79,000 acres of irrigated agricultural lands and approximately the same number of unirrigated open spaces. NSJWCD elected to become a Groundwater Sustainability Agency and is responsible for managing the groundwater for its area, which encompasses approximately 20 percent of the Eastern San Joaquin groundwater subbasin.

The Mokelumne River traverses the NSJWCD service area, and NSJWCD has a junior right (Permit 10477, Application 12842) to divert up to 20,000 acre-feet from the Mokelumne River. This water is generally available in normal to wet years. The district has been improving its infrastructure to utilize the full Permit 10477 right. Total agricultural water demand in NSJWCD is approximately 170,000 AFY and landowners rely primarily on private groundwater pumping to meet demand.

Agriculture is the predominant land use within NSJWCD, underscoring NSJWCD's critical role in supporting the local farming community. The region's agricultural activities are diverse, ranging from row crops to orchards, contributing significantly to the local economy. Additionally, the presence of dry pasture areas highlights the varied land use practices within the NSJWCD, catering to both crop production and livestock grazing.

NSJWCD Existing Infrastructure for MICUP

NSJWCD operates four pumping stations on the Mokelumne River. Three of these four systems relate to MICUP and are described below, with locations shown in Figure 3-3.

- North System Pump Station**:** Located off N. Tretheway Road on the north side of the Mokelumne River (Point of Diversion [POD] A029835)
- CalFed/Woodbridge System Pump Station: Located off E. Woodbridge Road on the north side of the Mokelumne River (POD A029835)
- South System Pump Station: Located off N. Tretheway Road on the south side of the Mokelumne River (POD A029835_01)

The North, South and CalFed Pump Stations all have a cone fish screen approved by the California Department of Fish and Wildlife. The North and South Pumps are rated for +/- 30 cubic feet per second and the CalFed Pump is rated for 10 cubic feet per second. It should be noted that the North and South systems were partly evaluated in the Eastern San Joaquin Basin Integrated Conjunctive Use Program Programmatic Environmental Impact Report certified in February 2011.[10]

NORTH SYSTEM

NSJWCD constructed the existing low-head (non-pressurized) North Pump Station and Pipeline in the late 1960s. The North System historically diverted and delivered Mokelumne River water to agricultural fields along the Acampo Road corridor. Landowners along the North System Pipeline designed and constructed their own on-farm irrigation systems to utilize surface water from the system.

The North System is the second largest surface water distribution system managed by NSJWCD (see Figure 3-4). It includes a pump station on the north bank of the Mokelumne River and a pipeline that runs west along Acampo Road with some laterals. The original pump had a design capacity of approximately 40 cfs and a conical fish screen was added in the early 2000s. The original pump and fish screen are not currently used due to their age and inefficiency. Between 2023 - 2025 NSJWCD installed a temporary pump system (two 60 HP centrifugal pumps) and fish screens adjacent to the North Pump Station, which has a current capacity of 17.5 cfs. NSJWCD is working on plans to rebuild the North Pump Station to include an initial capacity of 40 cfs, expandable to 60 cfs for purposes of diverting waters when available. The expansion is expected to be completed between 2026-2028 and will be the subject of a separate project specific CEQA review.

NSJWCD has also begun improvements to the pipeline distribution system for the North System. In 2023-2025 the district replaced the first segment of the main pipeline along Tretheway Road and Acampo Road. NSJWCD plans to continue the pipeline replacement down Acampo Road as it obtains funding.

NSJWCD currently operates the temporary pumps at the North System to deliver surface water for Flood-MAR, direct recharge and irrigation under Permit 10477, as shown in Figure 3-4. The system could also be used to deliver the water available under MICUP for the same purposes on additional acres along the Acampo Road corridor, within the potential recharge area shown in Figure 3-4.

[10] Northeastern San Joaquin County Groundwater Banking Authority, 2011. Eastern San Joaquin Basin Integrated Conjunctive Use Program, Programmatic Environmental Impact Report.

CALFED SYSTEM

The NSJWCD existing CalFed System includes a 10 cfs pump station on the north side of the Mokelumne River and pipeline that distributes water to nearby lands for Flood-MAR, as shown in Figure 3-4. The NSJWCD may use excess capacity in this system to divert MICUP water. Additional pipelines would be added to the system to distribute that water to nearby farmland for irrigation, Flood-MAR or direct recharge.

SOUTH SYSTEM

The South System is NSJWCD's largest surface water distribution system. It consists of a pump station on the south side of the Mokelumne River off of Tretheway Road and a distribution system which extends to the south, as shown in Figure 3-5. The distribution system includes approximately seven miles of cast in place and reinforced concrete pipe, an open ditch, lateral pipes, and portions of Pixley Slough and Bear Creek. The system has historically been used, and is still used, to deliver surface water diverted under Permit 10477 for irrigation use by area farmers, and for Flood-MAR and other direct recharge.

Since 2017, NSJWCD has been actively modernizing and improving the South System. Upgrades include the previous addition of a modern fish screen and the installation of a new pump station, new pipeline segments, and the implementation of Supervisory Control and Data Acquisition (SCADA) systems for automation. The South System pumping station currently has a capacity of approximately 35 cfs depending on water surface elevation in the Mokelumne River. The current pump station is expandable to 40 cfs. The new pump station and distribution system improvements were previously analyzed in the adopted 2016 Mitigated Negative Declaration for the Demonstration Recharge, Extraction, and Aquifer Management (DREAM) Project and NSJWCD South System Improvements.[11] NSJWCD prepared an addendum to that document in 2022 for its planned Handel Lateral Project, which will rebuild and extend an existing lateral off the South System.[12]

In 2023, NSJWCD purchased a 10-acre property close to the South System and converted it to a direct recharge basin – the Tecklenburg Basin (see Figure 3-5). The district currently conveys water from the main south pipeline to the Tecklenburg Basin using a a new 24-inch lateral from the main south pipeline to the Tecklenburg Basin, which was installed in 2025.

In addition, NSJWCD uses the Petersen site (a 20-acre vineyard along the main south pipeline) for Flood-MAR operations when water is available for recharge and site conditions are conducive . There are opportunities to expand the delivery of irrigation water from the South System to adjacent irrigated farmland that is currently using groundwater to accomplish in-lieu recharge, as well as opportunities for expanded Flood-MAR and direct recharge on lands adjacent to or near the south distribution system, within the area shown in Figure 3-5. NSJWCD will continue to use the South System to deliver Permit 10477 water for irrigation and recharge. NSJWCD could also take water available from MICUP for the same purposes utilizing unused capacity in its existing South System, or by expanding the South System Pump Station to 60 cfs and adding additional distribution pipelines.

[11] San Joaquin County Department of Public Works, 2016. FINAL INITIAL STUDY/ MITIGATED NEGATIVE DECLARATION for the DEMONSTRATION RECHARGE EXTRACTIONAND AQUIFER MANAGEMENT (DREAM) PROJECT & NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT SOUTH SYSTEM IMPROVEMENTS. Prepared by BaseCamp Environmental, Inc.
[12] North San Joaquin Water Conservation District, 2022. Notice of Determination, Handel Lateral Project, State Clearinghouse No. 2016032012, filed November 30, 2022.

NSJWCD MICUP Components

NSJWCD would divert MICUP water using:

1. Existing and or Expanded Capacity in the North, South and CalFed Systems
2. Expanded Use of Existing Private River Pumps
3. ASR Wells along the Mokelumne Aqueduct

Expanded Use of North, South and CalFed Systems

NSJWCD can utilize MICUP water by increasing diversions from the Mokelumne River using its existing North, South, and CalFed Systems. The NSJWCD plans to increase the capacity of these systems to take MICUP water.

Water diverted from the Mokelumne River would be conveyed through existing conveyance pipelines (some of which are currently being improved or are planned to be improved). New pipelines would also expand the geographic extent of the recharge activities within NSJWCD.

The proposed MICUP components for the North and South Systems would increase the total capacity of the NSJWCD system to enable those systems to utilize MICUP water. Once all planned and proposed recharge components are completed, NSJWCD would have a maximum total diversion and conveyance capacity of 130 cubic feet per second (cfs). For purposes of utilizing the MICUP water, the NSJWCD would need to build additional pipeline distribution capacity and acquire land for direct recharge and Flood-MAR. The acreage estimates which would be needed to leverage the full conveyance capacity are identified in Table 3-2. The potential locations for recharge basins, in-lieu recharge, and Flood-MAR are shown in Figure 3-4 and Figure 3-5.

Table 3-2 Recharge Area Estimates for North, South, and CalFed Systems

Recharge Basins	In-Lieu Recharge	Flood-MAR
Up to 1,000 acres	Up to 7,000 acres[1]	Up to 1,300 acres

[1] In-Lieu Recharge capacity will be built out to leverage existing District supplies, but may utilize MICUP water when available

Figure 3-4 NSJWCD North and CalFed Systems

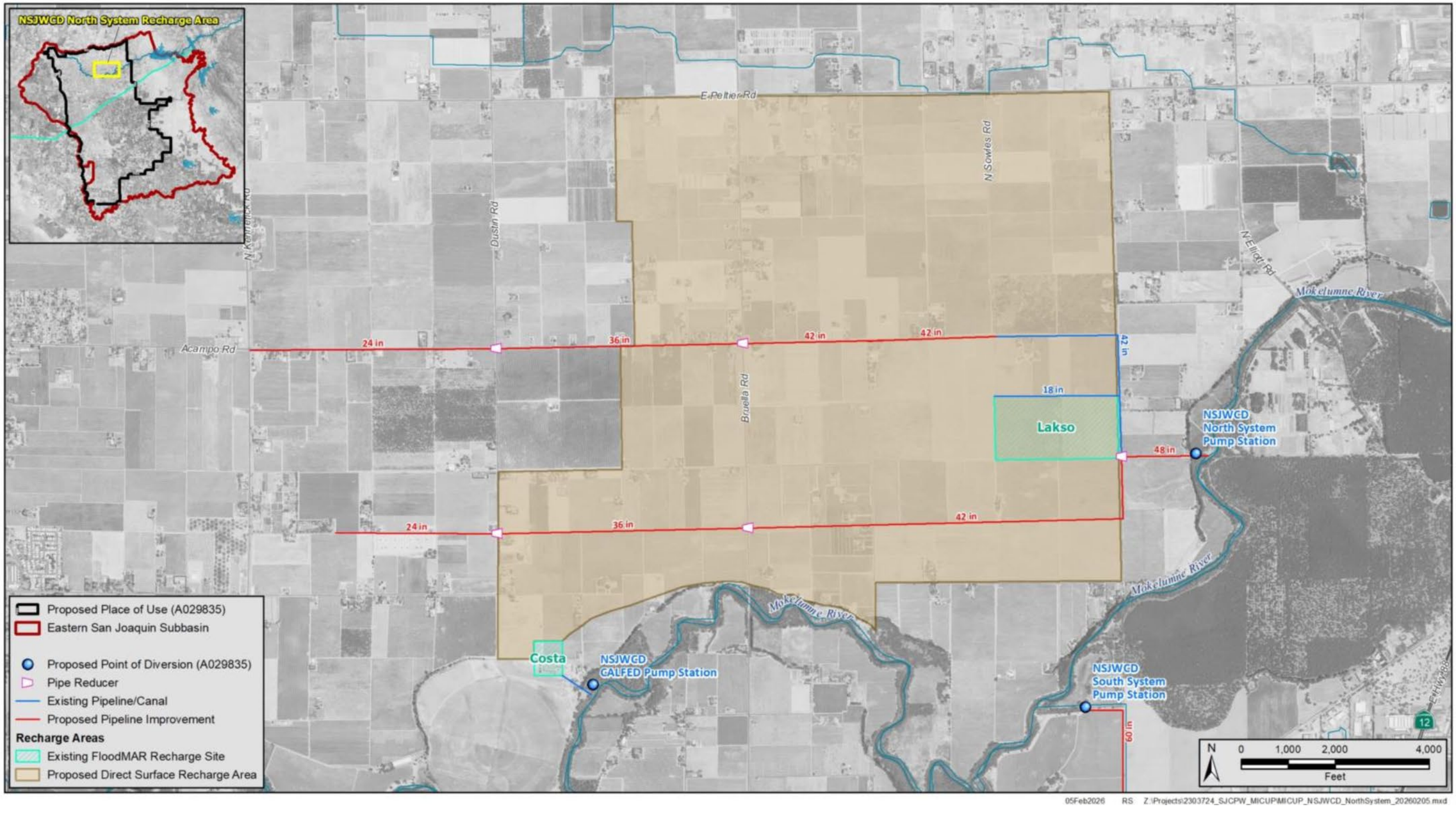
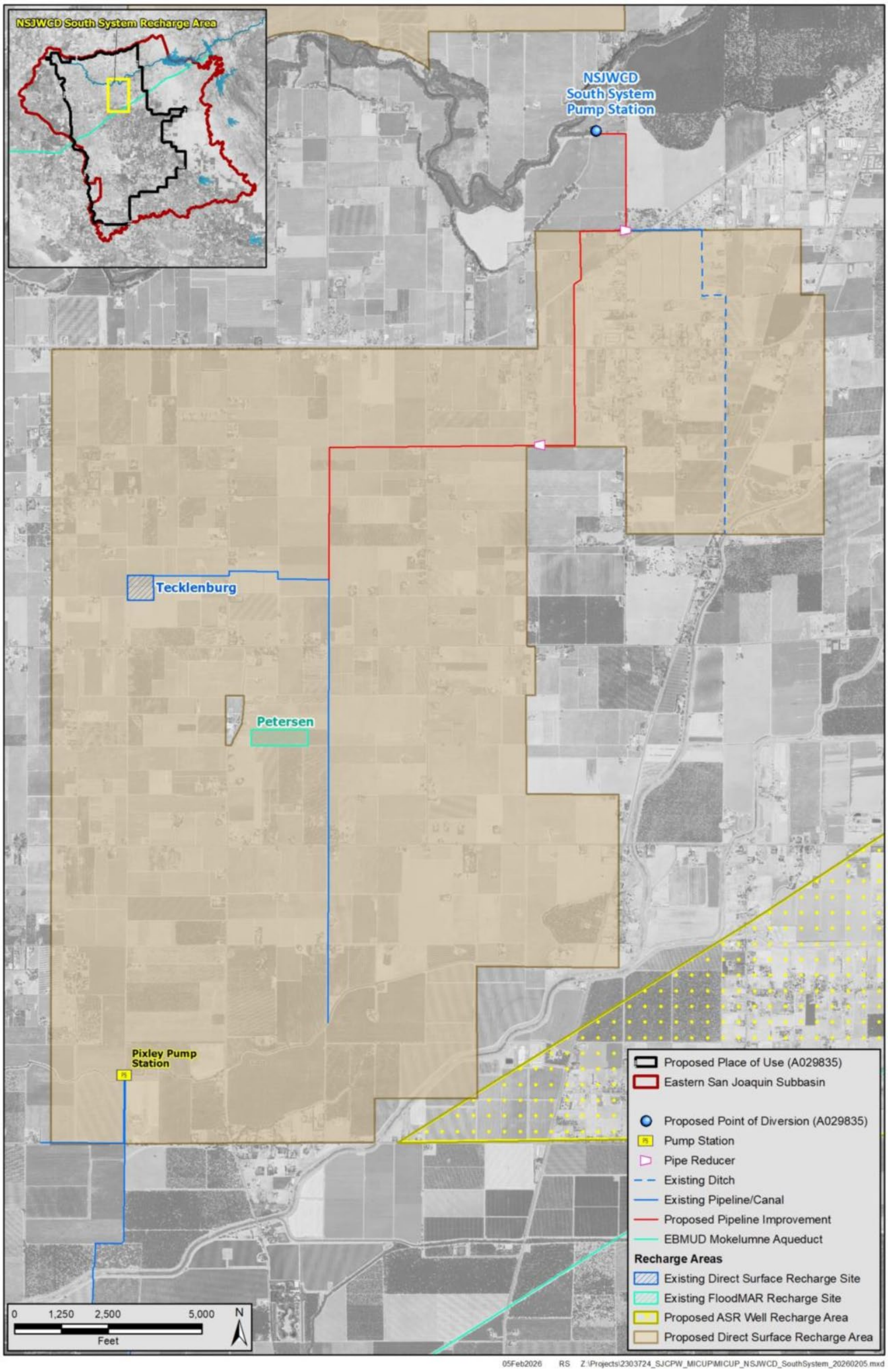


Figure 3-5 NSJWCD South System



Expanded Use of Existing Private River Pumps

NSJWCD also plans to partner with landowners who have existing private pumps along the Mokelumne River to expand the MICUP diversion capacity. Specifically, the district would contract with up to eight private landowners with individual pumps with capacities of 1 to 5 cubic feet per second (cfs) to divert Mokelumne River water during both the diversion and re-diversion windows. This water would be diverted at up to eight existing points of diversion shown in Figure 3-6 and would be used or recharged on existing agricultural lands for irrigation or during non-active periods for Flood-MAR. The district would require that each private pump has an approved fish screen to participate. Additional piping may be needed to convey the water pumped from these private pumps to adjacent parcels for use or recharge. It is assumed that the average land area that would receive water from each private pump is up to 100 acres, up to 800 acres in total. These activities would occur on land that is already disturbed and/or under cultivation. The specific parcels and points of diversion to be leveraged have not been identified, and accordingly, a one-mile radius buffer was established along the Mokelumne River to indicate where the potential Flood-MAR activities may occur once the proper agreements and infrastructure are established.

For planning purposes, it is assumed that there would be eight private landowners that have existing pumps with a 3 cfs capacity for a total capacity of 24 cfs.

ASR Wells off Mokelumne Aqueduct

NSJWCD may also construct aquifer storage and recovery (ASR) wells to pump water directly into the groundwater aquifer; the ASR wells would be located within the area identified in Figure 3-7. The water to be injected would come from a new intertie into the EBMUD Mokelumne Aqueduct. The location of the intertie into the EBMUD Aqueduct has not been established at this time, nor has the arrangement of pipelines to convey water from the Aqueduct to the ASR wells been determined. This project component would require construction of a diversion structure off the aqueduct. Up to 20 ASR wells with a capacity of 1 cfs each would be installed to convey up to 20 cfs off the Aqueduct. Each ASR well would have a footprint up to approximately 1 acre, and up to 3 acres of land would be needed for temporary access during construction. The ASR wells would be closely coordinated and planned with EBMUD. The final locations of each ASR well could fall within NSJWCD or SEWD service areas.

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Figure 3-6 NSJWCD Proposed Flood-MAR Area

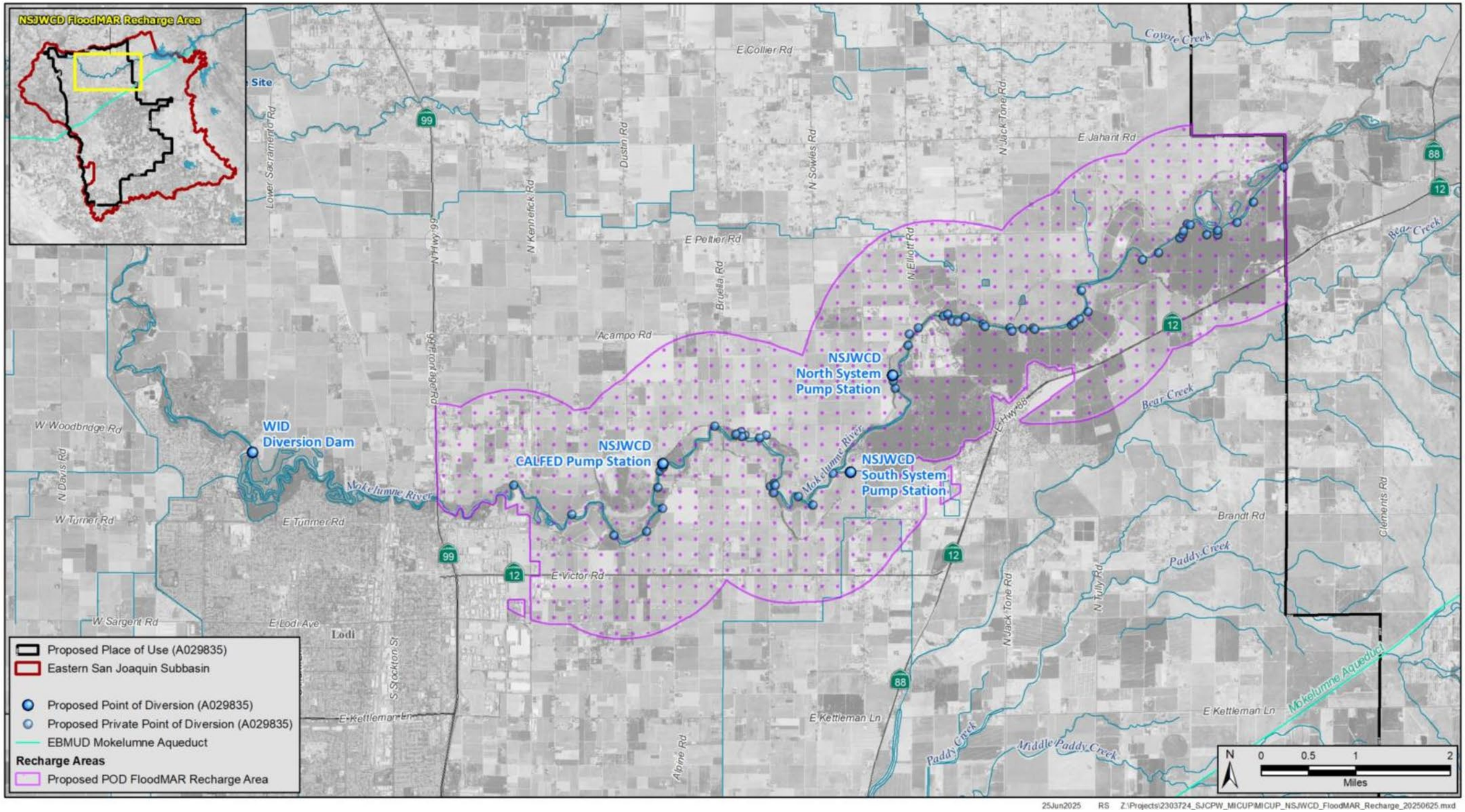
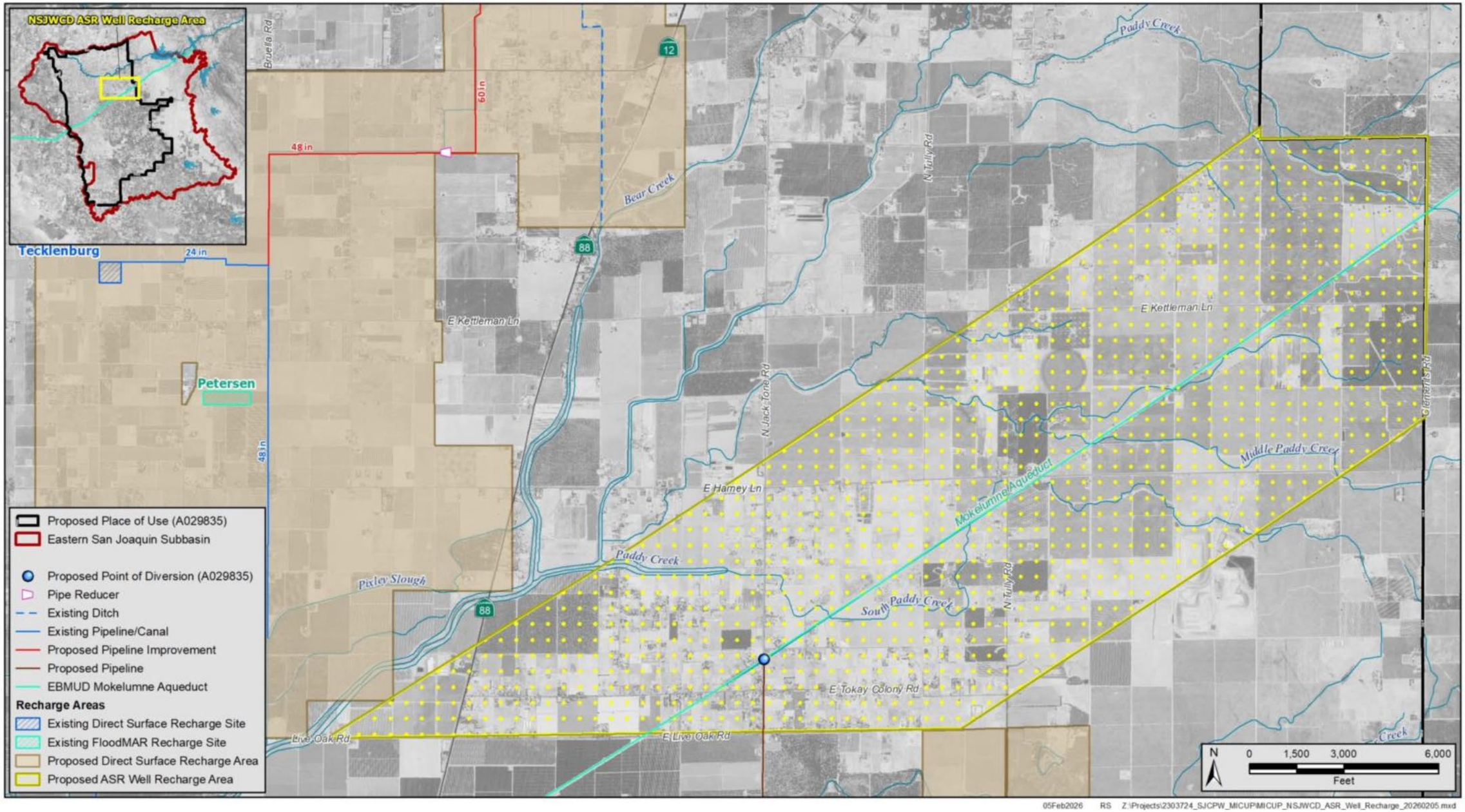


Figure 3-7 NSJWCD Proposed ASR Well Area



3.3.4 Stockton East Water District

SEWD Background

SEWD was established in 1948 under California's 1931 Water Conservation Act and originally operated as the Stockton and East San Joaquin Water Conservation District. SEWD spans the San Joaquin Valley's floor within the Subbasin, from the western boundary of the City of Stockton to the eastern San Joaquin County line, as shown in Figure 3-2.

SEWD's initial focus (1948-1963) was on water resource planning, evaluating groundwater conditions, and determining supplemental water needs. In 1971, SEWD was reconfigured by special action of the California legislature and expanded to include the entire Stockton urban area. SEWD negotiated contracts for water from the federal New Hogan Project and contracted with the greater Stockton area urban users to construct a drinking water treatment plant, now upgraded to 65 million gallons per day (MGD) to meet urban demand. The service area now covers over 143,000 acres, including additional agricultural users.

SEWD serves both urban and agricultural customers in and around Stockton, California and eastern San Joaquin County. It supports San Joaquin County's leading agricultural industry by providing surface water for irrigation and supplies wholesale treated drinking water, treated at the Dr. Joe Waidhofer Water Treatment Plant, to Stockton area retail customers through the California Water Service, the City of Stockton, and San Joaquin County. SEWD manages approximately 250 agricultural surface water, 1,900 agricultural groundwater, and 6,000 domestic well accounts.

SEWD is crucial for managing and conserving water resources in a region characterized by extensive agriculture, ensuring sustainable water management for both agricultural and urban needs in eastern San Joaquin County. Its location, in a key subbasin and a significant river system, positions it as a central player in ensuring sustainable water management for both agricultural and urban needs in eastern San Joaquin County.

SEWD Existing Infrastructure for MICUP

BECKMAN ASR WELL

On July 29, 1996, the East San Joaquin Parties Water Authority (ESJPWA) was created, a public entity formed by the San Joaquin County Flood Control and Water Conservation District, the Cities of Stockton and Lodi, SEWD, Central San Joaquin Water Conservation District, WID, and NSJWCD. The ESJPWA was established to address water deficiencies in Eastern San Joaquin County through collaborative projects with entities like EBMUD.

The ESJPWA installed the Beckman ASR Well, an aquifer storage and recovery well, and three monitoring wells, on the "Beckman" property (currently owned by Andreetta Prop LP). The Beckman Injection/Extraction Study, conducted by the ESJPWA, involved injecting water from EBMUD's Mokelumne River entitlement and monitoring its movement. The study concluded that injected water generally remained in the vicinity, influenced by factors like seasonal hydrogeology and regional pumping patterns. SEWD now proposes to upgrade the Beckman ASR Well, as shown in Figure 3-8, to use MICUP water for recharge and extraction, continuing the efforts to manage and conserve water resources effectively.

SEWD MICUP Components

SEWD would divert MICUP water from existing and new Mokelumne Aqueduct turnouts, for conveyance to recharge facilities within the district. These diversions would be coordinated with EBMUD as the owner and operator of the Mokelumne Aqueduct. Recharge activities may include agricultural irrigation/in-lieu recharge, Flood-MAR, recharge basins, ASR wells, and dry wells as shown in Figure 3-8.

ASR Wells off Mokelumne Aqueduct

The well casing, screening, and the EBMUD Mokelumne Aqueduct connection, are already in place to deliver water from the Mokelumne Aqueduct to the Beckman ASR Well. However, this site is currently not in use, and the pump has been removed. The Beckman ASR Well would need extensive upgrades including an inspection, a redevelopment process, a new well pump, new piping, and new valving to become operational again. EBMUD's Mokelumne Aqueduct connection would need to be rehabilitated and a pipeline from the Aqueduct connection to the Beckman ASR Well would need to be constructed to deliver water to the well.

In addition to the Beckman ASR Well, SEWD may construct more ASR wells adjacent to the Mokelumne Aqueduct (see Figure 3-8). As described above for NSJWCD, up to 20 ASR wells[13] would be developed in the area shown in both Figure 3-7 and Figure 3-8. The specifics and design of these structures would require close coordination with EBMUD. The final locations of each ASR well could fall within NSJWCD or SEWD service areas.

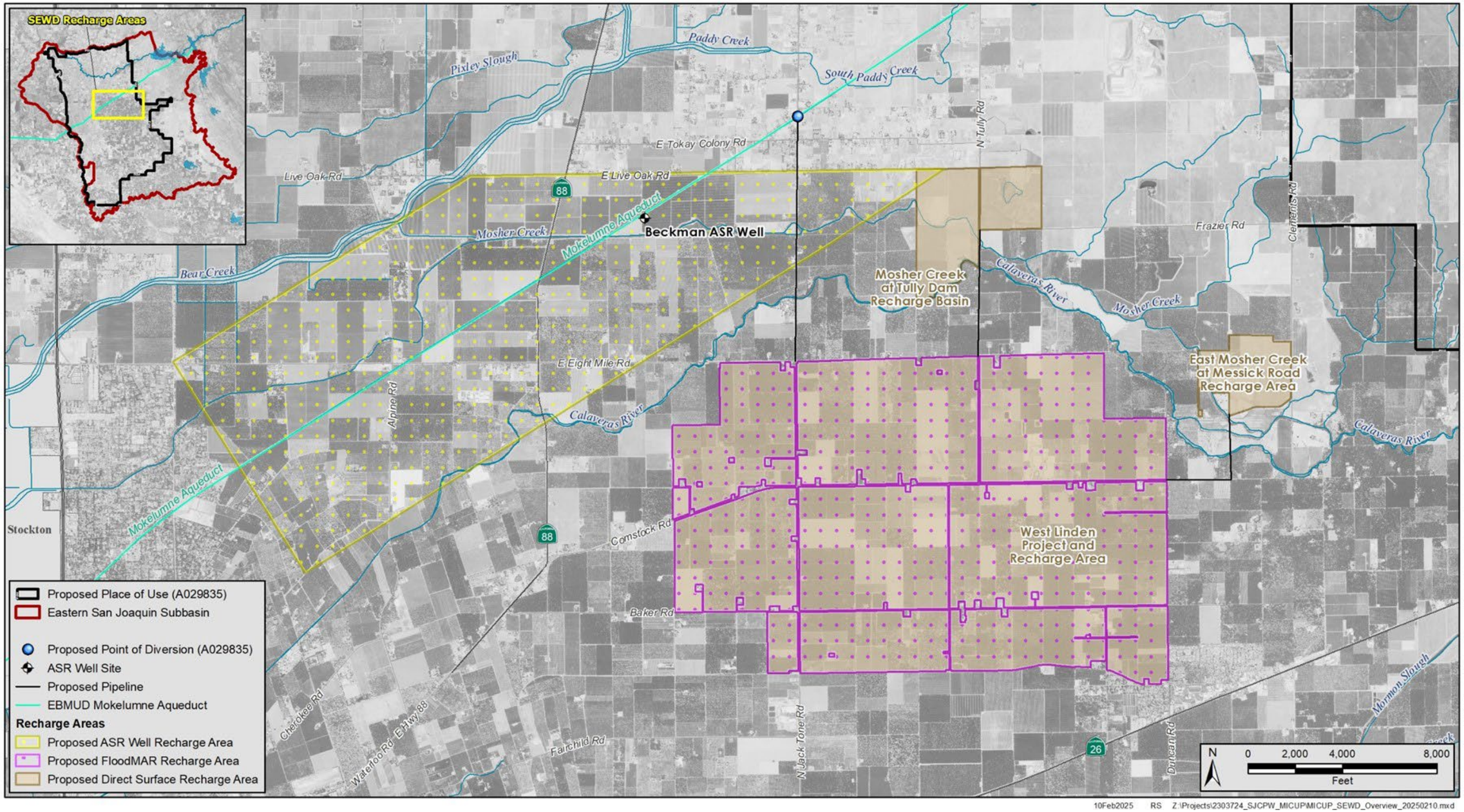
West Linden Recharge Area

The West Linden Recharge Area would require a new turnout on the Mokelumne Aqueduct near Jack Tone Road. Pressurized water diverted from the aqueduct would first travel through a small hydropower facility and sand filtration treatment process, then would be conveyed through approximately 70,000 linear feet of pipeline to provide surface water to agricultural land that currently has access only to groundwater and allow distribution for excess water during extreme water events to recharge via ASR wells, Flood-MAR and dry wells. The proposed pipeline would offset groundwater pumping using surface water for irrigation in the summer months and provide excess water from storm events in the winter for recharge. This water would be recharged through use of ASR and dry wells, in-lieu agricultural irrigation, recharge ponds, or Flood-MAR in the area shown in Figure 3-8. The dry wells would be sized to accommodate the entire flow into the West Linden Recharge Area, but SEWD would also pursue in-lieu irrigation with willing landowners identified to participate and divert MICUP water for agricultural uses when available.

The West Linden Recharge Area is proposed between Jack Tone, Baker, Duncan, and Eight Mile Roads (Figure 3-8). The recharge area would include up to 4 ASR wells and up to 142 dry wells, have a maximum pipeline capacity of 65 cfs, and provide surface water to up to 5,700 acres of farmland.

[13] There are 20 total wells proposed for both NSJWCD and SEWD. These wells may be constructed in either district's areas.

Figure 3-8 MICUP SEWD Overview



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Mosher Creek Recharge Areas

MOSHER CREEK AT TULLY DAM

SEWD also proposes to construct a 125-acre recharge basin and dry wells for the purposes of increased groundwater recharge. Eight fields in the general location shown in Figure 3-8 have been identified as potential recharge locations. SEWD would divert water from the Mokelumne Aqueduct, using the same turnout constructed for the West Linden Recharge Area, discharging into a pipeline running south along Jack Tone Road. Depending on which of the eight fields is chosen as the best recharge site, the pipeline may branch east along Live Oak Road, or the water may be conveyed through a pipeline extended from the West Linden pipeline to this recharge area. Part of the recharge basin may serve as an unlined regulating reservoir during the irrigation season to improve SEWD customer service and provide additional recharge.

EAST MOSHER CREEK AT MESSICK ROAD

SEWD also proposes to construct an 80-acre recharge basin for groundwater recharge. SEWD would divert water from Mokelumne Aqueduct to a pressurized sand filtration treatment process before discharging into a pipeline running south along Jack Tone Road serving the West Linden Recharge Area. The water would be conveyed through a pipeline extended from the West Linden pipeline to a recharge basin in one or more of seven possible fields identified west of and adjacent to Clements Road as seen in Figure 3-8. This water would be used to recharge the aquifer and would be extracted by private groundwater wells in SEWD used for domestic and production agriculture.

3.3.5 City of Stockton

City of Stockton Background

The City of Stockton (City) is located in California's Central Valley, about 60 miles east of the San Francisco Bay Area, within the Eastern San Joaquin Subbasin, as shown in Figure 3-2. The City was incorporated on July 25, 1850, under the general laws of the State of California. Under the charter adopted in 1923, the City operates under a Council-Manager and appointed City Manager form of government. The City of Stockton provides potable water service to City customers and wastewater collection/treatment and stormwater collection and disposal services. The City has more than 50,000 metered water connections in north and south Stockton covering the 64.8-square mile jurisdiction area. Properties in central Stockton receive water services from California Water Service (Cal Water). Figure 3-9 shows the City of Stockton service area.

Existing City of Stockton Infrastructure for MICUP

DELTA WATER TREATMENT PLANT AND INTAKE PUMP STATION

The Delta Water Treatment Plant (DWTP) is located along Lower Sacramento Road, north of Eight Mile Road, between the City of Stockton and City of Lodi, as shown in Figure 3-10. The DWTP treats up to 30 million gallons per day (MGD) of surface water from the San Joaquin and Mokelumne Rivers. The Delta Water Supply Intake pump station is located on the San Joaquin River about 7 miles west of the City. The raw water pipelines extend north from the Delta Water Supply Intake Pump Station and parallels the Empire Tract levee to Eight Mile Road, where the pipelines turn east and parallel the north side of Eight Mile Road to Davis Road. The alignment then turns north,

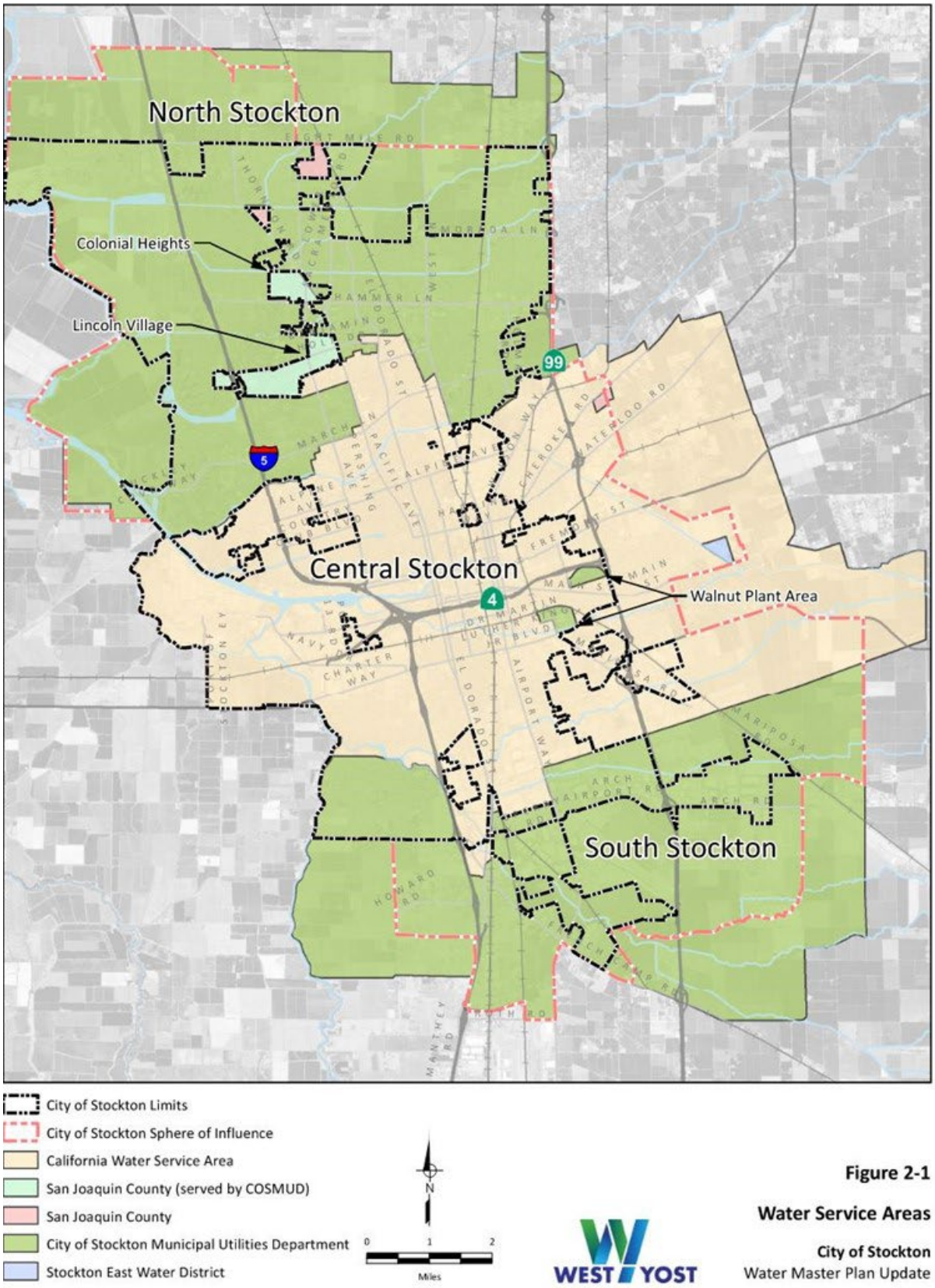
parallel to Davis Road approximately ½ mile, where the pipeline turns east to the DWTP site. This site is located on the west side of Lower Sacramento Road, just north of the City and approximately three miles east of Interstate 5 on a 126-acre parcel. The DWTP occupies approximately 56 acres along the western side of the parcel.

PIPELINES

The City of Stockton has pipelines that are used to convey raw water to the DWTP and treated water to their customers. Sources of water for the DWTP include those listed below. The pipelines that convey water to the DWTP from the Mokelumne River and the Delta are shown in Figure 3-10.

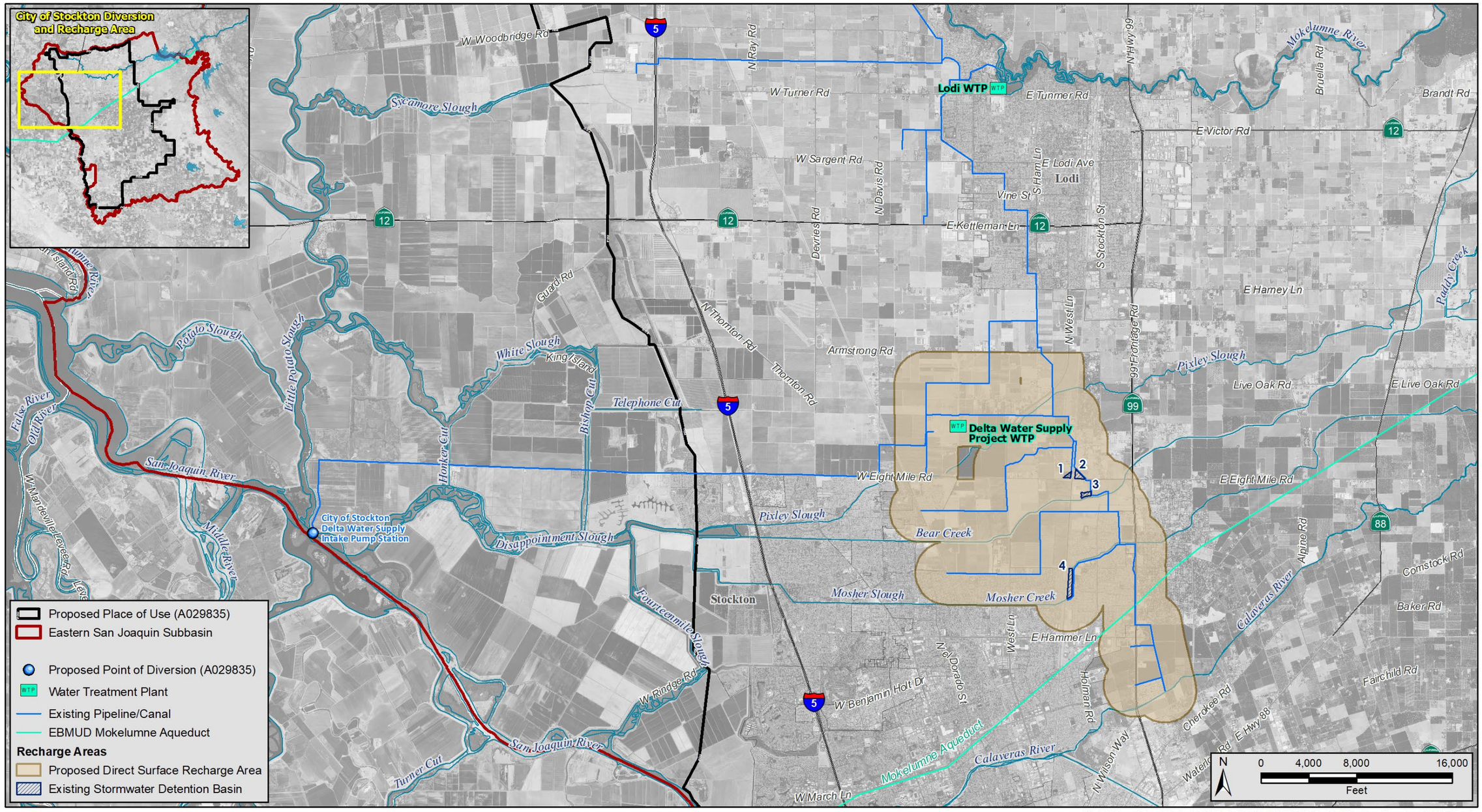
1. Raw surface water from the San Joaquin River is conveyed to the DWTP for treatment.
2. Raw surface water from the Mokelumne River (purchased from WID) is conveyed to the DWTP for treatment. Water can be conveyed from the WID Diversion Dam through the South Main Canal and then through the Wilkerson Canal or Pixley Slough pipeline to the DWTP for treatment.
3. Local groundwater from wells is conveyed into the City's distribution system.
4. Treated water imported from New Melones and New Hogan Reservoir is (purchased from SEWD) conveyed directly into the City's distribution system.

Figure 3-9 City of Stockton Service Area (West Yost, 2021)



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Figure 3-10 MICUP Components – City of Stockton



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STORMWATER BASINS

The City of Stockton operates four fully-constructed and operational storm drain facilities, which are shown in Figure 3-10. These facilities divert stormwater through drainage features in local properties and roadways. These facilities attenuate and promote settling before discharge into canals owned by WID. These basins can be operated in reverse utilizing existing infrastructure to facilitate recharge during periods when stormwater detention is not necessary. The basins are regularly mowed to keep a bare, natural surface. In total, these basins are approximately 31 acres.

REGIONAL CONVEYANCE FACILITIES

The City's stormwater basins receive surface water via WID regional conveyance facilities. WID diverts water primarily from the Mokelumne River at the Woodbridge Diversion Dam which impounds Lodi Lake, as shown in Figure 3-10. The Dam and its fish ladders were constructed in 2003 and replaced an older wooden flashboard dam originally built in 1910. The Dam went through an extensive design and environmental review and permitting process and its fish ladders were designed to CDFG and NMFS's standards for fish ladders. The Dam includes a fish counting system that has been used to monitor the fall up migration of Chinook Salmon, the spring spawning and up-migration of steelhead trout, Pacific lamprey eel and approximately 50 other species of fish that inhabit the Mokelumne River. WID operates the Dam works to re-regulate flows from Camanche Dam made to meet JSA minimum releases below the Dam. Diversions under MICUP that change flows in the Mokelumne River will need to be coordinated with Dam operations to ensure these requirements are met. The existence of Lodi Lake provides the necessary flows through the main diversion canal in WID, which runs underneath Lower Sacramento Road and feeds an extensive network of canals and pipelines to deliver water to the north, west, and south. WID owns and operates over 100 miles of canals and pipelines. Approximately 75 percent of these miles are unlined canals with the other 25 percent being concrete lined canals or pipelines. Fish migrating up and down the Mokelumne River are protected from access to the canal system by a state-of-the-art fish screen at the entrance to the diversion canal from Lodi Lake.

City of Stockton MICUP Components

DWTP Recharge Basin Project

The City is currently under contract for the design and construction of the DWTP Groundwater Recharge Basin Project, which includes new recharge basins and dry wells to be co-located at the DWTP (see Figure 3-11). While evaluated in this MICUP EIR, the City prepared a separate project-level CEQA document in April 2025.[14] The City would use its existing water rights for most deliveries to the proposed infiltration basins. The City currently has projected up to 21,000 AF (30,000 AF after the addition of dry wells) available capacity in the recharge basins. Up to 11,490 AF is projected to be diverted from the San Joaquin River under the City's existing water right permit with an additional 9,510 (18,510) AF of MICUP water to supplement for recharge when available.

The City of Stockton would divert MICUP water from the Mokelumne River using existing diversion facilities owned and operated by WID. The City would use MICUP water when their Delta water right is not fully available between the months of February to June due to endangered species protection. Water diverted from the Mokelumne River would be conveyed through existing canals and/or

[14] City of Stockton, 2025. Delta Water Treatment Plant Groundwater Recharge Basins Project, Initial Study/Addendum, prepared by HELIX Environmental Planning; State Clearinghouse No. 2003112060.

pipelines to the proposed DWTP Groundwater Recharge Basin. The DWTP is currently supplied by the City's diversion in the Sacramento-San Joaquin Delta. MICUP water may also be diverted at this location for recharge at the DWTP, subject to existing rules and restrictions.

The proposed design includes installation of large diameter vertical infiltration slotted wells (dry wells) placed in areas with high permeabilities within proposed recharge basins, to depths of 20 to 25 feet below ground surface, as shown in Figure 3-11 and Figure 3-12. These wells would be placed in large diameter borings filled with gravel to maximize the amount of water that can be directed to these depths. In addition, gravel-filled trenches sloped toward these wells would also be constructed to allow water to flow towards these areas.

The proposed layout includes three separate infiltration basins totaling about 43.5 acres as shown in Figure 3-11 and Figure 3-12. The surface water would be delivered by tapping into the existing raw water supply pipeline to the DWTP facility, or directly from the WID pipeline that parallels the north property boundary. The water would be distributed into each infiltration basin for direct recharge. Each infiltration basin would be excavated to about 3 feet below existing grade. Each infiltration basin would include the installation of large diameter slotted infiltration pipes to a depth of about 20 feet below ground surface to maximize the amount of water infiltrated. These pipes would be located in areas that consist of high permeability soils at 10 feet below ground surface. Trenches graded toward the infiltration pipes would also be constructed to help direct water to these areas.

These basins would be capable of receiving MICUP water from their existing diversion and pipeline on the San Joaquin River or through existing pipelines owned and operated by WID. Water can be conveyed from the WID Diversion Dam through the South Main Canal and then through the Wilkerson Lateral or Pixley Slough pipeline to the DWTP. The distribution of deliveries from the DWTP intake versus deliveries through WID's facilities has not yet been determined.

Figure 3-11 Proposed Layout of DWTP Recharge Basins – Preliminary Subject to Change

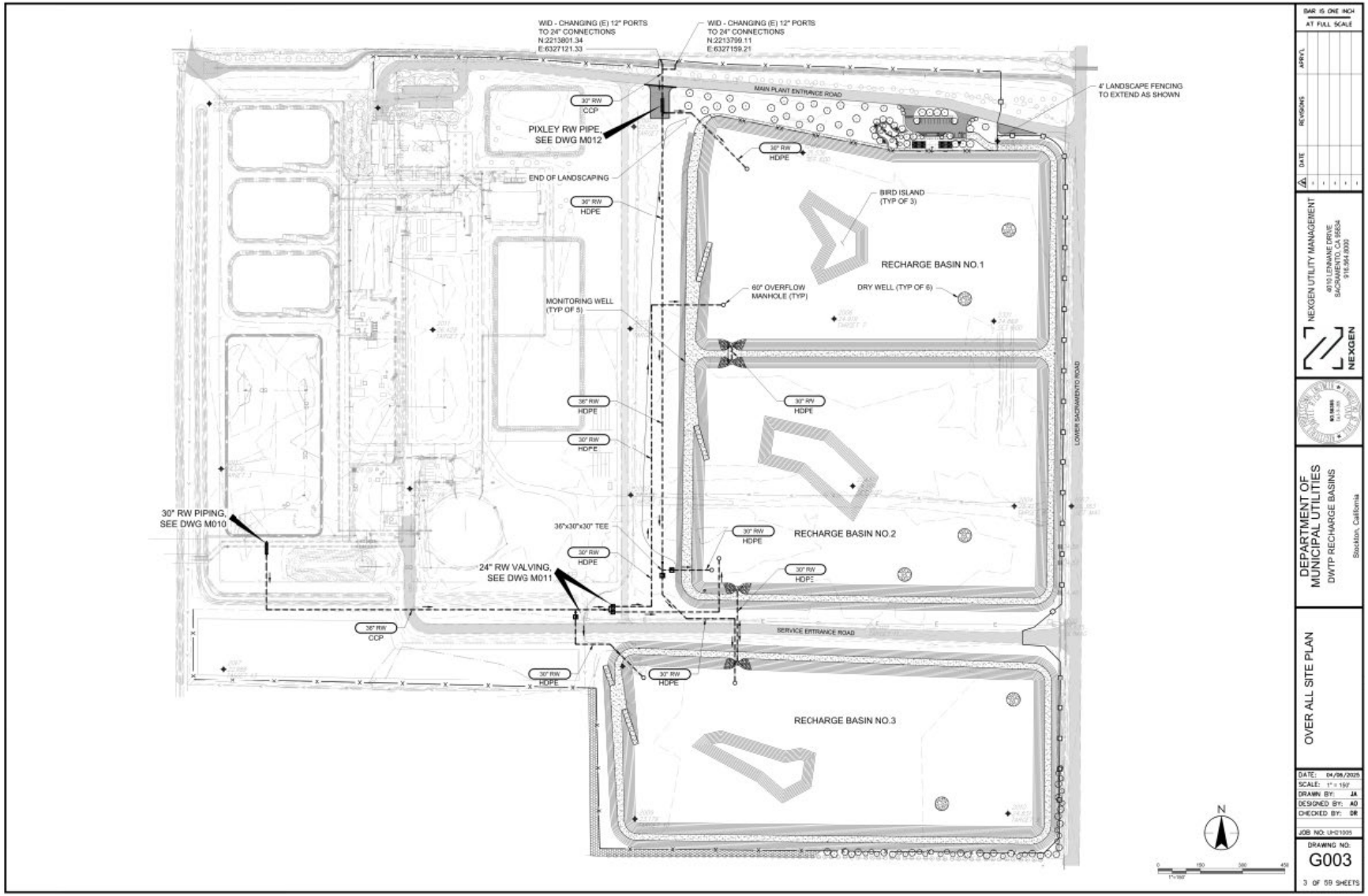
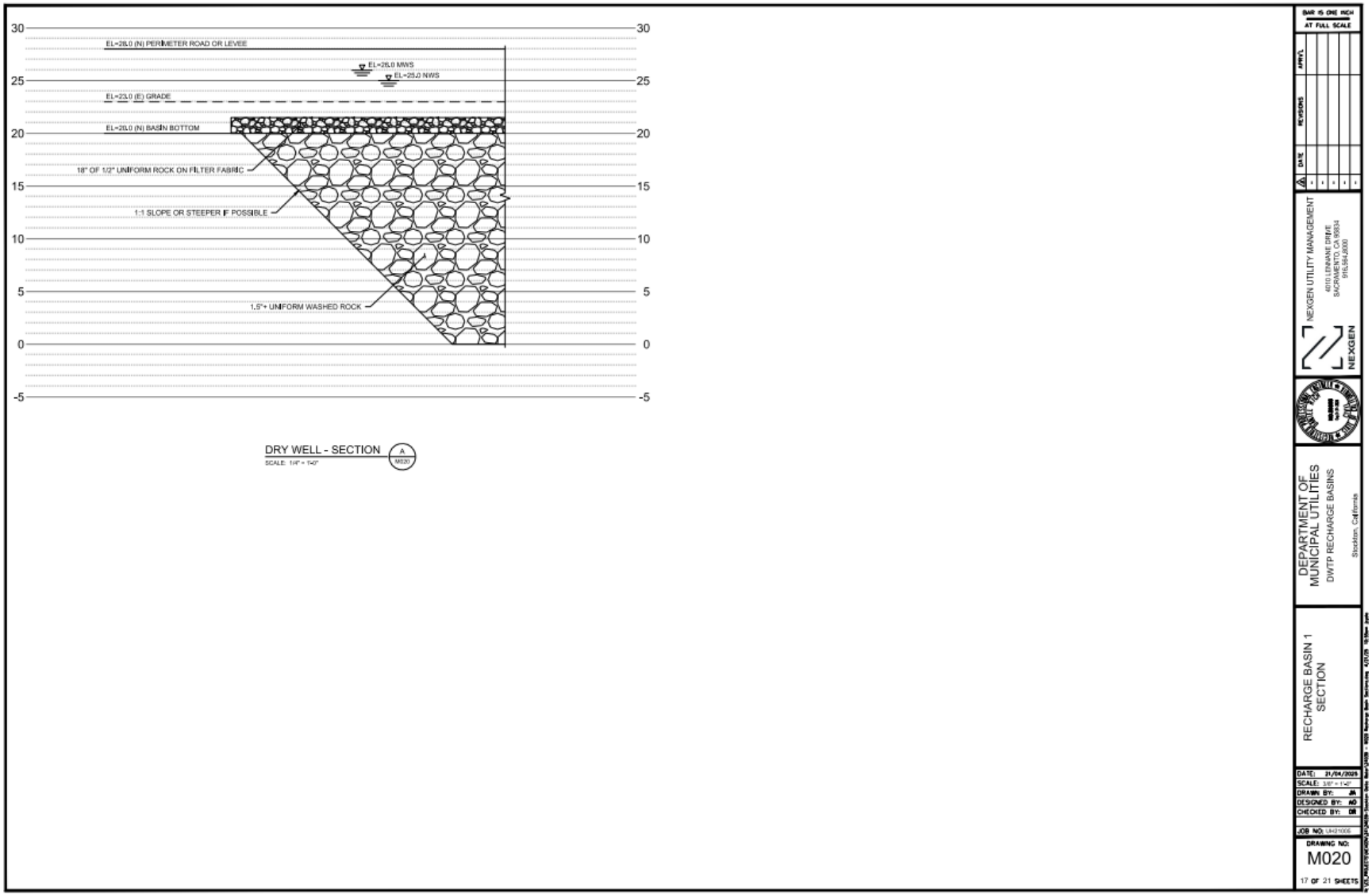


Figure 3-12 Dry Wells Inside the Recharge Basins - Preliminary Subject to Change



Direct Surface Recharge

STORMWATER BASINS

The City of Stockton would divert MICUP water up to 8 cfs to the four existing stormwater detention facilities shown in Figure 3-10 from May to September, ensuring they would be available for use during flood season. These facilities are designed to hold stormwater before releasing it. By directing MICUP diversions into these facilities, City of Stockton would replenish aquifers through direct percolation and enhance water availability for agricultural and urban needs. It is assumed that up to 2,200 AFY could be recharged at the stormwater detention facilities, which cover up to 31 acres.

RECHARGE BASINS

The City of Stockton would construct new groundwater recharge basins, in addition to those described above at the DWTP, on up to 70 acres within 0.5 miles of the WID South Main Canal and other conveyances, south of Armstrong Road, in the area shown in Figure 3-10. The City of Stockton would divert up to 18 cfs to these new recharge basins during the months of December to October, with the exception of two weeks in February when canal maintenance would occur. The City of Stockton assumes a maximum recharge capacity of up to 10,700 AFY.

3.4 MICUP Construction Activities

3.4.1 North San Joaquin Water Conservation District

Expanded Use of North, South and CalFed System

The existing pumping stations are currently being modernized and expanded to improve efficiency and handle higher flow rates. The North System Pump Station and the CalFed Pump Station would be completely replaced and expanded. The South System Pump Station would be upgraded within its existing footprint but would require an additional fish screen to be installed. These changes to the pumping stations would allow the North System Pump Station to be improved to a capacity of up to 60 cfs, the CalFed Pump Station to be improved to up to 20 cfs, and the South System Pump Station to be improved to up to 60 cfs.

Aging underground pipelines would be systematically replaced with larger-diameter concrete pipes, which would continue to enhance the overall system performance. Lastly, PVC lateral pipelines would be tied into the main network to facilitate water recharge on farms and connections to recharge basins. Note that the locations of participating farms and locations and sizes of recharge basins is unknown at this time, so a conservative estimate of this length was assumed. Pipeline enhancements are described further in Table 3-3.

Table 3-3 NSJWCD Proposed Upgraded and New Pipelines

	Approximate Pipeline Length	Pipeline Diameter	Location
North and CalFed Systems	Up to 19,000 feet	18-42 inches	Along Acampo Road starting at furthest west point of system near highway 99 going east to approximately N. Sowles Road
	1,300 feet	42 inches	Recently constructed along N Tretheway Road going south between Acampo Road and the Lakso Property
	1,400 feet	30 inches	Recently constructed along N Tretheway Road going south along the Lakso Property
	1,400 feet	14 inches	Along N Tretheway Road going south to the Reynolds Property
	2,000 feet	48 inches	Along unmarked road from Lakso Property east to the North System Pump Station
	Up to 20,000 feet	Up to 24 inches	Lateral pipelines to connect main pipelines to basins
	Up to 26,000 feet	Up to 42 inches	Unknown pipeline alignment to connect CalFed to the North System
South System	11,500 feet	60 inches	From the pump station east to N. Tretheway, south to Brandt, west along Brandt to private farm road, south along private farm road 2,600 feet south of highway 12 then west 1,300 feet to junction box. This is an upgrade to existing pipe in the current pipeline alignment.
	5,700 feet	48 inches	West from junction box along existing farm road. Upgrade to existing pipe in current pipeline alignment.
	4,000 feet	48 inches	South along existing farm road. Upgrade to existing pipe in current pipeline alignment.
	Up to 50,000 feet	Up to 24 inches	Lateral pipelines to connect main pipelines to basins and irrigated parcels
Expanded Use of Private Pumps	Up to 22,000 feet	15 inches	Pipelines would travel from diversions on the Mokelumne River to parcels of land within the 1-mile buffer. Exact locations would be dependent on landowner involvement.
ASR Wells	Up to 11,000 feet	24 inches	Main connection to new Mokelumne Aqueduct intertie
	Up to 16,000 feet	15 inches	From main connection to the individual ASR Wells. Final locations will be dependent on ASR well locations

Expanded Use of Private Pumps for Flood-MAR and In-lieu Recharge

The existing private pumps PODs and Flood-MAR sites may require improvements such as increasing the pump capacity and adding fish screens to convey water off the Mokelumne River onto the adjacent agricultural fields. The locations of existing private pumps are shown in Figure 3-6; up to 8 sites would be developed for MICUP. If the PODs have existing facilities that can be leveraged, less work may be required for installation, but for MICUP it is assumed that all new facilities would be installed. The upgrades to an existing diversion would include installation of a fish screen, pump station and pipeline to the applicable field. These systems may be temporary or permanent depending on the needs of the individual farmer and agreements with NSJWCD. For all components, it is assumed that eight conical fish screens, eight up to 50-horsepower pumps, and up to 22,000 feet of 15-inch diameter pipeline would be installed.

ASR Wells off Mokelumne Aqueduct

The ASR wells off the EBMUD Mokelumne Aqueduct, as shown in Figure 3-7, would require construction of one new intertie structure into the aqueduct. The specifics and design of these structures would require careful coordination with EBMUD. Up to 20 ASR wells would be installed to a depth of up to 250 ft. To connect the ASR wells to the Aqueduct, it is anticipated that up to 11,000 feet of 24-inch diameter pipeline would be installed for a main connection, and up to 16,000 feet of 15-inch diameter pipeline would be installed as laterals to connect to the ASR wells.

3.4.2 Stockton East Water District

Beckman ASR Well

The existing Beckman ASR Well would be upgraded to inject MICUP water into the aquifer. The amount of upgrading required would depend on its current condition. An assessment will be completed to determine whether all parts are in good condition and function properly. The redevelopment process would also play a crucial role in determining if the well can meet MICUP requirements. However, a new well pump, new piping, and new valving would be necessary. EBMUD's Mokelumne Aqueduct connection near the Beckman Well would also need to be upgraded and a pipeline from the Aqueduct connection to the Beckman Well would need to be constructed.

West Linden & Mosher Creek Recharge Areas

SEWD would construct a new Mokelumne Aqueduct intertie and up to 4 ASR wells and 142 dry wells within the recharge areas shown in Figure 3-8. The water conveyed from the Mokelumne Aqueduct to the West Linden Recharge Area and then to other recharge facilities, ASR wells, and dry wells would be pressurized off the Mokelumne Aqueduct and conveyed through approximately 70,000 linear feet of pipeline.

For the Mosher Creek Recharge Areas, pipelines would be extended from the West Linden Recharge Area to new recharge basins near Mosher Creek at Tully Dam and East Mosher Creek at Messick Road. The estimation of the pipeline length, diameter, and approximate location are described in Table 3-4. Since the proposed SEWD pipelines would cross the Calaveras River at three points, pipeline construction could occur in the river channel as part of the pipeline river crossings, and such construction activities could involve open-cut/trench excavation for installation.

Table 3-4 SEWD Proposed New Pipelines

Approximate Pipeline Length	Pipeline Diameter	Location
Up to 70,000 feet	Up to 60 inches	North South along Jack Tone Road from the point of diversion (POD) on the Mokelumne Aqueduct to the West Linden Recharge Area
Up to 7,000 feet	Up to 60 inches	North South along N Tully Road from Mosher Creek at Tully Dam Recharge Area to the West Linden Recharge Area
Up to 8,000 feet	Up to 60 inches	East West along Comstock Road then North South between Duncan Road and Clements Road from East Mosher Creek at Messick Road Recharge Area to the West Linden Recharge Area
Up to 10,000 feet	Up to 18 inches	Laterals from pipelines to fields identified in Figure 3-8

3.4.3 City of Stockton

DWTP Recharge Basin Project

The DWTP Groundwater Recharge Basin Project would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at the DWTP. No new pipelines would be constructed at the DWTP. The proposed recharge basins and dry wells would be built onsite at the DWTP.

Stormwater Basins

The City of Stockton would utilize existing infrastructure to convey MICUP water to the existing stormwater basins for groundwater recharge. No new pipelines or other infrastructure would be constructed.

Recharge Basins

The City of Stockton would build up to 70 acres of new recharge basins. Lateral pipelines would need to be built to convey water to these basins. It is assumed that up to two basin sites would be identified within the half mile buffer on either side of the existing WID canals. A conservative estimate of the lateral pipeline needed is assumed to be 6,000 linear feet of 18-inch diameter pipeline, depending on the final basin. Table 3-5.

Table 3-5 City of Stockton Proposed Lateral Pipelines

Approximate Pipeline Length	Pipeline Diameter	Location
Up to 6,000 feet	Up to 18 inches	Laterals from existing surface conveyance to new recharge basins in Figure 3-10, subject to change depending on final basin locations

3.4.4 Construction Process and Equipment

This section identifies the types of equipment typically used for construction of the individual MICUP components, but the planning-level assumptions would need to be assessed during final design, including potential specialized or custom equipment.

Construction of water diversion, conveyance, and recharge facilities under MICUP may first require land acquisition and would require the following construction activities.

- **Pipeline** construction work would involve tasks such as clearing and grubbing using bulldozers, excavators, and grapple skidders, as well as potholing with vacuum excavators. Trench excavation would be performed by trenchers, backhoes, and excavators, followed by backfilling using dump trucks and soil compactors.
- **Recharge basin** construction would involve construction activities that are similar to pipelines, with clearing and grubbing, earthwork (excavators, loaders, dump trucks), earthen berm formation to create basins, turnout structure integration for water flow control, and structures managing water distribution.
- **Dry well** construction would require equipment such as drilling rigs for boring holes, excavators for digging, and gravel packers for placing gravel around the perforated casing.
- **ASR well** construction would require a drill rig, which would be operated constantly for 24 hours for a limited period of time, and bentonite concrete slurry to maintain the well hole and create a

casing for the upper segment of the well. Pump tests also would be required to evaluate pump design and parameters and well capacity.

- **Pump station expansion** construction could require limited amounts of vegetation removal, excavation, and grading at existing pump stations.
- **Flood-MAR** may require construction of earthen berms to contain water, depending on the topography and conveyance system of the site. Depending on the existing crops and management of the site, the berms may be temporary.

The exact equipment needed would depend on the specific requirements and the local conditions at each site. The estimated construction equipment for each Partner Agency and their proposed MICUP components are listed in Table 3-6 through Table 3-8.

Table 3-6 Estimated Construction Equipment Use - NSJWCD

Equipment			MICUP Component – Equivalent Usage (Days)					
General Name	HP	Specific Name	North System	South System	PODs	ASR Wells	Recharge Basins	Total
Dozer	130	Caterpillar D4, John Deere 650	0	0	0	0	840	840
Excavator (M)	200	John Deere 245G, 328D	175	148	106	150	1,035	1,614
Excavator (L)	350	Hitachi 450/470 Caterpillar CP-653E	125	83	180	0	0	388
Compactor	150	Caterpillar CP-653E	254	186	286	150	195	1,071
Loader (S)	80	John Deere 210LE	150	115	233	325	308	1,131
Loader (L)	150	Volvo L120C	209	186	106	150	0	651
Telehandler	120	JLG 943	41	93	180	0	0	314
Water Truck	400	8000 gal.	150	93	233	325	2,070	2,871
Scraper	700	Caterpillar 637E	0	0	0	0	2,520	2,520
Drill Rig	400	Estimated Ford truck F550 HP	0	0	0	250	0	250

Table 3-7 SEWD Estimated Construction Equipment Use - SEWD

Equipment			MICUP Component – Equivalent Usage (Days)			
General Name	HP	Specific Name	West Linden Recharge Area	Mosher Creek at Tully Rd	East Mosher Creek at Messick Rd	Total
Dozer	130	Caterpillar D4, John Deere 650	0	73	56	129
Excavator (M)	200	John Deere 245G, 328D	361	90	69	520
Excavator (L)	350	Hitachi 450/470 Caterpillar CP-653E	154	0	0	154
Compactor	150	Caterpillar CP-653E	469	17	13	499
Loader (S)	80	John Deere 210LE	469	27	21	517
Loader (L)	150	Volvo L120C	364	0	0	364
Telehandler	120	JLG 943	128	0	0	128
Water Truck	400	8000 gal.	359	179	138	676
Scraper	700	Caterpillar 637E	0	218	168	386
Drill Rig	400	Estimated Ford truck F550 HP	213	0	0	213

Table 3-8 Estimated Construction Equipment Use – City of Stockton

Equipment			MICUP Component – Equivalent Usage (Days)		
General Name	HP	Specific Name	Dry Wells	Recharge Basins	Total
Dozer	130	Caterpillar D4, John Deere 650	0	294	294
Excavator (M)	200	John Deere 245G, 328D	18	362	380
Excavator (L)	350	Hitachi 450/470 Caterpillar CP-653E	8	0	8
Compactor	150	Caterpillar CP-653E	24	68	92
Loader (S)	80	John Deere 210LE	24	110	134
Loader (L)	150	Volvo L120C	18	0	18
Telehandler	120	JLG 943	0	0	0
Water Truck	400	8000 gal.	18	725	743
Scraper	700	Caterpillar 637E	0	882	882
Drill Rig	400	Estimated Ford truck F550 HP	12	0	12

For all Partner Agencies, the construction of proposed pipelines is assumed to have 3.5 feet of cover with 6-inches of bedding and 12-inches of clearance from the trench wall on each side. The trench width would be wider if the trench is sloped instead of shored. This could make the trench up to 11.5-feet wide for the 60-inch pipe diameter or somewhere in between if it is only necessary to shore 5-feet to the bottom. The estimation of depth of excavation and width of the trenches for various pipe diameters is provided in Table 3-9.

Table 3-9 Estimated Excavation for Various Pipe Sizes

Pipe Diameter (inches)	Typical Depth of Excavation (feet)	Max Expected Excavation (feet)	Width of Trenches (feet)
60	9	15	7
48	8	15	6
42	7.5	15	5.5
30	6.5	15	4.5
20	6	15	3.7
18	6	15	3.5
14	5.5	15	3.2

3.4.5 Construction Schedule

The schedule estimates provided in Table 3-10 assume that MICUP components would not be phased, and that no components would be built concurrently which may be greatly reduced if working on multiple component sites simultaneously. It should also be noted that all components depend on funding so there could be long delays between portions being completed. The schedules do not include any permitting or design time. Once the water right permit is issued by the SWRCB, then construction of MICUP components would be initiated.

Table 3-10 MICUP Estimated Construction Schedule

MICUP Component	Work Months
NSJWCD	
North and CalFed Systems	36
South System	28
Existing POD Flood-MAR	58
ASR Wells	80
Recharge Basins	100
Stockton East Water District	
Beckman ASR Well	4
West Linden Recharge Area	4
Mosher Creek Recharge Areas	6
City of Stockton	
Dry Wells	4
DWTP Groundwater Recharge	30
Recharge Basins	5

3.5 Operation

3.5.1 MICUP Operations

The County and the Partner Agencies would coordinate the implementation of MICUP through an Operations Working Group. The County and the Partner Agencies would enter into an Operating Agreement that includes criteria for allocating water under the MICUP water right permit between them when MICUP water becomes available for A029835. The Operations Working Group would agree on water availability under A029835 consistent with the terms and conditions imposed on A029835, allocate water to the Partner Agencies, monitor and collect data on Mokelumne River flow and diversions, and take other actions required to comply with the terms and conditions of the water right permit issued for A029835. The Operations Working Group would include EBMUD as the owner/operator of Pardee and Camanche Dam Reservoirs and the Mokelumne Aqueduct, to coordinate the releases of water available for MICUP. As stated above in *Section 3.3, Proposed MICUP Project*, the availability of stored water for MICUP would be determined by EBMUD when water EBMUD has stored becomes surplus to its water needs and existing operational, permitting or contractual requirements including releases for senior water rights and required fishery flows. MICUP would be operated subject to the JSA – and/or any subsequent Agreements to Support Healthy Rivers and Landscapes in California - such that MICUP diversions of natural flow or releases from storage in the Mokelumne River would be more than the required releases, similar to existing operating conditions. Ultimate decisions regarding operation of diversion facilities on the Mokelumne River shall remain solely within the prerogative of the Partner Agency that controls the operation of each facility.

EBMUD's operation of Pardee and Camanche Reservoirs would not change because of MICUP. EBMUD currently determines when it must bypass flow that exceeds its ability to store (because of water right limits or the flood control curve rules). Some of this water may be available for MICUP direct diversion below Camanche between December 1 and July 1. EBMUD also currently determines when to make releases from the reservoirs of water that EBMUD has stored but exceeds

operational demands and regulatory requirements. The County and EBMUD will have an operating agreement that would address the release of stored water between July 1 through October 31 for rediversion to MICUP projects.

All MICUP diversions would be in accordance with requests for releases by each Partner Agency, subject to agreements, and reported to the SWRCB.

3.5.2 MICUP Water Right Coordination and Use

North San Joaquin Water Conservation District

Upon completion of all MICUP components, NSJWCD would have the capacity to divert up to approximately 84,500 AFY for MICUP from December to October. This capacity would include diversions during the MICUP Direct Diversion Window (December to June) of 59,800 AFY and during the MICUP Re-Diversion Window (July to October) of 24,700 AFY. Annual capacity is further detailed in Table 3-11.

NSJWCD currently utilizes water from water right Permit 10477 to supply landowners with up to 20,000 acre-feet per year for in-lieu irrigation purposes. For MICUP, this allocation would serve as the assumed capacity for in-lieu water. It is assumed that MICUP water may be utilized instead of Permit 10477 for making in-lieu deliveries when available at NSJWCD's discretion. This substitution capability allows for the deferral of Permit 10477 water usage to subsequent months (when NSJWCD could divert Permit 10477 water from storage) if there is still demand for in-lieu water, but no MICUP water is available. The annual maximum capacity of MICUP water leveraged by NSJWCD would be unchanged by substituting in-lieu deliveries.

Stockton East Water District

Upon completion of all MICUP components, SEWD would have the capacity to recharge approximately 111,600 acre-feet per year for MICUP from December to October. This capacity would include diversions during the MICUP Direct Diversion Window (December to June) of 69,600 AFY and during the MICUP Re-Diversion to Storage Window (July to October) of 42,000 AFY. The details of this annual capacity are shown in Table 3-11.

City of Stockton

Upon completion of all MICUP components, the City of Stockton would be able to recharge approximately 29,610 AFY for MICUP. The details of this annual capacity are shown in Table 3-11.

3.5.3 Maintenance

To divert and pump water, MICUP would require operation and maintenance of the pumps, pipelines, and diversion structures. The operation of pumping stations would involve monitoring and controlling the pumps to ensure they are working at the desired capacity. This would include adjusting pump speeds, checking for leaks or malfunctions, and performing regular maintenance to keep the pumps in good working condition. In the case of MICUP, the pumps at the stations would need to be operated to achieve the desired flow rates. Pumps may be operated for up to 12 months per year, depending on hydrologic conditions and flow available for diversions.

The pipelines would carry water from the pumping stations to the desired locations. Operating the pipelines would involve monitoring the flow of water through the pipes, checking for leaks or blockages, and maintaining the pipelines to prevent corrosion or other damage.

Diversion structures are used to direct water from one location to another. Operating these structures would involve adjusting the flow of water as needed based on demand, monitoring the condition of the structures, and performing maintenance to ensure they continue to function properly. For MICUP, new diversion structures would be built to divert water from the EBMUD Mokelumne Aqueduct, and these would be operated to achieve the desired diversion rate. All MICUP diversions would be metered and recorded by a Supervisory Control and Data Acquisition (SCADA) system installed at pump stations.

Pressurized sand filtration processes, ASR and dry wells require maintenance to ensure their effectiveness. Maintenance would include removing debris, checking for standing water, and regular inspections and cleanings to prevent clogs and maintain proper drainage.

Recharge basins would require regular sediment removal, vegetation management, debris clearing, and periodic inspections to maintain their efficiency and recharge rate and prevent blockages. Additionally, water quality monitoring would ensure that the water entering the basin is free from contaminants. It is assumed that yearly maintenance would occur for two weeks when basins are empty.

In addition to these activities, the operation of these facilities would involve required compliance with relevant regulations, such as those related to water quality or environmental protection. These could include regular testing of water for contaminants, reporting to regulatory agencies, and implementing measures to protect local ecosystems.

Overall, operation and maintenance of MICUP facilities would not require additional staff. Vehicle trips related to operation and maintenance of proposed MICUP facilities would be nominal and incorporated into existing O&M facility plans.

3.5.4 Energy Consumption

The energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. Each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. These measures would help to reduce MICUP's overall energy consumption, including non-renewable energy consumption.

The Mokelumne Aqueduct is pressurized around 200 PSI near Jack Tone Road due to the elevation difference of the storage reservoirs to the turnout sites. While the Mokelumne Aqueducts operate at high pressure under gravity operations, gravity capacity is historically limited, and pumped operations will likely be required to wheel water for MICUP projects. Pumped operations are currently only available on Mokelumne Aqueducts No. 2 and 3 and the respective pumping plants must operate with multiple pumps and up to approximately 3,500 HP. Upon receiving a request to use Mokelumne Aqueduct capacity, EBMUD would perform its due diligence and determine whether capacity is available. Specific requirements, restrictions, and conditions may apply to utilize available capacity in the Mokelumne Aqueducts.

It is not anticipated that there would be a change in energy consumption for the Flood-MAR, stormwater detention facilities, unlined canal, and recharge basins as those operate via gravity flow.

However, maintenance activities, such as the replacement of parts and the regular equipment servicing would consume energy.

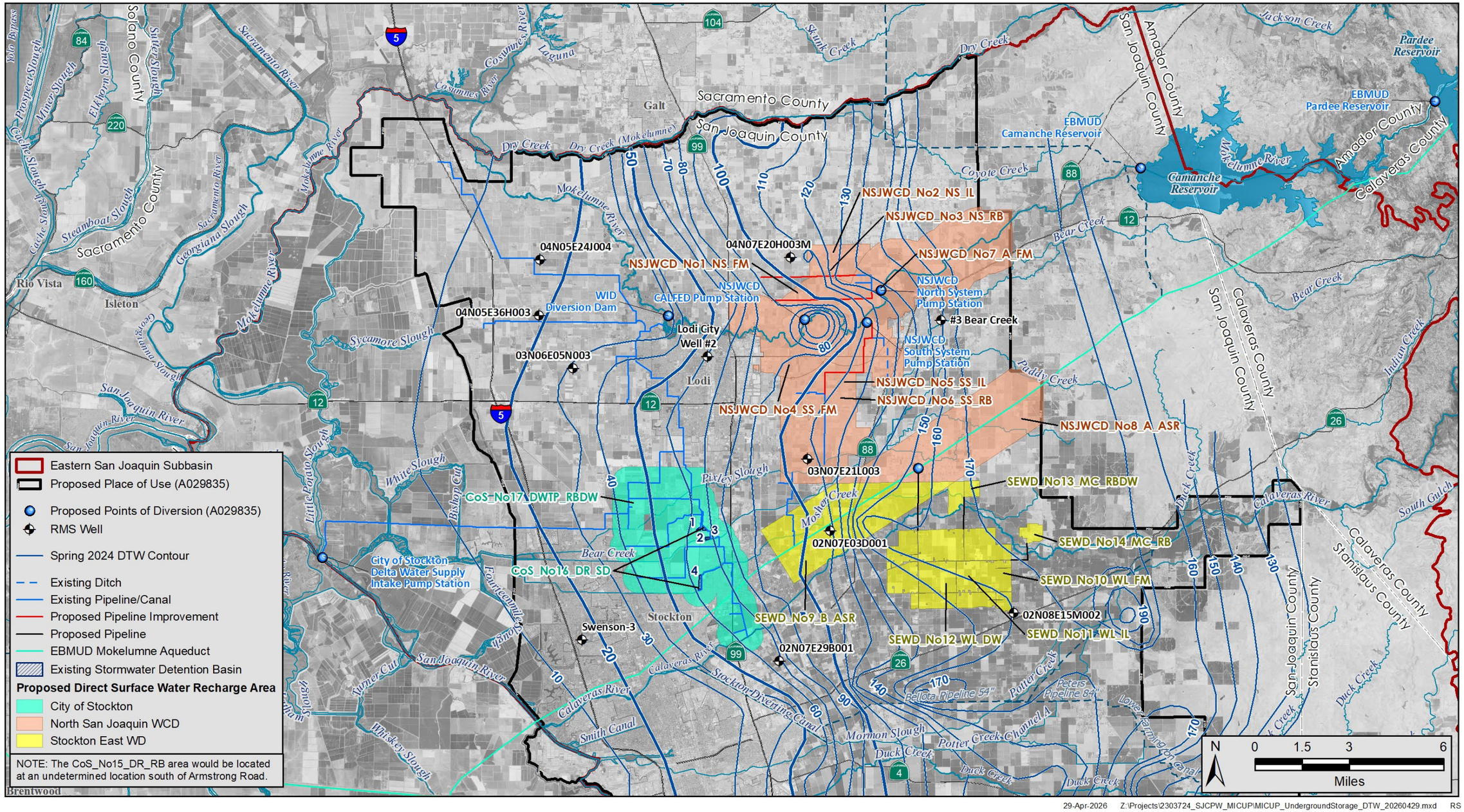
Water conveyed through the DWTP pipeline would require energy use to power the pump station. In addition, there would be an incremental increase in energy use related to operation of enlarged NSJWCD North System, South System, and CalFed pump stations.

3.5.5 Groundwater Monitoring

Operation of MICUP would include monitoring groundwater levels, in conjunction with existing and ongoing monitoring that is required for compliance with SGMA as defined by the ESJ GSP. There are up to nine existing monitoring wells that could be used to estimate the depth to water for each of the recharge areas within MICUP.[15] These wells are all identified as representative monitoring sites (RMS) for groundwater level monitoring in the 2024 Amendment to the ESJ GSP. The location of these wells relative to the MICUP recharge areas is shown in Figure 3-13.

[15] Supplement to Water Rights Application, MICUP Underground Storage Supplement Supporting Information, San Joaquin County, California, Submitted to San Joaquin County, Submitted by GEI Consultants, Inc., April 22, 2026.

Figure 3-13 MICUP Monitoring Well Locations



29-Apr-2026 Z:\Projects\2303724_SJCPW_MICUP\MICUP_UndergroundStorage_DTW_20260429.mxd RS

3.6 MICUP Components Summary

Table 3-11 Summary of MICUP Components

MICUP Component	Diversion Capacity (cubic feet per second)	Maximum Annual MICUP Direct Diversion Window (acre-feet)	Maximum Annual Rediversion from Storage (acre-feet)	Direct Surface Recharge (acres)	In-Lieu Recharge (acres)	Flood-MAR Recharge (acres)	Pipelines (linear feet)	Number of ASR Wells	Number of Dry Wells
North San Joaquin Water Conservation District									
North, CalFed and South System Expansion (max expansion)	130	47,000	19,800	Up to 1,000	Up to 7,000	Up to 500	Up to 140,900 (new and upgraded)	N/A	N/A
ASR Wells off Mokelumne Aqueduct	20	8,500	4,900	N/A	N/A	N/A	Up to 27,000 (new)	20	N/A
Expanded Use of Private Pumps	24	4,300	N/A	N/A	N/A	Up to 800	Up to 22,000 (new)	N/A	N/A
NSJWCD Total		**59,800**	**24,700**	**Up to 1,000**	**Up to 7,000**	**Up to 1,300**	**Up to 189,900**	**Up to 20**	**N/A**
Stockton East Water District									
East Mosher Creek at Messick Road	46 (from West Linden turnout)	19,600	11,300	80 (new)	N/A	N/A	8,000 LF (new)	N/A	N/A
Mosher Creek at Tully Dam	53 (from West Linden turnout)	22,600	13,100	125 (new)	N/A	N/A	7,000 LF (new)	N/A	N/A
West Linden Recharge Area	65 (new)	27,400	15,800	N/A	5.700	5,700	70,000 LF (60”) 10,000 LF (18”) (new)	4 (new)	142 (new)
ASR Wells off Mokelumne Aqueduct – Beckman Well	0.7 (Beckman)	300	200	N/A	N/A	N/A	N/A	1 (new)	N/A
SEWD Total		**69,900**	**40,400**	**205**	**5,700**	**5,700**	**95,000 LF**	**5**	**142**
City of Stockton									
DWTP Recharge Basins	31 (existing)	7,300	1,500	43.5 (new)	N/A	N/A	N/A	N/A	9 (new)
Stormwater Basins	8 (existing)	1,000	1,700	31 (existing)	N/A	N/A	N/A	N/A	N/A
Recharge Basins	18 (new)	6,900	3,800	70 (new)	N/A	N/A	6,000 LF (new)	N/A	N/A
City of Stockton Total		**15,200**	**7,000**	**145**	**N/A**	**N/A**	**6,000 LF**	**N/A**	**9**

3.7 Required Actions and Approvals

Implementation of the proposed project would include but not be limited to the following approvals:

- EIR Certification by San Joaquin County
- MICUP component construction approvals by NSJWCD, SEWD, and City of Stockton
- Issuance of a water rights permit by SWRCB
- Well Drilling permits by San Joaquin County

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4 Environmental Impact Analysis

Introduction to the Analysis

In compliance with *CEQA Guidelines* Section 15125 and 15126, this chapter sets forth the physical and regulatory environmental setting and addresses the potential significant environmental impacts of the MICUP (proposed project) with respect to existing baseline conditions in the MICUP area, which includes the Place of Use (project area).

The baseline used for the analysis of environmental impacts under the California Environmental Quality Act (CEQA) and CEQA Guidelines reflects the conditions present at the time of the Notice of Preparation (NOP) for this EIR, published on July 2, 2024, unless otherwise stated. The potential impacts of the proposed project are compared against the existing baseline conditions for each environmental resource topic.

The following environmental resource topics are assessed in detail in this chapter in accordance with *CEQA Guidelines* Appendix G:

- Aesthetics
- Agriculture and Land Use Planning
- Air Quality
- Biological Resources
- Cultural and Tribal Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions and Energy
- Hazards, Hazardous Materials, and Wildfire
- Hydrology and Water Quality – Surface Water
- Hydrology and Water Quality – Groundwater
- Noise
- Transportation

The *CEQA Guidelines* Section 15128 requires that an EIR "contain a statement briefly indicating the reasons that various possible significant effects of a project were determined not to be significant and therefore were not discussed in detail in the EIR." The following environmental resource topics from *CEQA Guidelines* Appendix G are not discussed in detail in this Draft EIR, because no significant impacts would occur as a result of construction or operation of the proposed project. As such, these topics are addressed in Section 4.13, Effects Found Not to Be Significant, following the aforementioned topical sections.

- Forestry Resources
- Mineral Resources
- Population and Housing
- Public Services and Recreation
- Utilities and Service Systems

Format of the Environmental Analysis

This EIR provides analyses of impacts for those environmental topics where it was determined in the NOP, or through subsequent analysis, that the proposed project would result in potentially significant effects. "Significant effect" is defined by *CEQA Guidelines* Section 15382 as:

> "a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant."

Sections 4.1 through 4.12 discuss the environmental impacts that may result with approval and implementation of the proposed project. The format of the environmental analysis for each environmental topic included in Sections 4.1 through 4.12 includes an introduction, environmental setting, regulatory framework, impact analysis, mitigation measures (if required), and cumulative impacts analysis, as described further below.

In addition, the structure of the analyses is organized by Partner Agency and by MICUP components described in Chapter 3, Project Description. The analyses of MICUP components are generally grouped by facility type, including (1) Pump Stations and Diversions; (2) Pipelines; and (3) Recharge Facilities (recharge basins, Flood-MAR, ASR wells and dry wells).

Previous CEQA Documentation

Proposed MICUP components would be constructed by the individual Partner Agencies and cooperatively operated through the Operations Working Group. Many of the MICUP facilities would be used by the Partner Agencies to deliver and/or recharge water supplies secured through rights, entitlements, or agreements other than MICUP. As such, some of the proposed MICUP facilities may already be under construction or may have been evaluated previously in accordance with CEQA, such as the expansion of the NSJWCD South System Pump Station to 40 cfs, which was analyzed in the adopted 2016 Mitigated Negative Declaration[1] for the DREAM Project and NSJWCD South System Improvements. Expansion beyond this capacity is evaluated in this EIR. Improvements to the existing NSJWCD South System pipeline conveyance system also were evaluated programmatically in the 2011 Eastern San Joaquin Basin Integrated Conjunctive Use Program PEIR.[2] Additional improvements are evaluated in this EIR. In addition, the City of Stockton's DWTP Recharge Basin Project is also currently under construction. While evaluated in this MICUP EIR, the City prepared a separate project-level CEQA document in April 2025.[3] The analyses in this EIR are consistent with the impacts and mitigation measures in the City's CEQA document.

Introduction

For each environmental resource topic, the introduction summarizes what will be discussed in the respective section and states what informational documents are used as the basis for the analysis.

Environmental Setting and Baseline

In accordance with *CEQA Guidelines* Section 15125(a), the environmental setting describes the existing baseline regional and local physical conditions of the project area and surroundings (e.g., existing land uses, transportation conditions, noise environment) with respect to each resource topic at the time the NOP was issued. Conditions are described in sufficient detail and breadth to allow a general understanding of the environmental impacts associated with implementation of the proposed project to determine whether a significant environmental impact would occur (*CEQA Guidelines* Section 15126.2(a)). Extraneous setting information that does not shed light on the impact analysis is not included in this EIR (*CEQA Guidelines* Section 15125(a)).

[1] San Joaquin County Department of Public Works, 2016
[2] Northeastern San Joaquin County Groundwater Banking Authority, 2011. Eastern San Joaquin Basin Integrated Conjunctive Use Program, Programmatic Environmental Impact Report.
[3] City of Stockton, 2025. Delta Water Treatment Plant Groundwater Recharge Basins Project, Initial Study/Addendum, prepared by HELIX Environmental Planning; State Clearinghouse [SCH] No. 2003112060.

CEQA Guidelines and case law recognize that the date for establishing an environmental baseline cannot be rigid (see CEQA Guidelines Sections 15146, 15151, and 15204). Environmental conditions may also change during the period of environmental review, and temporary lulls or spikes in operations that happen to occur during the period of review should not depress or elevate the baseline. Furthermore, environmental conditions may vary from year to year, and in some cases, it is necessary to consider conditions over a range of time periods.

Regulatory Framework

The regulatory framework describes the relevant federal, California, regional, and local regulatory requirements that are directly applicable to the environmental topic being analyzed. Where the project area and its surroundings fall within the jurisdiction of federal, State, and local regulatory agencies, the proposed project would be subject to the laws, rules, regulations, and policies of those agencies. These regulations are intended to guide development, reduce adverse effects on sensitive resources, and/or offer general guidance on the protection of such resources. These rules may also set the standards, in the form of significance criteria or thresholds of significance as discussed below, by which the potentially significant impacts of the proposed project are evaluated.

Impacts and Mitigation Measures

For each environmental topic, the impact analyses evaluate the potential for the implementation of the MICUP to result in direct and indirect adverse impacts on the existing physical environment, with consideration of both construction and operation impacts. The significance criteria questions for environmental impacts are listed at the beginning of this subsection, followed by the discussion of the approach to the analysis, specific thresholds of significance that may be applied to evaluate the impacts of the proposed project, and related comments that were received during the NOP public scoping period, if any.

The level of significance for each environmental impact examined in this Draft EIR is determined by considering the predicted magnitude of the impact in relation to the baseline environmental setting and assuming implementation of applicable regulatory requirements, measured against the significance criterion. Based on the significance criterion, the significance of each potential environmental impact is determined according to the following categories:

- **No Impact.** A determination of No Impact is reached if no potential exists for impacts or if the environmental resource does not occur in the project area or the area of potential impacts.
- **Less Than Significant Impact.** This determination applies if the impact does not exceed the defined significance threshold or would be eliminated or reduced to a less than significant level through compliance with existing local, state, and federal laws and regulations. No mitigation is required for impacts determined to be less than significant.
- **Less Than Significant Impact with Mitigation.** This determination applies if the proposed project would result in a significant impact, exceeding the established significance threshold, but feasible mitigation is available that would reduce the impact to a less than significant level.
- **Significant and Unavoidable Impact.** This determination applies if the proposed project would result in an adverse impact that exceeds the established significance threshold, and no feasible mitigation is available to reduce the impact to a less than significant level. Therefore, the residual impact would be significant and unavoidable.

As part of the impact analysis, mitigation measures are identified, where feasible, for impacts considered significant or potentially significant consistent with CEQA Guidelines Section 15126.4, which states that an EIR "shall describe feasible measures which could minimize significant adverse impacts." CEQA requires that mitigation measures have an essential nexus and be roughly proportional to the significant impact identified in the EIR.

Impacts are numbered and shown in bold type. The corresponding mitigation measures, where identified, are numbered and indented, and follow the impact statements. Impacts and mitigation measures are numbered consecutively within each topic and include an abbreviated reference to the impact section (e.g., "AQ" for Air Quality). The following abbreviations are used for individual topics:

- Aesthetics (AES)
- Agriculture and Land Use Planning (AG)
- Air Quality (AQ)
- Biological Resources (BIO)
- Cultural and Tribal Cultural Resources (CR)
- Geology and Soils (GEO)
- Greenhouse Gas Emissions and Energy (GHG)
- Hazards, Hazardous Materials, and Wildfire (HAZ)
- Hydrology and Water Quality - Surface Water (SW)
- Hydrology and Water Quality – Groundwater (GW)
- Noise (NOI)
- Transportation (TRA)

Cumulative Impacts

This subsection evaluates the potential for the proposed project in conjunction with other identified plans and projects (see Table 4-1) to result in cumulative impacts. The goal of this analysis is to determine whether the overall long-term impacts of all such plans and projects would be cumulatively significant, and to determine whether the proposed project on its own would cause a "cumulatively considerable" incremental contribution to any such cumulatively significant impacts. To determine whether the overall long-term impacts of all such plans and projects would be cumulatively significant, the analysis generally considers the following:

- The area in which impacts of the proposed project would be experienced;
- The impacts of the proposed project that are expected in the project area;
- Other past, proposed, and reasonably foreseeable plans and projects that have had or are expected to have impacts in the same area;
- The impacts or expected impacts of these other plans and projects; and
- The overall impact that can be expected if the individual impacts from each plan or project are allowed to accumulate.

"Cumulative impacts" refers to two or more individual impacts that, when considered together, are considerable, or that compound or increase other environmental impacts (CEQA Guidelines Section 15355). Cumulative impacts can result from individually minor but collectively significant impacts taking place over time. If the analysis determines that the potential exists for the proposed project,

taken together with other past, present, and reasonably foreseeable future plans and projects, to result in a significant or adverse cumulative impact, the analysis then determines whether the proposed project's incremental contribution to any significant cumulative impact is itself significant (i.e., "cumulatively considerable"). The cumulative impact analysis for each individual resource topic is presented in each resource section of this chapter immediately after the description of the direct and indirect impacts and identified mitigation measures.

According to Section 15130(b) of the *CEQA Guidelines*:

> [t]he discussion of cumulative impacts shall reflect the severity of the impacts and their likelihood of occurrence, but the discussion need not provide as great detail as is provided for the effects attributable to the project alone. The discussion should be guided by standards of practicality and reasonableness and should focus on the cumulative impact to which the identified other projects contribute rather than the attributes of other projects which do not contribute to the cumulative impact.

CEQA Guidelines Section 15064(h)(4) also states that:

> [t]he mere existence of significant cumulative impacts caused by other projects alone shall not constitute substantial evidence that the proposed project's incremental effects are cumulatively considerable.

Therefore, it is not necessarily true that, even where cumulative impacts are significant, any level of incremental contribution must be deemed cumulatively considerable by the lead agency. In addition, if the proposed project's individual impact is less than significant, its contribution to a significant cumulative impact could also be deemed cumulatively considerable, depending on the nature of the impact and the existing environmental setting. If, for example, a project is in an air basin determined to be in extreme or severe nonattainment for a particular criteria pollutant, a project's relatively small contribution of the same pollutant could be found to be cumulatively considerable. Thus, depending on the circumstances, an impact that is less than significant when considered individually may still be cumulatively considerable in light of the impact caused by all projects considered in the analysis. For the purposes of this Draft EIR, the proposed project would contribute to a cumulatively considerable and, therefore, significant cumulative impact if:

- The cumulative effects of other past, current, and probable future projects without the proposed project are not significant and the proposed project's incremental impact is substantial enough, when added to the cumulative effects, to result in a significant impact.
- The cumulative effects of other past, current, and probable future projects without the proposed project are already significant and the proposed project would result in a cumulatively considerable contribution to the already significant effect. The standards used to determine whether the contribution is cumulatively considerable include the existing baseline environmental conditions and whether the proposed project would cause a substantial increase in impacts or otherwise exceed an established threshold of significance.

CEQA requires the cumulative impact analyses in EIRs to consider either a list of planned and pending projects that may contribute to cumulative effects or a forecast of future development potential. This EIR uses the list approach; Table 4-1 lists the relevant plans and larger-scale projects considered in conjunction with the proposed project for the cumulative impacts environmental analysis that is included at the end of each environmental resource topic section in this EIR.

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Table 4-1 Cumulative Projects List by Jurisdiction

Project Number	Project Name	Development Type	Project Details	Location	Status
San Joaquin County[1]					
1	Site Approval No. PA-1900214	Commercial	Construction of a 20,000 sf building for storage of blankets	9150 East State Route 12 Highway, Lodi	Approved – under construction
2	PA-1800112, PA-1800156, PA-1800300	Commercial	GP Amendment, Rezoning, construction of a 4,800 sf shop, 4,800 sf transfer dock, 3,500 sf office, and 142 truck/trailer parking spaces	11150 E. State Route 120, Manteca	Approved – under construction
3	PA-2100261, PA-2100262, PA-2300212	Residential	GP Amendment, rezoning, subdivision	7272 E. Lathrop Rd., Manteca	Undergoing environmental review
4	PA-2200277, PA-2200278, PA-2300162	Residential	Construction of a 4,184 sf two-story, four-plex and 822 sf accessory dwelling unit	18911 N. Lilac St., Woodbridge	Undergoing environmental review
5	PA-2300024	Commercial	Construction of 76,404 sf sales, rental, service, and warehouse, 25-275 sf sales, rental, and warehouse; 27,301 sf repair shop; and 3,967 sf wash and storage building	6001 S. French Camp Rd.	Undergoing environmental review
6	PA-2200279	Commercial	Truck parking for 102 truck and trailers, a 4,464 sf structure with 3 truck repair bays and truck wash	6251 S. El Dorado St., French Camp	Undergoing environmental review
7	Interstate 5 Commerce Center Project	Limited Industrial	Construction of six industrial/warehouse buildings	Northeast of the Intersection of SR 12 and Thornton Road	Undergoing environmental review
8	PA-2200207	Limited Industrial	Construction of 61 truck parking spaces, 66 trailer parking spaces, parking for 13 passenger vehicles, a 11,500 sf office building, on-site well, and septic	4206 S. State Route & 99 E. Frontage Rd., Stockton	Undergoing environmental review
9	PA-2100014, PA-2200198	Agriculture	Re-use of 50,400 sf barns for cannabis cultivation	18299 N. Jacob Brack Rd., Lodi	Undergoing environmental review
10	PA-2200045(A)	Agriculture	Expansion of existing marina and associated uses	11050 W. Acker Island, Stockton	Undergoing environmental review
11	PA-2000228, -229, 22100229	Rural residential	Construction of a 7,980 sf fuel canopy for vehicles, 2,002 sf diesel canopy for trucks, 1,170 sf coffee shop drive through, and 6,000 sf convenience store.	St corner of E. Liberty Rd., and N. State Route , 99 E. Frontage Rd., Galt	Undergoing environmental review
12	PA-2100149	Agriculture	Construction of a 240 sf modular office, and grading for approximately 14-acre outdoor irrigation pipe storage area	3195 W. State Route 4, Stockton	Undergoing environmental review
13	PA-2100027	Community Commercial	Construction of a 216 sf office, 260 sf caretaker residence, 96 sf storage shed, and 144 sf RV shade structure	10150 N. State Route E. Frontage Rd., Stockton	Undergoing environmental review
14	PA-2000217, PA-2200021, PA-2000218, PA-2200070	Agriculture Urban Reserve/ Very Low Density Residential	GP Amendment, rezoning, subdivision into 26 residential lots	401 and 403 W. Woodbridge Rd., Woodbridge	Undergoing environmental review
City of Stockton[2]					
15	Delta Water Treatment Plant Campus Improvements Project	Utility	Relocation of facilities for Water Distribution staff functions	11373 N. Lower Sacramento Rd., Lodi	Request for proposal
Stockton East Water District					
16	Potter Creek Pump Station Upgrade Project	Water Infrastructure	Demolishing pipeline and installing pipeline, valves, vault, and cast-in-place concrete dissipation structure.	Potter Creek Pump Station	Request for proposal
17	Peters Pipeline Control Vault Replacement	Water Infrastructure	Demolition of water level control structure and replacement with reinforced concrete vault	Stockton	Request for proposal
18	Piping for Extraction Well No. 2	Water Infrastructure	Furnishing and installing approximately 25 linear feet of steel pipe, 160 lf RCP, and one 6-ft wide precast manhole	Dr. Joe Waidhofer Drinking Water Treatment Plant	Approved
19	Water Supply Enhancement Project	Groundwater recharge	Water Rights Application 31534 for diversion of up to 300 cfs from Calaveras River for agricultural irrigation and/or groundwater recharge and underground storage in the Eastern San Joaquin Groundwater Basin. New associated infrastructure includes diversions, pipelines, and pump stations to facilitate groundwater recharge using both in-lieu (~20,000 AFY) and Flood-MAR methods (~108,000 AFY).	SEWD service area and City of Stockton	Planning
Eastern San Joaquin Groundwater Authority[3]					
20	Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan (GSP), 2024 Update	Groundwater recharge	GSP Category A Projects include direct recharge projects and in-lieu recharge projects similar in nature to MICUP, including construction and operation of new recharge basins, pipelines, and pumps. Implementation would occur in the next 5 years with existing water rights.	Eastern San Joaquin Groundwater Subbasin	Approved Plan

Project Number	Project Name	Development Type	Project Details	Location	Status
East Bay Municipal Utility District					
21	Larger Conjunctive Use Project	Groundwater recharge	Larger scale DREAM Project, would implement Terms 1 and 2 of the PDA and provide additional EBMUD Mokelumne River Water for groundwater banking, up to 56,000 AFY	Along Mokelumne Aqueduct and Mokelumne River	Early Planning
22	Mokelumne Aqueducts Resilience Project[4]	Water Infrastructure	Maintenance and redundancy for Mokelumne Aqueduct; replace 16.5 miles of the 3 existing steel pipelines with new tunnel within existing aqueduct right-of-way.	Right of way for Mokelumne Aqueduct from Pardee Reservoir to the Delta	Planning, Design
23	Lower Mokelumne River Habitat Restoration Project[5]	Habitat Restoration	Floodplain restoration in riparian habitat areas downstream of Camanche Dam/Reservoir	Downstream of Camanche Reservoir	Planning, Design
24	Mokelumne Aqueducts Relining Project	Water Infrastructure	Aqueduct Lining Replacement	Right of way for Mokelumne Aqueduct	Ongoing Pilot Phase
25	Mokelumne Aqueduct Recoating Project	Water Infrastructure	Recoating the exterior coating of Mokelumne Aqueduct No. 1	Calaveras, San Joaquin, and Contra Costa counties	Approved – under construction
26	Aqueduct 3 Base Isolators	Water Infrastructure	Upgrade Mokelumne Aqueduct 3 base isolators to enhance seismic reliability in the above ground section of the aqueduct located in the Delta	San Joaquin and Contra Costa Counties	Approved
27	Exposed Aqueduct River Crossing	Water Infrastructure	Protection of the exposed Mokelumne aqueducts at the Old River Crossing located in the Delta	San Joaquin and Contra Costa Counties	Planning
28	Jones Tract Scour Protection	Water Infrastructure	Install scour protection from the Burlington Northern Santa Fe railroad embankment south past the Mokelumne Aqueduct alignments along Jones Tract located in the Delta	San Joaquin County	Planning
29	Pardee Tunnel Access Improvement	Water Infrastructure	This project will install a tunnel adit to improve access into Pardee Tunnel	Campo Seco	Planning
North San Joaquin Water Conservation District					
30	North System Improvement Project	Water Infrastructure	Improvement and modernization of pipeline system and pump station expansion	North of Mokelumne River	Construction
31	South System Improvement Project	Water Infrastructure	Improvement and modernization of pipeline system	South of Mokelumne River	Construction

[1] San Joaquin, County of. 2025. List of Active Planning Applications. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=actlist&typ=apd (accessed January 2025)

[2] Stockton, City of. 2025. Municipal Utilities. https://www.stocktonca.gov/business/contracts___purchasing/bidflash/municipal_utilities.php (accessed January 2025).

[3] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan.

[4] East Bay Municipal Utility District. 2025. Mokelumne Aqueducts Resiliency Project (MARP), https://www.ebmud.com/about-us/construction-and-maintenance/construction-my-neighborhood/mokelumne-aqueducts-resiliency-project-marp (accessed July 2025)

[5] Mokelumne River Floodplain Reconnection and Restoration Project: Improving Conditions for California's Central Valley Anadromous Fisheries

4.1 Aesthetics

This section describes existing conditions in the Place of Use related to visual character, scenic resources, views, and light and glare, as well as the relevant regulatory framework. This section also evaluates potential impacts related to aesthetics that could result from implementation of the proposed project.

Information in this section is based on in the San Joaquin County, City of Stockton, and City of Lodi General Plans, the California State Scenic Highway System map, Google Earth and Street photographs of the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas), as well as images of existing conditions and existing facilities from a site visit in October 2023.

4.1.1 Environmental Setting

Visual Character

Visual character in the California Environmental Quality Act (CEQA) context is an impartial description of the defining physical features, landscape patterns, and distinctive physical qualities within a landscape. Visual character is informed by the composition of land, vegetation, water, and structure and their relationship (or dominance) to one another, and by prominent elements of form, line, color, and texture that combine to define the composition of views. Visual character-defining resources and features within a landscape may derive from notable landforms, vegetation, land uses, building design and façade treatments, transportation facilities, overhead utility structures and lighting, historic structures or districts, or panoramic open space.

San Joaquin County

San Joaquin County is located at the north end of the San Joaquin Valley, part of California's vast agricultural heartland, and the character of the County is generally defined by its agricultural setting. The County also contains a complex network of creeks, rivers, and canals, which define the character of the natural landscape. The County's major rivers, the San Joaquin, the Mokelumne, the Calaveras, and the Stanislaus, lead to the Sacramento-San Joaquin Delta in the western half of the County. There are vast open areas, orchards, and agricultural lands that add to the small-town image of established communities in the area. Most segments of major highways are located at a higher elevation than surrounding lands for flood protection, providing motorists with views of the adjacent developments, agriculture, and open land. The foothills of the Sierra Nevada mountain range lie along the County's eastern boundary, and the foothills of the Diablo Range define the southwest corner of the County. With few exceptions, the flat topography is not conducive to views of the Delta region in the western portion of the County.

The County has a predominantly rural character, when compared to the urban centers of the nearby San Francisco Bay or Sacramento metropolitan areas, with some taller buildings in downtown Stockton. Generally, most structures are low- to medium-rise, with residential development consisting primarily of mobile home parks, older single-family detached residences, newer tract homes, and scattered high-density apartments. There are urban communities within the County that are surrounded by agricultural and vacant lands. The density and intensity of existing development varies, with the most-dense development located in or near the incorporated cities and unincorporated urban communities.

Project Area

The project area is located on lands within unincorporated San Joaquin County, the City of Lodi, and the City of Stockton. Below is a discussion of the visual character setting within each of the MICUP district jurisdiction areas. Photographs of essential existing water-related infrastructure across the Place of Use are provided in Figure 4.1-1[1].

North San Joaquin Water Conservation District

The North San Joaquin Water Conservation District (NSJWCD) area within the Place of Use is situated east and north of the City of Lodi within eastern San Joaquin County. The landscape includes approximately 79,000 acres of irrigated agricultural lands and approximately the same number of unirrigated open spaces. The visual character of the NSJWCD area is largely defined by the abundance of agricultural land uses in the vicinity and the Mokelumne River that generally bisects the district from east to west and defines its western borders. The distinctly rural character of the eastern extents of the NSJWCD is defined by rolling hills, vast open space areas and agricultural lands, rural residential development, and the Camanche Reservoir. The northwestern portions of the NSJWCD area contain more densely populated residential areas and commercial development along SR 99 and arterial roadways. Moderately sized agricultural parcels such as orchards, vineyards, and pastures coincide with single family residences throughout the NSJWCD area, providing an agriculturally based small town character. More expansive agricultural and open space areas characterize the areas closer to the Mokelumne River.

Stockton East Water District

The Stockton East Water District (SEWD) area within the Place of Use spans the San Joaquin Valley's floor from the eastern San Joaquin County line to the western boundary of the City of Stockton. The SEWD area includes the community of Linden, with additional detached areas immediately north and south of Stockton City limits. The Calaveras River runs east-west across the northern boundary of the SEWD area. Throughout the SEWD area, single-family residential developments are characterized by the prominence of mature vegetation and proximate agricultural lands. More large agricultural parcels, orchards, vineyards, and open space areas characterize the areas closer to the Calaveras River, with dense vegetation clustered at the river's edges. At the eastern-most extent of the SEWD area, the landscape is characterized by broad, expansive views of grasslands that are largely devoid of large vegetation and trees.

[1] Rincon Consultants. 2023. Photographs from October 25, 2023 site visit taken by Kelsey Bennett and Jennifer Jacobus.

Figure 4.1-1 Existing Water Infrastructure Photographs Across Place of Use



Photograph 1. Stockton Water Treatment Plant



Photograph 2. Beckman ASR well



Photograph 3. NSJWCD South Pump Station



Photograph 4. SEWD Diversion facility along Calaveras River

City of Stockton

The City of Stockton area within the Place of Use is located in California's Central Valley, about 60 miles east of the San Francisco Bay Area and serves as a hub for commerce and transportation. The downtown core area, located at the center of Stockton and bounded by Park Street, the railroad tracks, SR 4, and I-5, is characterized by compact urban development and a traditional street grid network and historic buildings[2] with mature trees and intentional landscape design. As detailed in Chapter 4.5, *Cultural and Tribal Cultural Resources*, there are at least 28 historic built resources within the city which are identified as California Historical Landmarks or historic resources designated by the National Register of Historic Places or California Register of Historical Resources. The City of Stockton was founded in 1850, and numerous buildings from the City's early history can be seen throughout the downtown area, such as the Stockton Savings and Loan Bank built in 1908. The presence of historic architecture amidst modern development is a key component of Downtown Stockton's visual character.

Many neighborhoods throughout the City contain distinguishing characteristics such as prominent landmarks, gateways, building types, street patterns, and land uses. However, large single-family community tract developments with standardized, uniform architectural and landscaping styles are present throughout the City that have a suburban character. There are more than 4,000 acres of vacant land within the City, with most of the acreage occurring at the edge of City limits. Views of riparian areas, open spaces, and agricultural fields are available along the San Joaquin River and its tertiary sloughs at the City's western limits. The area west of I-5 and north of I-4 and around the Port of Stockton, as well as the southern portion of the City are developed with large warehouses, rail yards, commercial centers, and utility structures that exhibit an industrial character.

Scenic Views and Scenic Resources

Most communities identify scenic resources as important visual assets that contribute to community identity. Visual resources are generally classified into two categories: scenic views and scenic resources. Scenic views are elements or components of the broader viewshed such as mountain ranges, valleys, and ridgelines. They are usually mid-ground or background elements of a viewshed that can be seen from a range of viewpoints, often along a roadway or other corridor. Scenic resources are specific features of a viewing area (or viewshed) such as trees, rock outcroppings, and historic buildings. They are specific features that act as the focal point of a viewshed and are usually foreground elements.

Aesthetically significant features occur in a diverse array of environments within the region, ranging in character from urban centers to rural agricultural lands to natural woodlands. The range of visual features in the region is afforded by the mixture of climate, topography, and flora and fauna found in the natural environment, and the diversity of style, composition, and distribution of the built environment. Features of the built environment that may also hold visual significance include individual or groups of structures that are distinctive due to their aesthetic, historical, social, or cultural significance or characteristics. Examples of the visually significant built environment may include bridges or overpasses, architecturally appealing buildings or groups of buildings, landscaped freeways, and a location where a historic event occurred.

[2] Stockton, City of. 2024. Envision Stockton 2040 General Plan. December 4, 2024. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf (accessed January 2025)

San Joaquin County

Natural features throughout the County include waterways, riparian habitat, wildlife habitat and wetlands, significant oak groves, and hillsides. Natural features of the County are clustered in the Sacramento-San Joaquin Delta area in the western half of the County. County policies specify that these natural features, as elements of the visual environment, should be protected from unwarranted or premature urban encroachment.[3]

The following sub-sections provide a description of the scenic resources within the County:

AGRICULTURAL LAND

The County's rural area has a high scenic value although it has been intensively developed, modified, and manipulated for agricultural purposes. The predominant characteristics of San Joaquin County's rural areas are primarily agricultural, including a mix of pasture, row crops, vineyards, and orchards with limited accessory buildings (barns, residences, sheds) scattered throughout. Viewers are offered expansive views over row crops and pastures, while orchards and vineyards create a focused line of sight. Most highways and roadways throughout the non-urbanized San Joaquin County provide some extent of rural agricultural landscape views. Additionally, within the project area, the City of Lodi General plan identifies agricultural lands as a scenic resource.[4]

RIVER CORRIDORS

The San Joaquin River, Stanislaus River, Mokelumne River, Calaveras River, and Dry Creek corridors, including their tributaries and creeks, provide scenic waterways and areas of riparian forest in the County. In addition, the lower Stanislaus and Mokelumne Rivers are the only areas left in the County with significant riparian woodland vegetation, heightening the importance of these areas. Views of river corridors can be seen briefly from state highways and local roads, along bikeways and trails, and by recreationists along the rivers. Major public viewpoints of these resources are limited to road and highway crossings because the wide floodplains have hindered the development of roads and other viewpoints, and dense vegetation mostly obscures the smaller waterways from view. Additionally, within the project area, the City of Lodi General Plan specifies the Mokelumne River space as a scenic resource.[5]

RANGELANDS

Rangelands within the County are the prototypical California landscape in this area of the State. Verdant green from late winter to early summer, these landscapes evolve to the dried grass brown of late summer and fall. Though some areas of rangeland are composed of oak savannah, they are predominantly made up of expansive grasslands interspersed with vernal pools and ephemeral streams. Development within these areas tends to be infrequent and consist of small-scale agricultural improvements. Rangelands are the primary landscape type in the eastern area of the County, and west of I-5, I-205, and I-580. Primary viewpoints of rangelands include I-5, I-205 and I-580 and SR 33 in the western County, and SR 4, SR 12, SR 26, SR 88 and SR 120, Shelton Road, Clements Road, Liberty Road, and Mackville Road in eastern San Joaquin County.

[19] San Joaquin County. 2016. San Joaquin County General Plan Policy Document. December 2016. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf (accessed January 2025)
[4] Lodi, City of. 2010. Lodi General Plan. April 7, 2010. https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF (accessed January 2025)
[5] Ibid

SCENIC PANORAMAS

Coastal range and Sierra Nevada foothill views from the wide valley floor constitute most of scenic vistas in the County. These ranges are most often viewed from roadways. The coastal Diablo Range borders San Joaquin County on the west and is composed of gently to steeply rolling hills. Views of the Diablo Range can be seen along the I-5 and I-580 corridors, from portions of SR 33, and Corral Hollow Road. The foothills of the Sierra Nevada border San Joaquin County on the east and are composed of gently rolling hills leading to the sharper terrain of the Sierra in the background. The dominant colors of the mountains and hills vary with the season, with golden brown hues through most of the year replaced by the green of vegetation in response to the winter rains. Due to air quality conditions within the County, views of these scenic panoramas are often obscured by haze, with views of the Sierra Nevada limited.

Project Area

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

Throughout the NSJWCD jurisdiction area, scenic views and resources are comprised of agricultural areas and rangelands; swaths of riparian vegetation and trees along the Mokelumne River and its tributaries, as well as the waterways themselves; open spaces and parks, such as Stillman Magee Park; the Camanche Reservoir; and locally designated scenic roadways (detailed in the *Scenic Highways* section, below). Scenic resources also include historic buildings and structures such as the Harmony Grove Church. The district was formed in 1948 and, thus, owns and/or operates infrastructure over 45 years of age, such as the North System Pump Station and CalFed pump stations, which were built in the late 1960s and has the potential to qualify as a historical resource pending further analysis. However, the pump stations are not visible from public viewpoints. Historic built resources are discussed further in Chapter 4.5, *Cultural and Tribal Cultural Resources.* Scenic views of the Sierra Nevada foothills are available toward the eastern extent of the NSJWCD area.

STOCKTON EAST WATER DISTRICT

Throughout the SEWD jurisdiction area, scenic views and resources are comprised of agricultural areas and rangelands; swaths of riparian vegetation and trees along the Calaveras River, Duck Creek, Little John's Creek, and their tributaries, as well as the waterways themselves; open spaces; and locally designated scenic roadways (detailed in the *Scenic Highways* section, below). Scenic resources also include historic buildings and structures. There are no known designated historical resources owned and/or operated by SEWD; however, the district was formed in 1948 and, therefore, likely owns and/or operates infrastructure over 45 years of age which has the potential to qualify as historical resources pending further evaluation. Historic built resources are discussed further in Chapter 4.5, *Cultural and Tribal Cultural Resources.* Scenic views of the Sierra Nevada foothills are available toward the eastern extent of the SEWD area.

CITY OF STOCKTON

Scenic views specified in the City of Stockton General Plan include views of riparian areas, open spaces (such as waterways, wetlands, natural landscapes, and parks), agricultural fields, and views available from locally designated scenic roadways (detailed in the *Scenic Highways* section, below).[6]

[6] Stockton, City of. 2024. Envision Stockton 2040 General Plan. December 4, 2024. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf (accessed January 2025)

Specifically, the Calaveras River and San Joaquin River provide scenic views of riparian vegetation and waterways.

Scenic resources also include four historic sites, 13 structures of merit, and 52 historic landmarks designated by the city; of which, 17 are listed in the National Register of Historic Places and two are identified as California Historic Landmarks. Beyond the City-identified resources, the National Register also lists the Elks Building and Cole's Five Cypress Farm, and the California Register lists the Oak Lawn Ranch and Western Pacific railway depot. Many of these historic resources are located in or near Downtown Stockton.[7] Historic built resources are discussed further in Chapter 4.5, *Cultural and Tribal Cultural Resources.*

Scenic Highways

California's Scenic Highway Program designates scenic highways with the intention of protecting these corridors from change that would diminish the aesthetic value of adjacent lands. A highway is designated as an eligible scenic highway when the local governing body (city or county) applies to the California Department of Transportation (Caltrans) for scenic highway approval, and Caltrans determines that it qualifies for official status.[8]

San Joaquin County

The San Joaquin County General Plan[9] identifies Interstate 5 (I-5), State Route (SR) 4 and SR 99, and 26 local roadways within the County as locally designated scenic roadways. Specifically, Interstate 580 (I-580) between I-5 and the Alameda County and I-5 from the Stanislaus County line to I-580 line are State-designated scenic highways.[10] The City of Lodi General Plan and the Envision Stockton 2040 General Plan do not identify any scenic corridors or roadways.[11,12] Within 0.25-mile of the project area, the County-designated scenic roadways include portions of: SR 88, SR 26, SR 12, Collier Road, Eight Mile Road, Inland Drive, Jack Tone Road, Elliot Road, Peltier Road, Tully Road, Liberty Road, Jahant Road, Mackville Road, and Clements Road.

Project Area

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

There are no State-designated or eligible scenic highways within the NSJWCD jurisdiction area.[13] The County-designated scenic routes within the NSJWCD jurisdiction area include portions of: SR 88, SR 12, SR 26, Jack Tone Road, Clements Road, Elliot Road, East Peltier Road, North Tully Road, East Jahant Road, Mackville Road, Collier Road East, Liberty Road, North Wimer Road, and North Shelton Road.

[7] Ibid
[8] California Department of Transportation (Caltrans). 2025. Scenic Highways – Frequently Asked Questions. https://dot.ca.gov/programs/design/lap-landscape-architecture-and-community-livability/lap-liv-i-scenic-highways/lap-liv-i-scenic-highways-faq2 (accessed January 2025)
[9] San Joaquin County. 2016. San Joaquin County General Plan Policy Document. December 2016. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf (accessed January 2025)
[10] Caltrans. 2019. California State Scenic Highway System Map. https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa (accessed January 2025)
[11] Lodi, City of. 2010. Lodi General Plan. April 7, 2010. https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF (accessed January 2025)
[12] Stockton, City of. 2024. Envision Stockton 2040 General Plan. December 4, 2024. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf (accessed January 2025)
[13] Ibid

STOCKTON EAST WATER DISTRICT

There are no State-designated or eligible scenic highways within the SEWD jurisdiction area.[14] The County-designated scenic routes within the SEWD jurisdiction area include portions of: SR 26, North Shelton Road, East Shelton Road, North Fine Road, Comstock Road, Clements Road, and Eight Mile Road.

CITY OF STOCKTON

There are no State-designated or eligible scenic highways within the City of Stockton jurisdiction area.[15] The County-designated scenic routes within the City of Stockton jurisdiction area include portions of I-5, SR 4, and Eight Mile Road.

Light and Glare

In the context of *CEQA Guidelines*, light is nighttime illumination that stimulates sight and makes things visible. Glare refers to light that is so bright that it creates a nuisance or a hazard, or inhibits the ability to see effectively, such as direct or reflected sunlight.

San Joaquin County

Daytime glare conditions in the vicinity of the project areas vary based on location within the County. Within developed areas, daytime glare conditions are typical to those found in suburban areas (e.g., sources of glare from windows and finishes on cars and buildings/structures), while there is a general lack of daytime glare across the majority of agricultural areas. Sources of daytime glare within the project area include direct beam sunlight and reflections from water bodies, windows, architectural coatings in developed areas, glass, and other reflective surfaces.

Nighttime light conditions in the vicinity of the project area vary based on location within the County. Within developed areas, such as the City of Lodi, light conditions are typical to those found in suburban areas (e.g., roadway lighting, commercial parking lot and building lighting, residential buildings, headlights from motor vehicles), while there is minimal nighttime light across the majority of agricultural areas. Sources of nighttime light include structure illumination, decorative landscape lighting, lighted signs, streetlights, and vehicle headlights, particularly from I-5 and other highly utilized roadways. Rural parts throughout the County experience sources of light; however, sources are more limited and intermittent across greater distances.

Project Area

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

Current light and glare levels within the suburban and commercial areas of the NSJWCD area include streetlights, parking lot lighting, exterior building lighting, and lighted signs. Most of the NSJWCD area encompasses rural residential and agricultural uses; in these areas, current light and glare levels are limited, as sources such as streetlights are not present. Mobile and temporary sources of light include the headlights of vehicles driving on roadways throughout the NSJWCD area. Other security and agricultural equipment lighting also serve as sources of light in the evening hours. Sunlight reflected off buildings, including glass and window façades, and the windshields of parked

[14] Ibid
[15] Ibid

vehicles are the primary sources of glare in the NSJWCD area, as well as sunlight reflected off water bodies such as the Camanche Reservoir.

STOCKTON EAST WATER DISTRICT

Current light and glare levels within the suburban and commercial areas of the SEWD area include streetlights, parking lot lighting, exterior building lighting, and lighted signs. Agricultural processing plants scattered throughout the SEWD area provide intense sources of exterior building and parking lot lighting. However, most of the SEWD area encompasses rural residential and agricultural uses; in these areas, current light and glare levels are limited, as sources such as streetlights and parking lot lighting are not present. Mobile and temporary sources of light include the headlights of vehicles driving on roadways throughout the SEWD area. Other security and agricultural equipment lighting also serve as sources of light in the evening hours. Sunlight reflected off buildings, including glass and window façades, and the windshields of parked vehicles are the primary sources of glare in the SEWD area.

CITY OF STOCKTON

Current light and glare levels within the City of Stockton area are consistent with typical suburban, commercial, and industrial areas, which include streetlights, parking lot lighting, exterior building and equipment lighting, safety lighting, and lighted signs. In rural residential and agricultural areas on the outskirts of the city, current light and glare levels are limited, as sources such as streetlights are not present. Mobile and temporary sources of light include the headlights of vehicles driving on roadways throughout the City of Stockton, most notably along I-5 and other major roadways. Other security and equipment lighting also serve as sources of light in the evening hours. Sunlight reflected off buildings, including glass and window façades, and the windshields of parked vehicles are the primary sources of glare in the city, as well as sunlight reflected off water bodies such as the San Joaquin River and Stockton Harbor.

4.1.2 Regulatory Framework

Federal Regulations

No existing federal regulations pertain to the visual resources in the vicinity of the project area.

State Regulations

Caltrans Scenic Highways and Corridor Protection Program

Caltrans defines a scenic highway as any freeway, highway, road, or other public right-of-way, that traverses an area of exceptional scenic quality. All designated scenic highways are required to have an approved Corridor Protection Program and remain in compliance to maintain Caltrans scenic highway status. The Corridor Protection Program requires the local governing body to develop and adopt protection measures in the form of ordinances, zoning, and/or planning policies that apply to the area of land within the scenic corridor. There are two officially designated State scenic highways within San Joaquin County: I-5, from the Stanislaus County line to I-580; and I-580 from I-5 to the Alameda County line.[16]

[16] Caltrans. 2019. California State Scenic Highway System Map. https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa (accessed January 2025)

California Code of Regulations Title 24 - Building Energy Efficiency Standards for Residential and Nonresidential Buildings

California Building Code (California Code of Regulations [CCR], Title 24)—including Title 24, Part 6—includes efficiency standards which regulate lighting characteristics (i.e., maximum power/brightness, shielding, light sensor controls). Different lighting standards are set by classifying areas by lighting zone. The classification is based on 2000 Census population figures. Areas can be designated as LZ0 (very low ambient illumination; e.g. undeveloped open space) LZ1 (low ambient illumination; e.g. rural areas), LZ2 (moderate ambient illumination; e.g. urban clusters), LZ3 (moderately high ambient illumination; e.g. urban areas), or LZ4 (high ambient illumination; e.g. entertainment districts). Lighting requirements for undeveloped and rural areas are stricter in order to protect the areas from new sources of light pollution and light trespass. Approximately 88 percent of San Joaquin County falls under the "rural" standard, whereas the Cities of Stockton and Lodi fall under the "urban" standard.[17, 18]

Regional and Local Regulations

General Plans

SAN JOAQUIN COUNTY GENERAL PLAN

The San Joaquin County General Plan[19] Land Use, Community Development, Public Health and Safety, Natural and Cultural Resource Elements set out to protect and enhance the unique scenic and visual features of San Joaquin County, and includes the following goals and policies:

Goal LU-3: Preserve and enhance the character and scale of San Joaquin County's communities and rural areas, including their architectural heritage and historic character.

- **LU-3.1:** The County shall ensure that new development respects San Joaquin County's heritage by encouraging new development to respond to local context, be compatible with the traditions and character of each community, and develop in an orderly fashion which is compatible with the scale of surrounding structures.
- **LU-3.2:** The County shall encourage new development of diverse and distinctive neighborhoods that build on the patterns of the natural landscape and respect the character of existing surrounding development.
- **LU-3.3:** The County shall encourage a balance of the scale and massing of new development to the physical and visual character of adjoining uses to provide appropriate transitions in building height and bulk that are sensitive to the physical and visual character of adjoining neighborhoods.
- **LU-3.10:** Visual Access. The County shall encourage new development to maintain views of hillsides, creeks, and other distinctive natural areas by regulating building orientation, height, and bulk.

[17] United States (U.S.) Census Bureau. 2023. County-level 2020 Census Urban and Rural Information for the U.S., Puerto Rico, and Island Areas sorted by state and county FIPS code. Updated September 2023. https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html (accessed February 2025)
[18] U.S. Census Bureau. 2023. List of all 2020 Census Urban Areas for the U.S., Puerto Rico, and Island Areas sorted by Urban Area Census (UACE) code. Updated September 2023. https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html (accessed February 2025)
[19] San Joaquin County. 2016. San Joaquin County General Plan Policy Document. December 2016. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf (accessed January 2025)

- **LU-8.2:** Open Space Character. The County shall require new development in Resource Conservation designated areas to be planned and designed to maintain the scenic open space character of the surrounding area, including view corridors from highways. New development should use natural landforms and vegetation in the least visually disruptive manner possible, and use design, construction, and maintenance techniques that minimize the visibility of structures.

Goal C-1: Maintain a planning framework that promotes the viability of Urban and Rural Communities and coordinates development within City Fringe Areas, while protecting the agricultural, open space, scenic, cultural, historic and natural resources heritage of the County.

- **C-3.4:** To use financial resources efficiently, reduce growth pressure, and maintain the character of rural communities, the County shall not develop new urban-level infrastructure in Rural Communities (e.g., curbs, gutters, sidewalks, and public water and sewer systems), unless those changes respond specifically to stated local needs (e.g., Safer Routes to School). The County shall discourage other public agencies from developing urban-level infrastructure within Rural Communities unless it is part of a project or process to convert the community into an Urban Community.
- **PHS-2.13:** Multi-Purpose Flood Control Projects. The County shall encourage multi-purpose flood control projects, to the extent feasible, that incorporate recreation, resource conservation, and preservation of natural riparian habitat and scenic values of the County's waterways, creeks, and lakes.

Goal PHS-5: To protect public health, agricultural crops, scenic resources, and the built and natural environments from air pollution.

- **NCR-6.8: Land Use and Development.** The County shall encourage land uses and development that retain and enhance significant historic properties and sustain historical community character.

Goal NCR-7: To protect and enhance the unique scenic features of San Joaquin County.

- **NCR-7.1: Scenic Roadways.** The County shall protect the visual character of designated scenic roadways
- **NCR-7.2: Views from Public Lands and Roadways**. The County shall ensure that views of waterways, hilltops, and oak groves from public land and public roadways are protected and public access is provided to them whenever possible.
- **NCR-7.4: Visually Complementary Development.** The County shall require new development adjacent to scenic resources to be sited and designed to visually complement those resources, except in MR-Z designated areas.
- **NCR-7.5: Require Landscape Plans.** The County shall require landscape plans for new development along State- or County- designated scenic routes.
- **NCR-7.6: Preservation of Ridgelines and Hill Tops.** The County shall ensure that ridgelines and major hill tops remain undeveloped.
- **NCR-7.7: Reducing Light Pollution.** The County shall encourage project designs, lighting configurations, and operational practices that reduce light pollution and preserve view of the night sky.

- **NCR-7.8: Underground Utility Lines.** The County shall require all new electric and communication distribution facilities adjacent to scenic routes to be placed underground, whenever feasible. Where overhead utility lines are unavoidable, every effort should be made to reduce the visual impacts through elements of design.
- **NCR-8.7: Protect Resources.** The County shall strive to protect the diverse resources upon which recreation is based, such as waterways, marsh lands, wildlife habitats, unique land and scenic features, and historical and cultural sites.

City of Stockton General Plan

The Envision Stockton 2040 General Plan[20] includes policies and actions related to the protection and improvement of visual resources within its Land Use section. These policies and actions and include:

- **LU-1.3:** Improve the visual quality of the urban environment to be more welcoming and inviting at key gateways and travel corridors into the city.
- **Action LU-1.3B:** Work with transportation agency partners and private property owners to improve maintenance, code enforcement, screening, and landscaping of viewsheds along major transportation routes into Stockton, including rail corridors, Highway 99, Highway 4, and Interstate 5.
- **Action LU-1.3C:** Require the incorporation of scenic views, including open space features like waterways, wetlands, natural landscapes, and parks, into design of the built environment.
- **LU 5.2**: Protect natural resource areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other cultural/historic resources from encroachment or destruction by incompatible development.
- **LU 5.3**: Define discrete and clear city edges that preserve agriculture, open space, and scenic views.
- **Action LU-5.3A:** At the interface between development and rural landscapes, use landscaping and other attractive edging instead of soundwalls and similar utilitarian edges of developments to maintain the visual integrity of open space.
- **Action LU-6.3D:** Design public facilities and infrastructure to maintain and improve the visual quality of the urban environment, including through the following approaches:
  - Designing buildings and infrastructure to fit into and complement their ultimate surroundings.
  - Buffering buildings and infrastructure from their surroundings as appropriate to shield unsightly areas from public view.
  - Providing appropriate landscaping.

City of Lodi General Plan

The City of Lodi General Plan[21] aims to maintain its small-town atmosphere and provide compact urban form, promoting infill development downtown and along key corridors. The City of Lodi General Plan identifies parks and historic buildings and structures as scenic resources within the City. Policies within the Community Design & Livability; Land Use; Parks, Recreation, and Open

[20] Stockton, City of. 2024. Envision Stockton 2040 General Plan. December 4, 2024. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf (accessed January 2025)
[21] Lodi, City of. 2010. Lodi General Plan. April 7, 2010. https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF (accessed January 2025)

Space chapters related to visual and scenic resources and community character within of the City of Lodi, include:

- **P-G2:** Protect natural resource areas, native vegetation, scenic areas, open space areas, and parks from encroachment or destruction.
- **P-P11:** Encourage the planting of native trees, shrubs, and grasslands in order to preserve the visual integrity of the landscape, provide habitat conditions suitable for native vegetation, and ensure the maximum number and variety of well-adapted plants are maintained.
- **CD-G3:** Respect and maintain Lodi's small-town character, its existing neighborhoods, the historic downtown, and historic buildings.
- **CD-P32:** In order to use less energy and reduce light pollution, ensure that lighting associated with new development or facilities (including street lighting, recreational facilities, and parking) shall be designed to prevent artificial lighting from illuminating adjacent residential neighborhoods and/or natural areas at a level greater than one foot candle above ambient conditions.

Municipal Codes

SAN JOAQUIN COUNTY ORDINANCE CODE

The San Joaquin Ordinance Code includes provisions and regulations related to aesthetics, scenic resources, and light and glare. Land use regulations and development standards, including those requiring compatible uses and visual character, are outlined in Chapters 9-200 (Residential Zones), 9-201 (Commercial Zones), 9-202 (Industrial Zones), and 9-203 (Agricultural Zones). Chapter 9-705 (Historic Districts and Landmarks) requires review criteria to preserve the visual character and aesthetics in historic areas.

The San Joaquin Ordinance Code (Chapter 9-403, Lighting and Illumination) provides general requirements for efficient use of lighting (such as limiting lighting during daylight hours and utilizing timers and sensor lighting), entrance lighting, light shielding, illuminance limitations, off-site spillover reduction, and certification by a California-registered engineer. Additionally, Section 9-1025.6M includes performance standards related to light and glare for exterior lighting, requiring shielded and recessed lighting for exterior lighting and prohibiting high intensity lighting to minimize glare and reflections.

CITY OF STOCKTON MUNICIPAL CODE

The City of Stockton Municipal Code includes provisions related to aesthetics, visual resources, and light and glare. Chapter 16.120 (Design Review) establishes procedures for design review of development throughout the City in order to encourage development that is compatible and harmonious. Chapter 16.152 (Site Plan Review) establishes review procedures for proposed development to ensure consistency with general land uses, goals, objectives, implementation programs, and policies of the General Plan, and to protect the character of the city. Additionally, Section 16.72.245 (Heritage Trees) provides protection for heritage trees, which are considered scenic resources, and Section 16.56 provides landscaping standards for aesthetic and functional enhancement.

Section 16.32.070 (Light and Glare) includes development standards related to light and glare for exterior lighting, requiring shielded lighting and proper light placement to eliminate spillover illumination and glare.

CITY OF LODI MUNICIPAL CODE

The City of Lodi Municipal Code includes provisions related to visual character, visual resources, and light and glare. Chapter 17.16 (Applicability and General Design Guidelines) establishes design guidelines and procedures for design review of development throughout the City, including but not limited to, guidelines for exterior lighting design, visual screening, preservation of community character, and structure compatibility and design. Chapter 17.12 (General Property Development and Use Standards) includes development standards related to light and glare for exterior lighting, requiring shielded or recessed lighting to minimize offsite illumination and glare. Commercial and industrial zone-specific design guidelines are provided in Chapters 17.20 and 17.24, respectively, which provide recommendations for protecting visual compatibility and minimizing visual impacts associated with parking, equipment, and outdoor storage. Chapter 17.30 (Landscaping) establishes landscape requirements to preserve and enhance the visual character of the community, enhance visual compatibility between proximate land uses, reduce offsite light and glare, and screen or improve unsightly visual components (e.g., parking areas and outdoor storage).

4.1.3 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 *CEQA Guidelines* Appendix G significance criteria questions related to Aesthetics:

Would MICUP (the proposed project):

a) Have a substantial adverse effect on a scenic vista?
b) Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?
c) In nonurbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?
d) Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Approach to Analysis

Scenic Vistas

The evaluation of potential impacts to scenic vistas is based on review of the project area and surrounding environment. In determining the level of significance, this analysis focuses on the nature and magnitude of visual change in relationship to scenic vistas, the number of public vantage points from where this change would be visible, and the number of viewers who would be affected by this change. In addition, this analysis considers viewer sensitivity as a function of the visibility of resources in the landscape, the proximity of the viewers to the visual resource, elevation of the viewers relative to the visual resource, frequency and duration of views, numbers of viewers, and types and expectations of individuals and viewer groups.

State Scenic Highways

The evaluation of potential impacts related to scenic resources within a State scenic highway is based on review of the program area and surrounding environment. In determining the level of significance, this analysis focuses on the nature and magnitude of visual change in relationship to designated scenic highways and scenic resources, the number of public vantage points from where this change would be visible, and the number of viewers who would be affected by this change. Similar to scenic vistas, this analysis considers viewer sensitivity as a function of the visibility of resources in the landscape, the proximity of the viewers to the visual resource, elevation of the viewers relative to the visual resource, frequency and duration of views, numbers of viewers, and types and expectations of individuals and viewer groups.

Visual Character

CEQA Guidelines Section 21071 defines an urbanized area as:

1. An incorporated city that has either:
    a. A population of at least 100,000 persons, or
    b. A population of less than 100,000 persons if the population of that city and not more than two contiguous incorporated cities combined equals at least 100,000 persons.

2. An unincorporated area that is either:
    a. Completely surrounded by one or more incorporated cities and both of the following criteria are met:
        i. The population of the unincorporated area and the population of the surrounding incorporated city or cities equals at least 100,000 persons
        ii. The population density of the unincorporated area at least equals the population density of the surrounding city or cities.

    b. Located within an urban growth boundary and has an existing residential population of at least 5,000 persons per square mile.

Pursuant to CEQA Guidelines Section 21071, the Place of Use includes both urbanized and non-urbanized areas. The incorporated City of Stockton is considered an urbanized area under CEQA, because its population is 319,543[22] (more than 100,000). Given that construction and operation of facilities (or projects and infrastructure) associated with the proposed project in the City of Stockton would occur in an urbanized area, the impact discussion of visual character and views is focused on consistency with applicable zoning and other regulations governing scenic quality, such as those protecting heritage trees and other scenic resources, and development design standards.

However, the rest of the Place of Use is considered non-urbanized area, because the incorporated City of Lodi contains a population of 67,679[23] (less than 100,000), and is located within unincorporated area that is not completely surrounded by one or more incorporated cities and is not located within an urban growth boundary. Thus, the impacts related to visual character or quality attributable to proposed project implementation within unincorporated lands were evaluated relative to visual conditions under project buildout, as determined by existing experiences

[22] United States Census Bureau. 2025. QuickFacts for Stockton, California. https://www.census.gov/quickfacts/fact/table/stocktoncitycalifornia/PST045223#PST045223 (accessed January 2025)
[23] United States Census Bureau. 2025. QuickFacts for Lodi, California. https://www.census.gov/quickfacts/fact/table/lodicitycalifornia/PST045224 (accessed January 2025)

from public viewpoints in and around the project area. Photographs and maps from Google Earth were reviewed in preparation of this analysis, as well as photographs from a site visit to the project area and some facilities in October 2023. Given that the proposed project would facilitate development in a non-urbanized area, the impact discussion of visual character and views is focused on degradation of the existing visual character or quality of public views of the unincorporated project area and its surroundings.

Light and Glare

The analysis of light and glare impacts focuses on the nature and magnitude of changes in light and glare conditions associated with implementation of the proposed project on the project area and surroundings. If proposed and existing light and glare conditions are similar, then the visual compatibility would be high. If the proposed light and glare conditions strongly contrast with existing light and glare conditions or conflict with applicable policies and guidelines, then light and glare compatibility would be low, and significant impacts may result.

EIR Scoping Comments Consideration

No comments that pertain to aesthetics were received in response to publication of the Notice of Preparation for this EIR.

Specific Thresholds of Significance

For purposes of this analysis, the following thresholds are used to evaluate the significance of aesthetics impacts resulting from implementation of proposed project.

- Permanent project infrastructure blocking or significantly altering existing views from a scenic route or corridor toward a visual/scenic resource (i.e., ridgeline)
- Project construction substantially altering existing natural topography or damaging scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway.
- Within unincorporated San Joaquin County and the City of Lodi, permanent project infrastructure being inconsistent with or degrading the visual character of the project area or existing development in the surrounding area or degrading the quality of public views of the project area.
- Within the City of Stockton, permanent project infrastructure conflicting with applicable zoning and other regulations governing scenic quality are included in the City of Stockton General Plan the City of Stockton municipal code.
- Construction or operation of facilities or infrastructure creating a new source of substantial light or glare that would adversely affect day or nighttime views for sensitive receptors (i.e., residents) within the project area.

Impact Evaluation

Scenic Vistas

Significance Criterion a:	Would the proposed project have a substantial adverse effect on a scenic vista?

Impact AES-1 OPERATION OF FACILITIES ASSOCIATED WITH THE PROPOSED PROJECT COULD INTRODUCE CONTRASTING ELEMENTS WITHIN THE SITE LINE OF SCENIC VISTAS. COMPLIANCE WITH THE SAN JOAQUIN COUNTY MUNICIPAL CODE AND GENERAL PLAN AND THE CITY OF STOCKTON MUNICIPAL CODE AND GENERAL PLAN WOULD ENSURE IMPACTS TO SCENIC VISTAS ARE LESS THAN SIGNIFICANT.

The types of proposed project infrastructure and facilities that would be implemented throughout the Place of Use are exemplified in Figure 4.1-2[24] and would include:

- Points of diversion or re-diversion
- New or expanded pump stations
- New pipelines
- Direct surface recharge, including:
  - Flood-MAR
  - Surface detention basins (such as recharge basins, storm detention basins, and unlined canals)
  - Aquifer storage and recovery (ASR) wells and dry wells

Typical diversion facility components are shown in see Figure 4.1-1, Photograph 4. Typical pump station facilities, such as the NSJWCD South Pump Station, are shown in Figure 4.1-1, Photograph 3.

Flood-MAR areas (Figure 4.1-2, Photograph 2) can be active agricultural lands with the capacity to store surface water. Direct surface detention basins appear as flooded fields or ponds (Figure 4.1-2, Photograph 3). Well heads, such as those shown in Figure 4.1-2, Photograph 1, present as concrete or metal vaults at ground level or slightly elevated with an access door on top. ASR wells are accompanied by aboveground metal storage tanks with proximate well heads, such as those present at the Beckman ASR well (Figure 4.1-1, Photograph 2). Proposed pipelines would largely be located underground; however, aboveground pumps (such as the one shown in Figure 4.1-2, Photograph 4) would be required for project functionality.

Construction

All Districts

Aboveground structures could vary in size from low-profile vaults to single-story buildings. Most of the future wells would be located within existing roadway/rights-of-way or existing facilities. Although proposed recharge facilities could be visible from public vantage points, wellhead housings likely would be located adjacent to roadways and proximate to land already developed and not expected to obstruct scenic vistas.

[24] Rincon Consultants. 2023. Photographs from October 25, 2023 site visit taken by Kelsey Bennett.

Figure 4.1-2 Examples of Proposed Project Infrastructure



Photograph 1. Underground pipeline access structures



Photograph 2. Flood-MAR



Photograph 3. Direct recharge site



Photograph 4. Diversion pump

As part of the pre-construction stage, project components within the City of Stockton would be required to adhere to the development standards outlined in the City of Stockton Municipal Code, such as those requiring design review to ensure compatible development (Chapter 16.120) and site plan review (Chapter 16.152) to ensure that aboveground structures do not impede scenic views. Scenic vistas and views would also be protected through adherence to the policies and actions outlined in the City's General Plan, such as Action LU-6.3D, which requires the design of buildings and infrastructure to be complementary to their surroundings and, if unsightly, shielded from view by landscaping or other means. Further, scenic vistas and views would be protected through project consistency with San Joaquin County's General Plan, such as Policy NCR-7.2, which requires that views of waterways, hilltops, and oak groves from public land and public roadways are protected and public access is provided to them whenever possible; and Policy NCR-7.4, which requires new development adjacent to scenic resources to be sited and designed to visually complement those resources. Therefore, pre-construction impacts to scenic vistas would be less than significant.

Impacts related to substantial adverse effects on a scenic vista are limited to operational impacts, because construction impacts are temporary and would not result in permanent obstructions to scenic vistas. No substantial adverse effects on scenic vistas from construction would result from implementation of the proposed project.

Operation

All Districts

Scenic views and vistas within the Partner Agency areas include those of agricultural areas and rangelands; swaths of riparian vegetation and trees along the Mokelumne, Calaveras, and San Joaquin Rivers and associated tributaries, as well as the waterways themselves; open spaces and parks, such as Stillman Magee Park; historic sites, such as the Stockton Savings and Loan Bank; the Camanche Reservoir; the Sierra Nevada foothills, and those from locally designated scenic roadways (e.g. SR 99).

Under MICUP for all Partner Agency districts, ongoing operational activities would consist of operation and maintenance of the pump stations, pipelines, and wells. Annual maintenance of recharge basins would also require occasional use of equipment for sediment removal, vegetation management, and debris clearing, but are not dissimilar to routine agricultural work. However, project components would be required to adhere to the development standards outlined in the San Joquin County Ordinance Code (Chapters 9-200 through 9-203), such as those requiring compatible development and visual screening, requiring that aboveground structures do not impede scenic views. Scenic vistas and views would also be protected through adherence to the policies outlined in the San Joaquin County General Plan, such as LU-3.10 and NCR-7.2, which provide that views of hillsides, waterways, and other distinctive natural areas are protected and accessible for the public. In addition, project components within the City of Stockton would be required to adhere to the development standards outlined in the City of Stockton Municipal Code, such as those requiring design review to ensure compatible development (Chapter 16.120) and site plan review (Chapter 16.152) to ensure that aboveground structures do not impede scenic views. Scenic vistas and views would be protected through adherence to the policies and actions outlined in the City of Stockton General Plan, such as Action LU-6.3D, which requires the design of buildings and infrastructure to be complementary to their surroundings and, if unsightly, shielded from view by landscaping or other means. Similarly, project components within the City of Lodi would be required to adhere to the development standards outlined in the City of Lodi Municipal Code, including those requiring design

review to ensure visual compatibility and minimize visual impacts associated with aboveground structures and facilities (Chapter 17.16, 17.20, and 17.24).

Aboveground project structures could vary in size from low-profile vaults to single-story buildings. Finished pipelines would be underground, and most pump stations and wells would be located within existing roadway/rights-of-way or existing facilities. Although proposed recharge facilities could be visible from public vantage points, wellhead housings likely would be located adjacent to roadways and proximate to land already developed and not expected to obstruct scenic vistas. As such, operational activities would occur within the respective facility footprint and at or below existing ground level and, thus, views of the Mokelumne and Calaveras Rivers and foothills of the Diablo Range and Sierra Nevada or of other waterways, hilltops, and oak groves from public land and roadways would not be obscured. In addition, Flood-MAR activities would flood agricultural field areas within created earthen berms, but not in manner that would result in changes to scenic vistas due to restriction of such occasional operational flooding of existing agricultural areas occurring at ground level. Therefore, operational impacts of all three Partner Agencies related to effects on a scenic vista would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

Scenic Resources within State Scenic Highways

Significance Criterion b:	Would the proposed project substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a State scenic highway?

Impact AES-2 THE PROPOSED PROJECT COULD AFFECT SCENIC RESOURCES WITHIN LOCALLY IDENTIFIED SCENIC ROADWAYS. HOWEVER, FACILITIES ASSOCIATED WITH THE PROPOSED PROJECT WOULD NOT BE WITHIN OR VISIBLE FROM DESIGNATED STATE SCENIC HIGHWAYS. NO IMPACT WOULD OCCUR.

Construction

All Districts

There are two officially designated State scenic highways within San Joaquin County: I-5, from the Stanislaus County line to I-580; and I-580 from I-5 to the Alameda County line.[25] The nearest proposed project facilities would be located more than 20 miles away from the nearest designated State scenic highway segment. As such, the proposed project would not be visible from a State scenic highway. Further, construction impacts would be temporary; therefore, no impacts to scenic resources or views within a State scenic highway would occur.

However, there are scenic resources within the project area. The San Joaquin County General Plan recognizes a network of locally designated scenic roadways that include I-5, SR 4, SR 99, SR 26, and portions of SR 88, SR 26, SR 12, Collier Road, Eight Mile Road, Inland Drive, Jack Tone Road, Elliot

[25] Caltrans. 2019. California State Scenic Highway System Map. https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa (accessed January 2025)

Road, Peltier Road, Tully Road, Liberty Road, Jahant Road, Mackville Road, and Clements Road. Within the NSJWCD jurisdiction area, construction of the proposed direct surface recharge areas may be visible from SR 88 and SR 12; construction of the proposed Flood-MAR recharge areas may be visible from Jahant Road, Tully Road, Peltier Road, Elliot Road, SR 88 and SR 12; construction of the proposed ASR well recharge areas may be visible from Jack Tone Road and Clements Road; and construction of a proposed diversion point, location northeast of the existing Beckman ASR well, would be visible from Jack Tone Road. Within the SEWD jurisdiction area, construction of the proposed direct surface recharge areas may be visible from Clements Road and construction of the proposed Flood-MAR recharge areas may be visible from Jack Tone Road, Eight Mile Road, SR 99, and SR 26. Within the City of Stockton jurisdiction area, construction of Flood-MAR recharge areas, basins, dry wells, and new pipelines may be visible from SR 99. The temporary presence of construction equipment (i.e. tractors, trucks) and construction activities (i.e. personnel, materials staging) would adversely affect views from the above-listed scenic corridors.

Projects within the City of Stockton would be required to adhere to the development standards outlined in the City of Stockton Municipal Code, such as those requiring site plan review (Chapter 16.152) to ensure that aboveground structures do not impede scenic views. Further, project components would be required to adhere to the policies of the San Joaquin General Plan, including policies NCR-7.1 through 7.3, which protect scenic features within scenic route corridors.

Due to distance and intervening features (i.e., vegetation, buildings, topography) and compliance with the applicable development standards and policies, construction of project facilities would not be visible from the scenic roadways identified in the San Joaquin County General Plan and, thus, would not have a substantial adverse effect related to scenic resources or scenic views from a locally designated scenic roadway. Therefore, for all three Partner Agencies, no construction impact would occur related to effects on scenic resources or scenic views within locally designated scenic roadway corridors.

Operation

All Districts

As stated above, the nearest proposed project facilities would be located more than 20 miles away from the nearest designated State scenic highway segment. As such, the proposed project would not be visible from a State scenic highway. Therefore, although there are scenic resources within the project area, for all three Partner Agencies, no operational impact would occur related to effects on scenic resources within a State scenic highway.

However, the San Joaquin County General Plan recognizes a network of locally designated scenic roadways that include I-5, SR 4, SR 99, SR 26, and portions of SR 88, SR 26, SR 12, Collier Road, Eight Mile Road, Inland Drive, Jack Tone Road, Elliot Road, Peltier Road, Tully Road, Liberty Road, Jahant Road, Mackville Road, and Clements Road. Within the NSJWCD jurisdiction area, proposed direct surface recharge areas may be visible from SR 88 and SR 12; proposed Flood-MAR recharge areas may be visible from Jahant Road, Tully Road, Peltier Road, Elliot Road, SR 88 and SR 12; proposed ASR well recharge areas may be visible from Jack Tone Road and Clements Road; and a proposed diversion point, location northeast of the existing Beckman ASR well, would be visible from Jack Tone Road. Within the SEWD jurisdiction area, proposed direct surface recharge areas may be visible from Clements Road; proposed Flood-MAR recharge areas may be visible from Jack Tone Road, Eight Mile Road, SR 99, and SR 26. Within the City of Stockton jurisdiction area, Flood-MAR recharge areas, basins, dry wells, and new pipelines may be visible from SR 99.

Aboveground structures could vary in size from low-profile vaults to single-story buildings. Most of the future wells would be located within existing roadway/rights-of-way or existing facilities. Although proposed recharge facilities could be visible from locally designated scenic roadways, wellhead housings would likely be located adjacent to roadways and proximate to land already developed and not expected to obstruct views from the scenic route corridors.

Projects within the City of Stockton would be required to adhere to the development standards outlined in the City of Stockton Municipal Code, such as those requiring design review to ensure compatible development (Chapter 16.120) and site plan review (Chapter 16.152) to ensure that aboveground structures do not impede scenic views. Further, project components would be required to adhere to the policies of the San Joaquin General Plan, including policies NCR-7.1 through 7.3, which protect scenic features within scenic route corridors.

Due to distance and intervening features (i.e., vegetation, buildings, topography), compliance with development standards and policies, and given that most project facilities would be below or at grade during operation, operation of project facilities would not be visible from the scenic roadways identified in the San Joaquin County General Plan and, thus, would not have a substantial adverse effect related to scenic resources or scenic views from a locally designated scenic roadway. Therefore, for all three Partner Agencies, no operational impact would occur related to adverse effects on scenic resources or scenic views within locally designated scenic roadway corridors.

Mitigation Measures

No mitigation is required.

Level of Significance

No Impact

Visual Character or Quality of Public Views

Significance Criterion c:	In nonurbanized areas, would the project substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality?

Impact AES-3 WITHIN THE NONURBANIZED PROJECT AREA, MICUP FACILITIES WOULD NOT SUBSTANTIALLY DEGRADE THE EXISTING VISUAL CHARACTER OR QUALITY OF PUBLIC VIEWS. WITHIN THE URBANIZED CITY OF STOCKTON, MICUP FACILITIES WOULD NOT CONFLICT WITH APPLICABLE CITY REGULATIONS GOVERNING SCENIC QUALITY. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

All Districts

Impacts related to substantial degradation of visual character or quality of public views are limited to operational impacts. In addition, no respective construction impacts resulting in conflicts with zoning and regulations governing scenic quality would occur under development facilitated by the proposed project.

Operation

North San Joaquin Water Conservation District

The NSJWCD area is largely characterized by rural residences, agricultural landscapes, and natural features such as riparian vegetation and the Mokelumne River, with clusters of denser commercial and residential development along SR 99 and arterial roadways.

Underground facilities, such as pipelines, are not expected to have a permanent effect on visual character of an area. As part of the proposed project, disturbed areas, including pipeline alignments would be restored similar to preconstruction conditions. Most aboveground structures would be located within existing development or roadways. Small aboveground wellheads and expanded pump stations would have no significant effect on the visual character of the area. Larger structures, such as single-story housing for wellheads and reconstructed pump station facilities, would be compatible with existing visual character through adherence with the San Joaquin County Municipal Code and General Plan. Municipal Code Chapters 9-200 through 9-203 include land use regulations and development standards that require compatible uses and the preservation of community character. General plan policies related to the preservation of visual character include but are not limited to LU-3.1 through LU-3.3, which requires that development be compatible with existing visual character, and LU-8.2, which requires the maintenance of scenic open space character.

Public views of the project would largely be provided from public roadways. Project components located nearest to public roads within the NSJWCD include new and improved pipelines, wells, and surface recharge areas. Pipelines would be underground and thereby not visible, and low-profile well heads would not encroach upon public views. Proposed surface recharge areas could be visible from these roadways as well as Stillman Magee Park; however, these areas would be visually consistent with similar facilities in the immediate vicinity. Due to intervening vegetation and topography, no pump stations would be visible from public viewpoints. Public views would also be protected through adherence to County General Plan policies, such as NCR-7.2, which requires that views of waterways, hilltops, and oak groves from public land and public roadways are protected and that public access is provided to them.

Therefore, with adherence to the San Joaquin County Municipal Code and General Plan policies, NSJWCD operational impacts related to effects on existing visual character and quality of public views of the project area and its surroundings would be less than significant.

Stockton East Water District

The SEWD area is largely characterized by rural residences, agricultural and open space landscapes, and natural features such as the Calaveras River.

Underground facilities, such as pipelines, are not expected to have a permanent effect on visual character of an area. As part of the proposed project, disturbed areas, including pipeline alignments would be restored similar to preconstruction conditions. Most aboveground structures would be located within existing development or roadways. Small aboveground wellheads and new pump stations would have no significant effect on the visual character of the area. Larger structures, such as single-story housing for wellheads and new pump station facilities, would be compatible with existing visual character through adherence with the San Joaquin County Municipal Code and General Plan. Municipal Code Chapters 9-200 through 9-203 include land use regulations and development standards which require compatible uses and the preservation of community character. General plan policies related to the preservation of visual character include but are not

limited to LU-3.1 through LU-3.3, which require development is compatible with existing visual character, and LU-8.2, which requires the maintenance of scenic open space character.

Public views of the project would largely be provided from public roadways. Project components located nearest to public roads within the SEWD include new and improved pipelines, wells, and surface recharge areas. Pipelines would be underground and thereby not visible, and low-profile well heads would not encroach upon public views. Proposed surface recharge areas could also be visible from public roadways; however, these areas would be visually consistent with similar facilities and existing agricultural uses in the vicinity. Public views would also be protected through adherence to County General Plan policies, such as NCR-7.2, which requires that views of waterways, hilltops, and oak groves from public land and public roadways are protected and that public access is provided to them.

Therefore, with adherence to the San Joaquin County Municipal Code and General Plan policies, SEWD operational impacts related to effects on existing visual character and quality of public views of the project area and its surroundings would be less than significant.

City of Stockton

The City of Stockton is located in an urbanized area according to CEQA Guidelines Section 21071. The regulations governing scenic quality within the City of Stockton are included in the City of Stockton Municipal Code and General Plan are detailed in Section 4.1.2, *Regulatory Setting*.

The Delta Water Treatment Plant (DWTP) Groundwater Recharge Basin Project would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at the DWTP, and no new pipelines would be constructed within the City. Therefore, no conflicts with applicable zoning or other regulations governing scenic quality would occur for these components.

Up to 70 acres of recharge basins would also be introduced as part of the proposed project; however, groundwater recharge areas would be limited to agricultural and open space areas and would not be located upon urban or built-up lands within the City of Stockton. Similarly, approximately 6,000 linear feet of new pipeline would be introduced as part of the proposed project in agricultural and open space areas; however, the pipelines would not be visible once installed underground. Project facilities would be consistent with allowed uses and zoning and would be located on lands containing similar existing infrastructure. The project would be comply with the City's General Plan and Municipal Code policies and requirements, including those related to visual and scenic resources, such as Goal LU-3, which aims to preserve and enhance the character and scale of San Joaquin County's communities and rural areas through implementation of compatible development (Policy LU-3.1), maintaining visual access to natural areas and features (Policy LU-3.10), and minimizing the visibility of structures (Policy LU-8.2). Further the project would undergo design review and site plan review, as required by Municipal Code Chapters 16.120 and 16.152 to ensure that project development is compatible and consistent with the land uses, goals, objectives, programs, and policies of the General Plan.

The proposed project would not conflict with applicable zoning and other regulations governing scenic quality within the City of Stockton. Therefore, City of Stockton operational impacts related to consistency with applicable zoning and policies governing scenic quality would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

New Source of Light or Glare

Significance Criterion d:	Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

Impact AES-4 FACILITIES ASSOCIATED WITH THE PROPOSED PROJECT WOULD CREATE NEW SOURCES OF LIGHT OR GLARE THAT COULD ADVERSELY AFFECT DAYTIME OR NIGHTTIME VIEWS IN THE AREA. ALL LIGHT SOURCES WOULD BE SHIELDED AND DIRECTED DOWNWARD AND UTILIZE MOTION SENSORS AND TIMERS TO MINIMIZE LIGHT SPILLOVER AND LIGHT DURATION IN ACCORDANCE WITH SAN JOQUIN COUNTY AND THE CITY OF STOCKTON MUNICIPAL CODES. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

All Districts

Impacts related to creation of new sources of light and glare that could adversely affect daytime and nighttime views in the area are typically limited to operational impacts. Most construction activities associated with MICUP components would occur during the daytime, limiting potential for construction-related, temporary nighttime lighting impacts. Construction-related nighttime lighting used for activities such as 24-hour drilling required during well construction would be used at future project construction sites only for safety and security purposes. All nighttime construction lighting would be shielded and directed downward (toward the work area) to limit potential spillover to adjacent areas. Therefore, construction light and glare impacts related to construction of the proposed project would be less than significant.

Operation

All Districts

Existing sources of light and glare within the three Partner Agency areas vary. Light and glare sources within developed areas are consistent with suburban and commercial development. However, most of the areas contain rural residential and agricultural uses that provide limited sources of light and glare. Significant impacts related to light and glare would occur if there were substantial permanent increases in ambient daytime or nighttime light levels near light-sensitive land uses, such as residential areas.

Rural residences with minimal exposure to existing light sources are located throughout the Place of Use. There would be no lighting associated with project underground facilities (such as pipelines and wells) or project recharge basins, which make up the largest area of visible project components. Rural residences proximate to the CalFed Pump Station and North System Pump Station would be exposed to limited operational lighting from the expanded pump stations. However, pump station expansion would occur in the same location as existing facilities with similar operational lighting, and intervening vegetation and topography generally blocks views of the pump stations from nearby residences. Operational lighting would be limited and shielded and directed downward and inward (toward the facility) in accordance with the San Joaquin County Ordinance Code, City of Lodi, and City of Stockton Municipal Code requirements. As such, with implementation of shielded,

downward and project-facing lighting, impacts of nighttime light during operational activities would not create new sources of substantial light that would adversely affect nighttime views in the area, and operational lighting impacts would be less than significant.

It is not anticipated that operational daytime glare would occur from proposed project structures (e.g. pump stations, pipelines), given the lack of proposed facility reflective materials and above-ground presence. However, the surface of water is reflective; and thus, when full of water, recharge areas would introduce new sources of daytime glare. Any potential glare resulting from surface water would appear similar in character to surrounding agricultural uses and water bodies (e.g., Mokelumne River) in the Place of Use, which also use ponds and other surface water retention facilities. Therefore, glare impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

4.1.4 Cumulative Impacts

The geographic scope of the cumulative aesthetics analysis is the visible areas within and surrounding the MICUP Place of Use. The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1 (refer to Chapter 4, *Environmental Impact Analysis*) located in San Joaquin County. Cumulative impacts regarding aesthetics may occur if any of the related cumulative projects are in close enough proximity to be within the same field of view as the proposed project and result in significant adverse changes in the visual quality and character of the surrounding area.

Scenic Vistas

Scenic vistas are varied and dispersed throughout the area within and surrounding the MICUP Place of Use. In locations where scenic vistas are of high quality, such as in the rural, agricultural, and open space areas of San Joaquin County and where unobstructed views of the Sierra Nevada Mountains are available, cumulative projects would be more likely to cause or make a cumulatively considerable contribution to a significant cumulative impact on scenic vistas, in particular if the cumulative projects were located in close proximity to scenic vistas available from publicly accessible vantage points. By contrast, in locations where the quality of scenic vistas is of lesser quality, such as within the urbanized areas of Stockton, there is a decreased likelihood that cumulative projects would result in significant impacts to scenic vistas, because development in these areas would likely be infill and, thus, would be consistent with neighboring existing development.

Cumulative residential and commercial development would undergo design review processes as required by the applicable jurisdiction which would minimize impacts to scenic views. Additionally, cumulative water infrastructure and groundwater recharge projects would either utilize existing infrastructure or develop new infrastructure in agricultural areas where similar features are visible; and thereby, would not result in substantial visual contrast. Compliance with the applicable San Joaquin County, City of Lodi, and City of Stockton General Plans and Municipal Codes intended to protect scenic vistas would minimize potential impacts would ensure that these and other

development projects do not adversely affect scenic vistas. Cumulative impacts resulting in adverse effects to a scenic vista from planned or pending projects would be less than significant, and the project's contribution to these impacts would not be cumulatively considerable.

Scenic Resources within State Scenic Highways

State designated scenic highways and locally designated scenic routes run throughout San Joaquin County. There are two officially designated State scenic highways within San Joaquin County: I-5, from the Stanislaus County line to I-580; and I-580 from I-5 to the Alameda County line.[26] No components of the proposed project are visible from I-580 due to distance.

If sited near a State scenic highway or scenic route, cumulative projects could result in a cumulatively considerable impact if located near other cumulative projects that have a significant impact on scenic resources within State scenic highways or locally designated scenic routes. Cumulative projects located along I-5, such as the Interstate 5 Commerce Center Project, would likely be visible from the highway; however, such projects would be visually consistent with existing development in the vicinity. Cumulative water infrastructure and groundwater recharge projects located in the northeastern quadrant of the MICUP Place of Use would potentially be visible from locally designated scenic roadways; however, the existing visual environment in the project area consists of similar water facilities amongst agricultural and rural residential areas. These cumulative projects would implement similar facilities that are within the existing visual setting of the project area, and would be at or near ground level, thereby not affecting views from, or scenic resources within, the scenic roadway. Therefore, cumulative project impacts related to degradation of scenic resources would be less than significant, and the proposed project would not contribute to a cumulatively considerable impact.

Similar to the proposed project, all cumulative projects would be required to undergo design review by the applicable jurisdiction, and adhere to the San Joaquin County, City of Lodi, and City of Stockton General Plans and Municipal Codes, including policies and ordinances which protect views and visual resources within scenic road corridors. Compliance with these policies would ensure that cumulative development projects do not adversely affect scenic vistas or damage scenic resources. Cumulative adverse impacts to scenic resources within a State- or locally designated scenic roadway would be less than significant, and the project's contribution to these impacts would not be cumulatively considerable

Visual Character and Quality of Public Views

While cumulative projects would involve construction equipment similar to the proposed project, construction activities would be temporary and only be visible for short periods of time; and thus, would not have permanent impacts to visual character or the quality of public views. Cumulative impacts resulting in adverse effects to a visual character and the quality of public views from planned or pending projects would be less than significant, and the project's contribution to these impacts would not be cumulatively considerable.

Cumulative residential, commercial, and utility development projects would have the potential to impact community character and the quality of public views. Similar to the proposed project, all cumulative projects would be required to undergo design review by the applicable jurisdiction, and adhere to the San Joaquin County, City of Lodi, and City of Stockton General Plans and Municipal

[26] Caltrans. 2019. California State Scenic Highway System Map. https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa (accessed January 2025)

Codes, including policies and ordinances which protect and maintain existing visual character and access to public views. Compliance with applicable general plan and municipal code requirements would ensure that cumulative impacts associated with adverse effects to visual character and the quality of public views would be less than significant, and the project's contribution to these impacts would not be cumulatively considerable.

Various cumulative projects, such as the Potter Creek Pump Station Upgrade Project and the Peters Pipeline Control Vault Replacement would introduce new or replaced water infrastructure, and recovery and conveyance facilities. The existing visual environment in the project area consists of similar water facilities amongst agricultural and rural residential areas. These cumulative projects would implement similar facilities that are within the existing visual setting of the project area, and would be at or near ground level, thereby not affecting the availability or quality of public views in the vicinity. Therefore, cumulative project impacts related to degradation of visual character and public views would be less than significant, and the proposed project would not contribute to a cumulatively considerable impact.

Light and Glare

Although some cumulative projects would be located in urban or suburban areas where existing levels of light and glare are higher, and thus, the effects of additional sources would be minimal, many projects would be in rural residential and agricultural areas where sources of existing light and glare are limited. New sources of light and glare from cumulative projects within rural areas would likely be visible from proximate roads and residences, some of which may experience nighttime lighting becoming more visible or prominent, covering a larger area and/or appearing in new areas as a result of cumulative development. Compliance with San Joaquin County, City of Lodi, and City of Stockton General Plans and Municipal Codes, including policies and ordinances which require shielded, downward-facing lighting and which regulate offsite light spill would minimize the creation of any substantial new sources of light and glare in the region from cumulative development projects. Cumulative impacts associated with new sources of light and glare would be less than significant, and the project's contribution to these impacts would not be cumulatively considerable.

Overall Level of Cumulative Significance

Less Than Significant

4.2 Agriculture & Land Use Planning

4.2.1 Introduction

This section summarizes San Joaquin County's agriculture and land use characteristics, including overall agricultural land types and land use patterns, and analyzes the potential environmental effects of the proposed project related to Agriculture and Land Use Planning. This section includes: a description of the existing agricultural resources and land uses within the project area (defined as the Place of Use that also encompasses the Partner Agency jurisdiction areas); a summary of applicable regulations related to agricultural resources and land use; an evaluation of the potential impacts of the proposed project related to agricultural resources and land uses; and an evaluation of cumulative impacts.

Information in this section is based on the County of San Joaquin, City of Stockton, and City of Lodi General Plans and Municipal Codes; California Department of Conservation Important Farmland maps; and other various land use planning documents and resources.

4.2.2 Environmental Setting

Current Physical Land Use

Place of Use within San Joaquin County

The project area is located within San Joaquin County. San Joaquin County encompasses nearly 1,440 square miles of relatively level, agriculturally productive lands in California's agricultural heartland, the San Joaquin Valley. The Place of Use is located within the center of San Joaquin County, comprising approximately 45 percent of the County. San Joaquin County is characterized by agricultural soils, farming activities, and urbanized areas. Fruit and nut crops, field crops, and livestock and poultry are the mainstays of the region's agricultural economy.[1] Approximately 4,000 farms are located in San Joaquin County, with an average farm size of 202 acres.[2]

Incorporated areas within San Joaquin County and the Place of Use include the cities of Stockton, Lodi, Manteca, Ripon, and Lathrop. Major land uses include agriculture, urban/incorporated, rural residential, commercial, industrial, rangeland, and open space/natural habitat.

North San Joaquin Water Conservation District

NSJWCD's service area is situated east and north of Lodi in San Joaquin County, covering 149,000 acres on both sides of the Mokelumne River and encompassing approximately 79,000 acres of irrigated farmlands. Irrigated farmland within NSJWCD's service area includes wine grapes, cherries, almonds, walnuts, and various other crops. Agriculture is the predominant land use within the NSJWCD service area, and most NSJWCD growers rely exclusively on groundwater. The region's agricultural activities range from row crops to orchards to dry pasture areas, supporting both crop production and livestock grazing.[3]

[1] San Joaquin, County of. 2016. *San Joaquin County General Plan*. December 2016. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf
[2] Stockton East Water District. 2023. *Strategic Plan*. https://www.sewd.net/files/2ba22232c/Stockton-Strategic-Plan-v4.pdf
[3] North San Joaquin Water Conservation District. 2021. *Strategic Plan*. https://nsjwcd.specialdistrict.org/files/47e32f804/2022-strategic-plan-small.pdf

Stockton East Water District

SEWD serves both urban and agricultural customers in and around Stockton. SEWD's service area includes more than 143,000 acres, from the western boundary of Stockton to the eastern San Joaquin County line. SEWD supports San Joaquin County's agricultural industry by providing surface water for irrigation, and supplies wholesale treated drinking water to Stockton area retail customers. The SEWD manages approximately 250 agricultural surface water diversion accounts, 1,900 agricultural groundwater use accounts, and 6,000 domestic well accounts, ensuring sustainable water management for both agricultural and urban needs in eastern San Joaquin County.[4]

City of Stockton

Stockton encompasses an area of approximately 65 square miles and serves as the seat of San Joaquin County. Land uses mapped within the city limit cover 33,600 acres, more than a third of which is used for housing. Of the 11,900 acres devoted to residential use, more than 85 percent contain single-family homes. Public/semi-public uses take up almost a quarter of the city; these uses include government buildings, public and private schools, the airport, hospitals, and religious institutions. Industrial and commercial uses combined represent about 15 percent of the city's land, and parks, recreation, open space, and agricultural uses account for about 14 percent.[5]

Areas Surrounding Project Area

TO THE NORTH

The northern boundary of the project area is adjacent to the Mokelumne River and the Eastern San Joaquin Groundwater Subbasin, extending into Sacramento County. This area includes agricultural lands and rural communities that rely on both surface water and groundwater for irrigation and domestic use.

TO THE EAST

To the east, the project area is bordered by the Sierra Nevada foothills, extending into Calaveras County. This region is characterized by a mix of agricultural lands, including vineyards and orchards, as well as open spaces and rural residential areas.

TO THE SOUTH

The southern boundary of the project area includes the Stanislaus River and the southern portions of the Eastern San Joaquin Groundwater Subbasin, extending into Stanislaus County. This area is predominantly agricultural, with a focus on row crops, orchards, and dairy farming.

TO THE WEST

To the west, the project area is bordered by the Sacramento-San Joaquin Delta, extending into Contra Costa County. This region is characterized by a network of waterways, levees, and agricultural lands, with a focus on crop production and livestock grazing.

[4] Stockton East Water District. 2023. *Strategic Plan*. https://www.sewd.net/files/2ba22232c/Stockton-Strategic-Plan-v4.pdf
[5] Stockton, City of. 2018. *Envision Stockton 2040 General Plan*. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf

Current Land Use Designations and Zoning

Plans Defining Land Use Designations and Zoning in Project Area

Land use designations and zoning within the project area are defined by the San Joaquin County General Plan, as well as the general plans of the cities of Stockton and Lodi. These general plans are characterized in detail in Section 4.2.3, *Regulatory Framework*. General plans provide the framework for land use decisions, ensuring that development is consistent with community goals and sustainable resource management.

Mapped Land Use Designations and Zoning in Project Area

Figure 4.2-1 shows land use zoning in the project area. As shown, the majority of the MICUP Place of Use area is designated for agricultural use. The cities of Lodi, Stockton, Manteca, and Lathrop are primarily zoned City, with Urban Reserves situated between City land uses and Agriculture around Stockton and Manteca. Pockets of residential lands are scattered across the Place of Use outside of city limits as well.

Important Farmland Resources

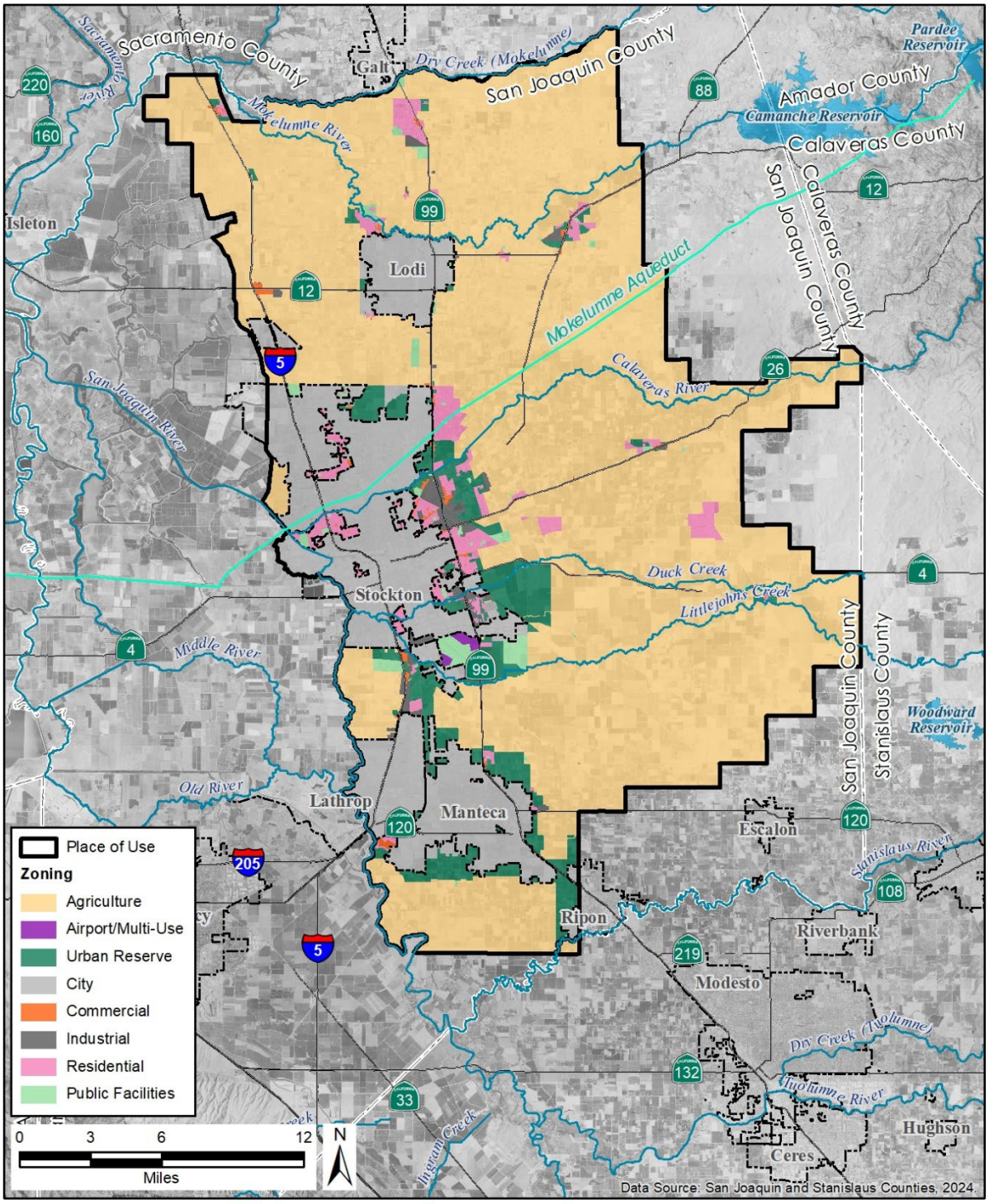
To characterize the environmental baseline for agricultural resources, Important Farmland Maps produced by the California Department of Conservation's (DOC) Farmland Mapping and Monitoring Project (FMMP) were reviewed.[6] According to CEQA Guidelines Section 21060.1(a), "agricultural land" is defined as Prime Farmland, Farmland of Statewide Importance, or Unique Farmland as defined by the United States Department of Agriculture land inventory and monitoring criteria, as modified for California.

Unless otherwise expressed, the future use of "Important Farmland" specifically includes the following definitions provided by the DOC:

- **Prime Farmland:** Land which has the best combination of physical and chemical characteristics for producing crops. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed, including water management, according to current farming standards. Land must have been used for irrigated agricultural production at some point during the four years prior to the mapping date.
- **Farmland of Statewide Importance:** Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the four years prior to the mapping date.
- **Unique Farmland:** Land of lesser quality soils used for the production of specific high economic value crops. It has the special combination of soil quality, location, growing season and moisture supply needed to produce sustained high quality or high yields of a specific crop when treated and managed according to current farming methods. It is usually irrigated but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Examples of crops include oranges, olives, avocados, rice, grapes and cut flowers.

[6] California Department of Conservation (DOC). 2022. *California Important Farmland Finder [map].* https://maps.conservation.ca.gov/DLRP/CIFF/ (accessed October 2022).

Figure 4.2-1 Land Use and Zoning in Place of Use



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Project Area

Figure 4.2-2 shows Important Farmland resources within the project area. Prime Farmland, Farmland of Statewide Importance, Farmland of Local Importance, and Unique Farmland is prevalent across the MICUP project area within San Joaquin County. The cities of Lodi, Stockton, Manteca, and Lathrop consist predominantly of urban and built-up land, with some parcels of mapped Important Farmland on the outskirts of the city limits.

Existing Agricultural Areas and Production Types

San Joaquin County

San Joaquin County's agricultural industry generated over $3 billion in 2023, supporting over 34,000 jobs. Overall, San Joaquin County agriculture supports approximately 10 percent of the County's economy. Table 4.2-1 identifies the top ten agricultural commodities in San Joaquin County in 2023.

Table 4.2-1 San Joaquin County Top Agricultural Commodities in 2023

Ranking	Commodity	Acreage	Quantity Produced	Total Gross Value
1	Milk	NA[1]	31,070,000 CWT[2]	$621,400,000
2	Grapes	81,600 bearing acres	640,000 tons	$393,887,000
3	Almonds	112,600 bearing acres	440,400 tons	$343,553,000
4	Cherries	19,800 bearing acres	54,500 tons	$273,374,000
5	Eggs	NA[1]	56,330,000 dozen	$238,924,000
6	Walnuts	70,100 bearing acres	160,000 tons	$149,326,000
7	Tomatoes	18,500 harvested acres	912,000 tons	$147,369,000
8	Cattle	NA[1]	135,000 heads of cattle	$145,596,000
9	Blueberries	2,360 bearing acres	15,950 tons	$81,178,000
10	Silage and other field crops	67,000 harvested acres	642,000 tons	$77,970,000

[1] Data not available

[2] In agriculture, "CWT" is a unit of measurement and stands for hundredweight, or 100 pounds.

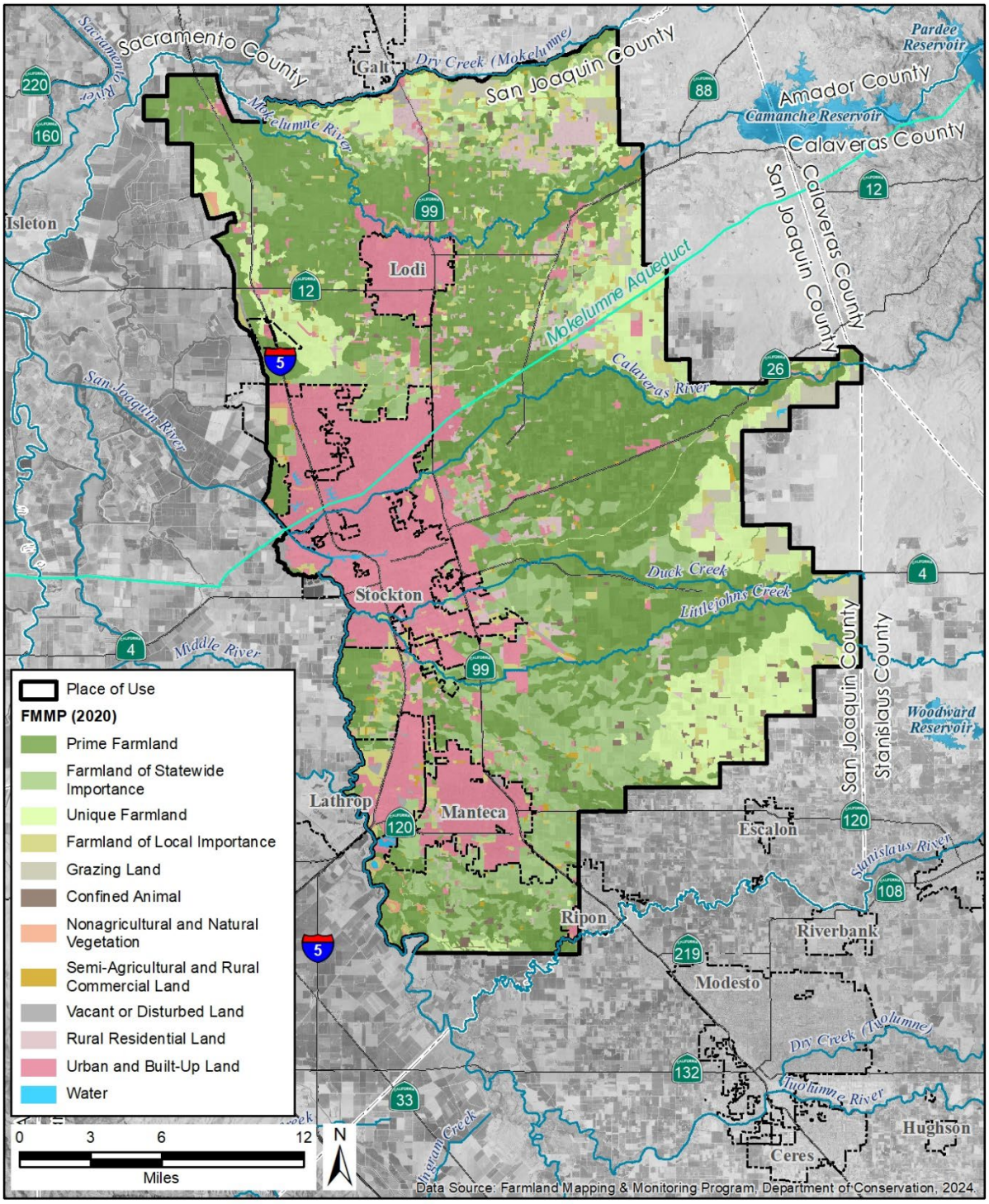
Source: San Joaquin County Agricultural Commissioner. 2024. 2023 San Joaquin County Crop Report. August 27, 2024. https://www.sjgov.org/docs/default-source/agricultural-commissioner-documents/croprpt-archive/2020to2029/sjc_cr2023.pdf?sfvrsn=a2390690_5

As shown in Table 4.2-1, the top three agricultural commodities in San Joaquin County in 2023 by value were milk, grapes, and almonds. Over the last fifteen years, the composition of crops grown in San Joaquin County shifted, with substantial growth in fruit and nut crops and declining production of vegetables and field crops. For example, almond acreage expanded from 48,000 acres in 2008 to 112,600 acres in 2023, reflecting a broader trend across California.

Figure 4.2-3 shows mapped crop types within the Place of Use.

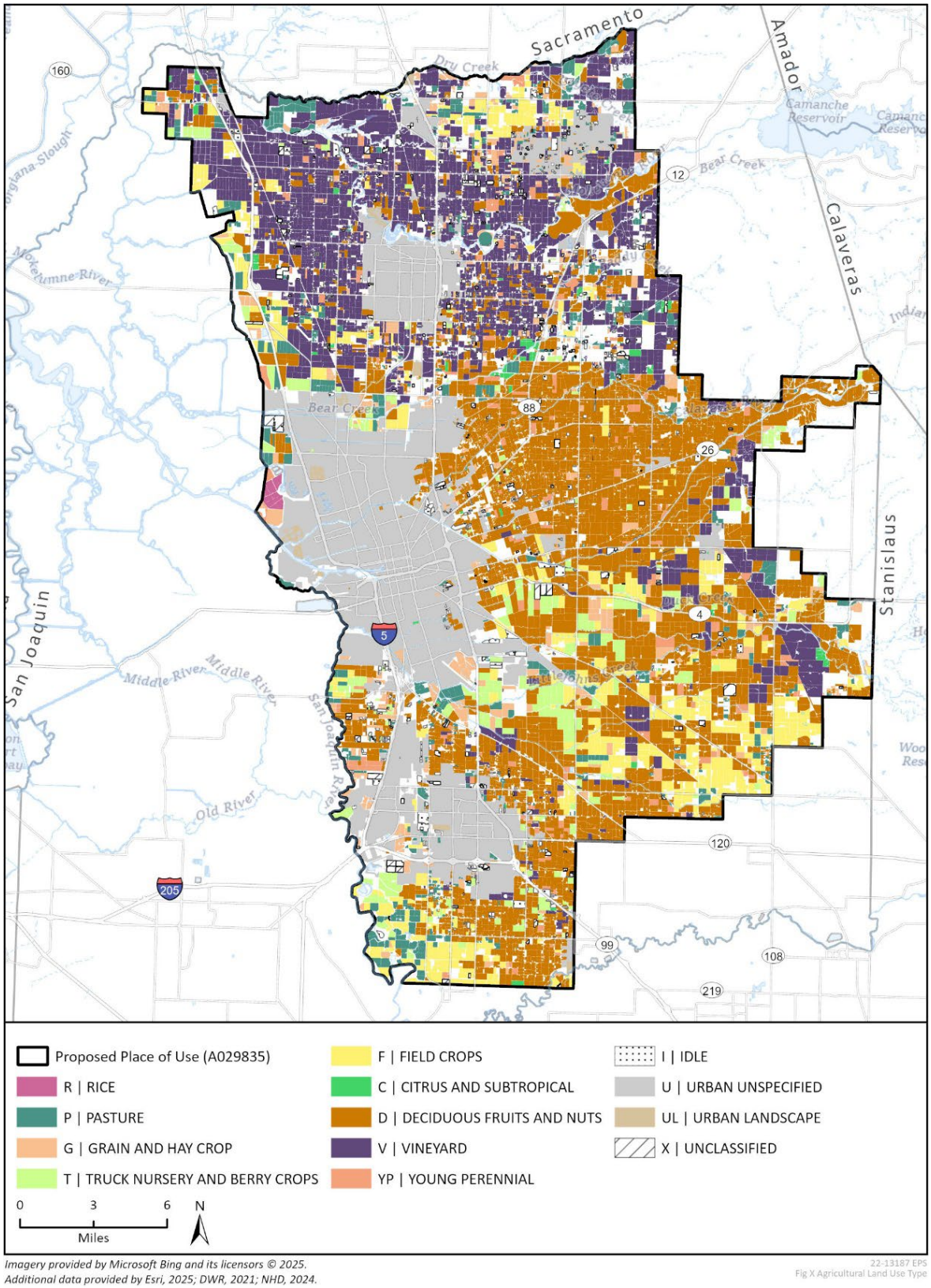
As shown in Figure 4.2-3, vineyards dominate the northern portion of the Place of Use. Deciduous fruits and nuts dominate the southern portion, along with field crops and pasture. Other crop types such as truck nursery and berry crops, and citrus and subtropical crops, are scattered across the Place of Use.

Figure 4.2-2 Important Farmland Resources in Place of Use



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Figure 4.2-3 Crop Types in Place of Use



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San Joaquin County's agricultural irrigation water is sourced from both surface water and groundwater supplies. Surface water is sourced from rivers and streams, including the San Joaquin River and its tributaries like the Calaveras, Mokelumne, and Stanislaus Rivers. Specific water sources are discussed for each partner agency in Section 4.2.2, *Current Physical Land Use*.

Agricultural Zoning

San Joaquin County

San Joaquin County's General Plan 2035 designates a significant portion of its land for agricultural use, reflecting the county's commitment to preserving its rich agricultural heritage. The County has established the following zoning designations for agricultural use:

- **General Agriculture (A/G).** This designation provides for large-scale agricultural production and associated processing, sales, and support uses. Some examples include crop production, grazing, and livestock raising facilities; agricultural processing facilities (e.g., canning operations); and agricultural support and sales.
- **Limited Agriculture (A/L).** This designation provides for small-scale and specialty agricultural production and associated processing, sales, and support uses.
- **Agriculture-Urban Reserve (A/UR).** The Agricultural-Urban Reserve designation generally applies to areas currently undeveloped or used for agricultural production that are in the logical path of development around an Urban Community or City Fringe Area.
- **Agriculture/Industrial (A/I).** This designation provides for limited dry uses that complement both agricultural and industrial business and will not generate a significant amount of waste or utilize a large amount of water.

The County's jurisdiction covers approximately 90 percent of all land in the county, the vast majority of which is designated General Agriculture (A/G). However, there are more intensive residential and urban uses in the county surrounding cities and within unincorporated communities.[7]

The NSJWCD and SEWD service areas are located within unincorporated San Joaquin County. Per San Joaquin County Municipal Code Chapter 9-600, utility services and water storage infrastructure are allowable uses in agricultural zones.

City of Stockton

As previously noted, Stockton consists primarily of urban and built-up land. The City of Stockton Development Code establishes an Open Space (OS) zoning district, which is consistent with the Open Space/Agriculture General Plan designation and allows for agricultural land uses. According to the City of Stockton's General Plan, lands under this designation are intended to remain unincorporated and under the jurisdiction of San Joaquin County.[8]

City of Lodi

Agricultural uses encompass less than one percent of the City of Lodi's incorporated limits. The City of Lodi's municipal code allows for agricultural land uses in residential and industrial zones. Agricultural uses are also authorized on a case-by-case basis with a Use Permit in some residential and mixed use zones.

[7] San Joaquin, County of. 2016. *San Joaquin County General Plan*. December 2016. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf
[8] Ibid.

Williamson Act Contracts

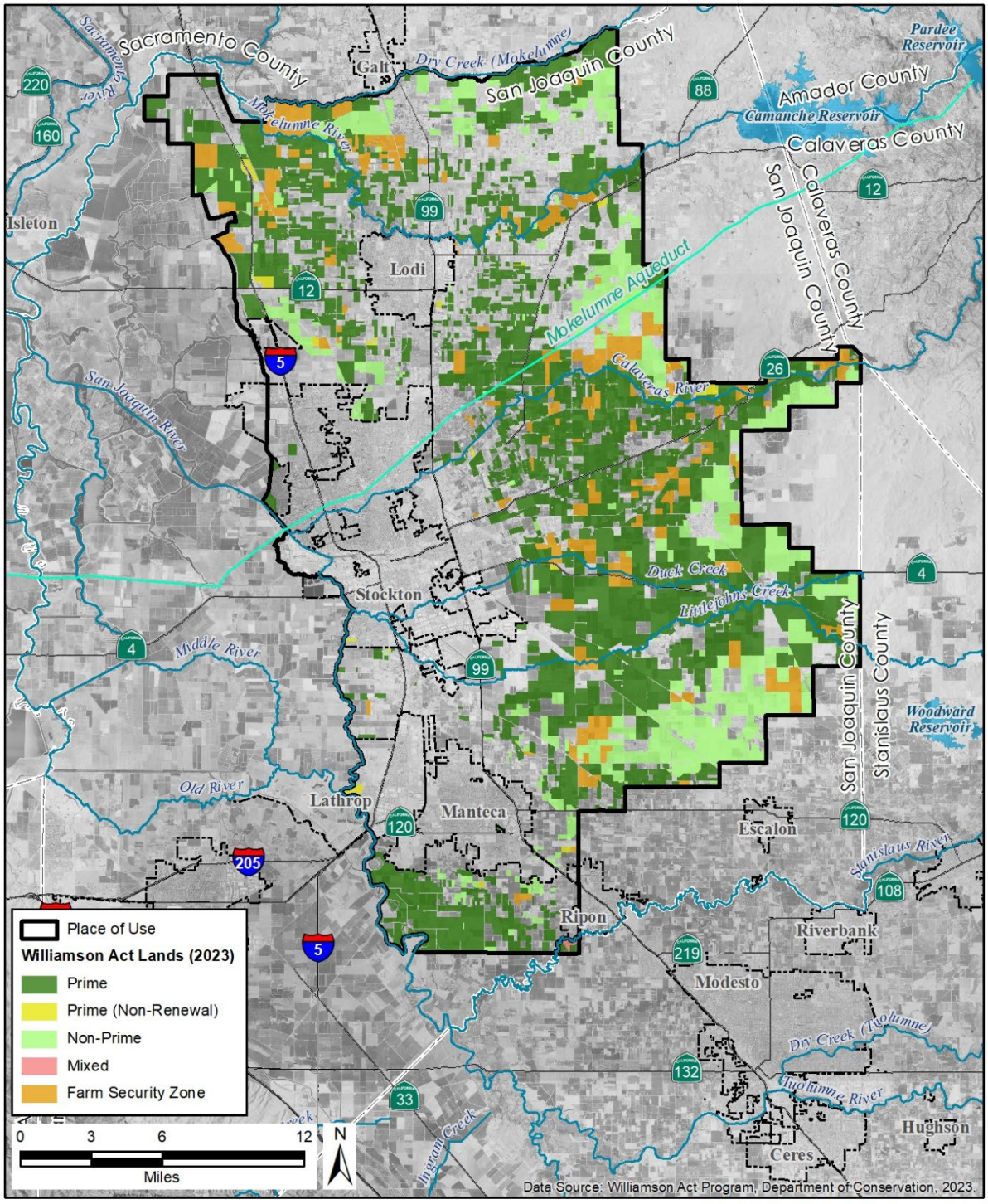
Counties and cities designate agricultural preserves and offer preferential taxation to private agricultural landowners based on the income-producing value of their property in agricultural use, rather than on the property's assessed market value. In return for the preferential tax rate, the landowner signs a contract, a Williamson Act contract, with the county or city agreeing not to develop the land with non-agricultural uses for a minimum 10-year period.

Project Area

Figure 4.2-4 shows Williamson Act lands in the project area. As shown, approximately half of the MICUP project area consists of lands under Williamson Act contracts, with the highest densities located in the northern and eastern portions of the project area. Specifically, Williamson Act lands also exist within the MICUP project component areas.

NSJWCD and SEWD service areas all contain numerous parcels consisting of Williamson Act lands. The City of Stockton is primarily urban and contains only a few parcels of Williamson Act lands.

Figure 4.2-4 Williamson Act Lands in Place of Use



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4.2.3 Regulatory Framework

Federal Regulations

No federal plans, policies, regulations, or laws related to agriculture and land use planning are applicable to the proposed project.

State Regulations

Williamson Act

The California Land Conservation Act (Williamson Act) of 1965 enables counties and cities to designate agricultural preserves and offer preferential taxation to private agricultural landowners based on the income-producing value of their property in agricultural use, rather than on the property's assessed market value. In return for the preferential tax rate, the landowner signs a contract with the county or city agreeing not to develop the land for a minimum 10-year period. Permissible land uses under Williamson Act contracts (e.g., agricultural land uses and limited ancillary uses) are governed by Government Code Section 51238.1. In accordance with State law, each city and county has the discretion to determine land uses that are or are not compatible with Williamson Act contracts, provided these uses are not prohibited under the Act. Water infrastructure is generally considered a compatible use because it supports agricultural activities.[9]

Local and Regional Regulations

SJCOG 2022 RTP/SCS Plan

The San Joaquin Council of Governments (SJCOG) Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) is a comprehensive long-range vision and investment plan that addresses the future transportation needs of San Joaquin County. Adopted on August 25, 2022, the RTP/SCS integrates transportation and land use planning to support sustainable growth, economic development, and environmental stewardship. The plan considers future population growth, housing needs, and public health goals, aiming to provide diverse transportation options that reduce greenhouse gas emissions and vehicle miles traveled. By aligning with state and federal regulations, the RTP/SCS ensures that transportation projects in the region qualify for necessary funding, promoting a financially and environmentally responsible approach to regional development.[10]

San Joaquin County General Plan

San Joaquin County has land use regulatory authority over all unincorporated land in the county, which includes all areas except land within the city limits of Escalon, Lathrop, Lodi, Manteca, Ripon, Stockton, Tracy, or land owned/managed by either the State or Federal governments (e.g., State Parks, National Parks, Bureau of Land Management areas, and tribal lands) and areas not under County jurisdiction (e.g., public schools, prisons).[11]

[9] California Department of Conservation. 2024. *Williamson Act & Compatible Use: Land Conservation Act of 1965.* September 12, 2024. https://www.conservation.ca.gov/dlrp/wa/Documents/WA%20Compatibility%209.12.2024.pdf (accessed February 2025)
[10] San Joaquin Council of Governments. 2022. *Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS).* August 2022. https://www.sjcog.org/608/Adopted-2022-RTPSCS-Plan (accessed January 2025)
[11] San Joaquin, County of. 2016. *San Joaquin County General Plan*. December 2016. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf

The San Joaquin County General Plan 2035 was adopted by the Board of Supervisors in December 2016. This comprehensive plan serves as the County's blueprint for future land use, development, preservation, and resource conservation decisions. It addresses a wide range of topics, including land use, circulation, housing, open space, conservation, safety, and noise, ensuring that development is balanced with the preservation of agricultural and natural resources. The plan emphasizes the importance of making the most of existing infrastructure and public facilities, minimizing impacts to agricultural and natural resources, and expanding opportunities for economic and job growth. The focus of the Land Use section of the General Plan is to identify ways the County can encourage employment generating development while preserving prime farmland, protect natural habitats, and reducing the financial, social, and environmental impacts of urban sprawl, which provide co-benefits for public health.[12]

The following San Joaquin County General Plan goals and policies are relevant to this section:

Goal LU-7. Provide for the long-term preservation of productive farmland and to accommodate agricultural services and related activities that support the continued viability of the County's agricultural industry.

- **LU-7.1 Protect Agricultural Land.** The County shall protect agricultural lands needed for the continuation of viable commercial agricultural production and other agricultural enterprises.
- **LU-7.2 Agricultural Support Uses.** The County shall require new agricultural support development and non-farm activities to be compatible with surrounding agricultural operations. New developments shall be required to demonstrate that they are locating in an agricultural area because of unique site area requirements, operational characteristics, resource orientation, or because it is providing a service to the surrounding agricultural area. The operational characteristics of the use may not have a detrimental impact on the operation or use of surrounding agricultural properties. Developments must be sited to avoid any disruption to the surrounding agricultural operations.

Goal IS-4. To ensure reliable supplies of water for unincorporated areas to meet the needs of existing and future residents and businesses, while promoting water conservation and the use of sustainable water supply sources.

- **IS-4.1 Water Agency Support.** The County shall support efforts of local water agencies, special district, and water conservation districts to ensure that adequate high-quality water supplies are available to support existing and future residents and businesses.
- **IS-4.2 Interagency Cooperation.** The County shall work with local water agencies to address existing and future water needs for the County.
- **IS-4.7 Conjunctive Use.** The County shall support conjunctive use of groundwater and surface water by local water agencies to improve water supply reliability.
- **IS-4.9 Groundwater Management.** The County shall continue to support cooperative, regional groundwater management planning by local water agencies, water users, and other affected parties to ensure a sustainable, adequate, safe, and economically viable groundwater supply for existing and future uses within the County.

[12] Ibid

City of Stockton General Plan

The City of Stockton's General Plan, known as Envision Stockton 2040, was adopted by the City Council on December 4, 2018. This plan outlines the city's vision for growth and development over the next two decades, focusing on sustainable development, economic vitality, and enhanced quality of life for residents. The plan includes land use designations for residential, commercial, industrial, and mixed-use developments, and provides guidelines for zoning and development standards to ensure that growth is managed in a way that supports the city's goals and objectives.[13]

The following City of Stockton General Plan policies and actions are relevant to this section:

- **Policy SAF-3.1.** Secure long-term renewable contracts and related agreements to ensure that surface water rights will be available to meet projected demand.
- **Policy SAF-3.2.** Protect the availability of clean potable water from groundwater sources.
  - **Action SAF-3.2A.** Continue to cooperate with San Joaquin County, Stockton East Water District, and CalWater to monitor groundwater withdrawals and ensure that they fall within the target yield for the drinking water aquifer.

City of Lodi General Plan

The City of Lodi's General Plan was last updated in April 2010. The plan provides a set of policies and programs that form a blueprint for physical development throughout the community. The plan includes land use designations for residential, commercial, industrial, and agricultural areas, and establishes guidelines for zoning and development to ensure that growth is consistent with the city's vision and goals. The General Plan emphasizes the need to preserve the City's compact urban form, open spaces, and agricultural lands while accommodating growth needs.[14]

The following City of Lodi General Plan goals and policies are relevant to this section:

- **Policy C-P1.** Work with San Joaquin County and the City of Stockton to maintain land surrounding Lodi in agricultural use. Encourage the continuation of Flag City as a small freeway-oriented commercial node, with no residential uses.
- **Policy C-P4.** Encourage San Joaquin County to conserve agricultural soils, preserve agricultural land surrounding the City and promote the continuation of existing agricultural operations, by supporting the county's economic programs.

4.2.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 *CEQA Guidelines* Appendix G significance criteria questions related to Agriculture and Land Use Planning.

[13] Stockton, City of. 2018. *Envision Stockton 2040 General Plan*. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf

[14] Lodi, City of. 2010. *General Plan*. April 2010. https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF (accessed January 2025)

Would MICUP (the proposed project):

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?
d) Physically divide an established community?
e) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Approach to Analysis

Agricultural Resources

CONSTRUCTION

The evaluation of construction-related direct impacts to agricultural resources is informed by the California Department of Conservation Agricultural Land Evaluation and Site Assessment (LESA) Model, which is a point-based approach for rating the relative importance of agricultural land resources based upon specific measurable features. The California LESA Model was developed consistent with Public Resources Code Section 21095 to provide lead agencies with a methodology to quantitatively and consistently evaluate potentially significant effects on the environment related to agricultural land conversions.

The California Agricultural LESA Model evaluates measures of soil resource quality, a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, the factors are rated, weighted, and combined, resulting in a single numeric score. The California LESA Model is made up of two components, known as "Land Evaluation" (LE) and "Site Assessment" (SA), scored and weighted separately to yield a total LE subscore and SA subscore. The Final LESA Score is the sum of the LE and SA subscores and has a maximum possible score of 100 points. Based on the Final LESA Score, numerical thresholds are used to determine the significance of a project's impacts on agricultural resources.

This EIR identifies a Final LESA Score for each Partner Agency project components. LESA Model worksheets and the respective California Department of Conservation instruction manual[15] are attached in Appendix D.

Land Evaluation

The LE subscore consists of two factors, including the Land Capability Classification (LCC) rating and the Storie Index rating, which were devised to measure the inherent soil-based qualities of land as they relate to agricultural production. The LCC Rating and Storie Index rating scores are based on the soil map unit(s) identified on a property and the acreage of each soil mapping unit relative to the property's total acreage.

[15] California Department of Conservation. 1997. California Agricultural Land Evaluation and Site Assessment (LESA) Model Instruction Manual. Downloaded here: https://www.conservation.ca.gov/dlrp/Pages/qh_lesa.aspx (accessed January 2025)

- **Land Capability Classification (LCC Rating):** The LCC indicates the suitability of soils for most kinds of crops. Soils are rated on a scale from Class I to Class VIII. Soils having the fewest limitations for agricultural production receive the highest rating.
- **Storie Index Rating:** The Storie Index provides a numeric rating (based on a 100-point scale) of the relative degree of suitability or value of a given soil for intensive agricultural use. The rating is based on four soil characteristics: degree of soil profile development, surface texture, slope, and other soil and landscape conditions including drainage, alkalinity, nutrient level, acidity, erosion, and microrelief.

For project areas with multiple soil mapping units, the LCC Rating and Storie Index Rating are determined by multiplying the ratings for each map unit by the corresponding map unit's proportion of the project area's total acreage. Soil types present in the project area are described in detail in Section 4.6, *Geology and Soils,* and characterized by Partner Agency service area.

Site Assessment

The SA subscore consists of four factors measuring the social, economic, and geographic features that contribute to the overall value of agricultural land. The SA factors include:

- **Project Size.** The Project Size Rating is determined by summing the acres in a project that fall within one of three consolidated LCC categories (i.e., Class I to Class VIII). For this analysis, it was assumed that direct surface recharge basins and well pad sites would constitute the developed footprint acreages for each partner agency. Because in-lieu recharge, Flood-MAR, and pipelines would not permanently convert land uses, they were not included in the acreage totals for the LESA Model.
- **Water Resource Availability.** The Water Resources Availability Rating is based on the water sources that supply each agricultural site. For the purposes of this modeling effort, it was conservatively assumed that project components may be sited on lands with water irrigation resources available with limited physical or economic restrictions.
- **Surrounding Agricultural Land.** The Surrounding Agricultural Land Rating accounts for the possibility that surrounding agricultural land use is likely to influence and be influenced by the project's agricultural land. A rectangular zone of influence is identified that encompasses all project components. Based on the percentage of agricultural land in the zone of influence, the project site is assigned a Surrounding Agricultural Land Score.
- **Surrounding Protected Resource Land.** The Surrounding Protected Resource Land Rating is an extension of the Surrounding Agricultural Land Rating and is scored in a similar manner. Protected resource lands are those lands with long-term use restrictions that are compatible with or supportive of agricultural land uses. For the purposes of this analysis, this was considered to consist of mapped Farmland by the California Department of Conservation.

OPERATION

The operational analysis considered the consistency of proposed project infrastructure with existing land uses, including existing zoning, agricultural uses, and Williamson Act contracts. The analysis also considered the potential for indirect impacts to agricultural lands via changes in water supply availability.

Land Use Planning

The evaluation of proposed project impacts related to land use planning is based on a comparison of MICUP to the applicable land use-related plans, policies, and regulations to determine if development facilitated by the proposed project would conflict with a plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect. This section also analyzes whether project components and infrastructure facilitated by the proposed project would physically divide communities.

Implementation of the proposed project could result in a significant impact if it would conflict with applicable land use plans and policies of the San Joaquin County General Plan, City of Lodi General Plan, City of Stockton General Plan, San Joaquin County Ordinance Code with respect to agricultural land uses, or SJCOG RTP/SCS Plan. A policy inconsistency is considered a significant adverse impact only if the inconsistency would result in a significant adverse physical impact based on the established significance criterion.

EIR Scoping Comments Consideration

No comments that pertain to agriculture or land use planning were received in response to publication of the Notice of Preparation for this EIR.

Geographic Scope

For the purposes of this EIR analysis, this Agriculture and Land Use Planning section focuses on San Joaquin County and the cities of Stockton and Lodi, which are more proximate to the project components than the cities located farther south in the Place of Use.

Specific Thresholds of Significance

For purposes of this analysis, the following thresholds are used to evaluate the significance of agriculture resources and land use/planning impacts resulting from implementation of the proposed project:

- Physical direct converting of prime or unique farmland or farmland of Statewide importance to non-agricultural uses, resulting in a LESA Score that exceeds the significance thresholds identified in Table 4.2-2.
- Indirect converting of prime or unique farmland or farmland of Statewide importance to non-agricultural uses via water irrigation cessation.
- Project components or infrastructure conflicting with the land use policies, land use designations, or zoning of the General Plans or Ordinance Codes of San Joaquin County or the cities of Stockton and Lodi.
- Project components or infrastructure conflicting with the agricultural policies of the General Plans or Ordinance Codes of San Joaquin County or the cities of Stockton and Lodi.
- Conflicting with an existing Williamson Act contract.
- Project components or infrastructure resulting in physical division of a residential community area within San Joaquin County or the cities of Stockton and Lodi.

Table 4.2-2 LESA Model Significance Thresholds

Total LESA Score	Scoring Decision
0 to 39 points	Not considered significant
40 to 59 points	Considered significant *only* if Land Evaluation and Site Assessment subscores are each greater than or equal to 20 points
60 to 79 points	Considered significant *unless* either Land Evaluation or Site Assessment subscore is less than 20 points
80 to 100 points	Considered significant

LESA = Land Evaluation and Site Assessment Model

Source: California Department of Conservation. 1997. *California Agricultural Land Evaluation and Site Assessment (LESA) Model Instruction Manual.* Downloaded here: https://www.conservation.ca.gov/dlrp/Pages/qh_lesa.aspx (accessed January 2025)

Impact Evaluation

Conversion of Agricultural Resources

Significance Criterion a:	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?
Significance Criterion c:	Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?

Impact AG-1 CONSTRUCTION OF MICUP PROJECT COMPONENTS WOULD RESULT IN CONVERSION OF IMPORTANT FARMLAND TO NON-AGRICULTURAL USE. OPERATION OF MICUP WOULD RESULT IN BENEFICIAL IMPACTS TO AGRICULTURAL LANDS. HOWEVER, CONSTRUCTION IMPACTS WOULD BE SIGNIFICANT AND UNAVOIDABLE.

Construction

North San Joaquin Water Conservation District

As shown in Figure 4.2-5, the majority of NSJWCD project component areas consist of lands designated Prime Farmland and Farmland of Statewide Importance.

PUMP STATIONS AND DIVERSION POINTS

Improvements at pump stations and diversion points would not convert any farmland to non-agricultural use. As such, no Important Farmland would be converted to non-agricultural use, and impacts would be less than significant.

PIPELINE IMPROVEMENTS AND EXTENSIONS

Pipeline construction activities associated with trenching and pipeline installation would temporarily interfere with agricultural activities within construction work areas. Excavation for the width and depth of the pipeline trenches may temporarily disturb some agricultural soil and topsoil within mapped Important Farmland areas shown in Figure 4.2-5 and other agricultural lands in the project area. If these soils are exported from the project area after construction, then loss of agricultural soils would occur, adversely affecting Important Farmland.

To avoid adverse impacts to agricultural soils and Important Farmland, implementation of Mitigation Measure AG-1 would require the stockpiling and restoration of agricultural topsoil along pipeline alignments in agricultural areas. During pipeline construction, topsoil would be stockpiled and stored separately from other excavated soils and backfill and would be restored once pipeline installation is complete. Upon completion of construction, the agricultural ground surface would be restored and agricultural activities could resume. As such, NSJWCD pipeline construction would not permanently convert mapped Farmland or other agricultural lands to non-agricultural use. NSJWCD pipeline construction impacts related to agricultural conversion would be less than significant with incorporation of mitigation.

RECHARGE FACILITIES

The NSJWCD Recharge Area consists of agricultural lands designated as Important Farmland, as shown in Figure 4.2-5. Construction of recharge basins would not preclude the future use of the sites for agricultural activities, as no hardscaping is required for development of the recharge basins; rather, earthen berms would be created to contain water within the proposed direct surface recharge and Flood-MAR areas. While the physical design of the new recharge basins may allow for agricultural use when basins are not actively recharging, this analysis conservatively models the proposed recharge basins as permanent conversions of agricultural land for the purposes of the LESA Model.

Table 4.2-3 summarizes the LESA Model results for NSJWCD project components. Because in-lieu recharge, Flood-MAR, and pipelines would not permanently convert land uses, they were not included in the acreage totals for the LESA Model.

Table 4.2-3 NSJWCD – LESA Model Scores for Recharge Facilities

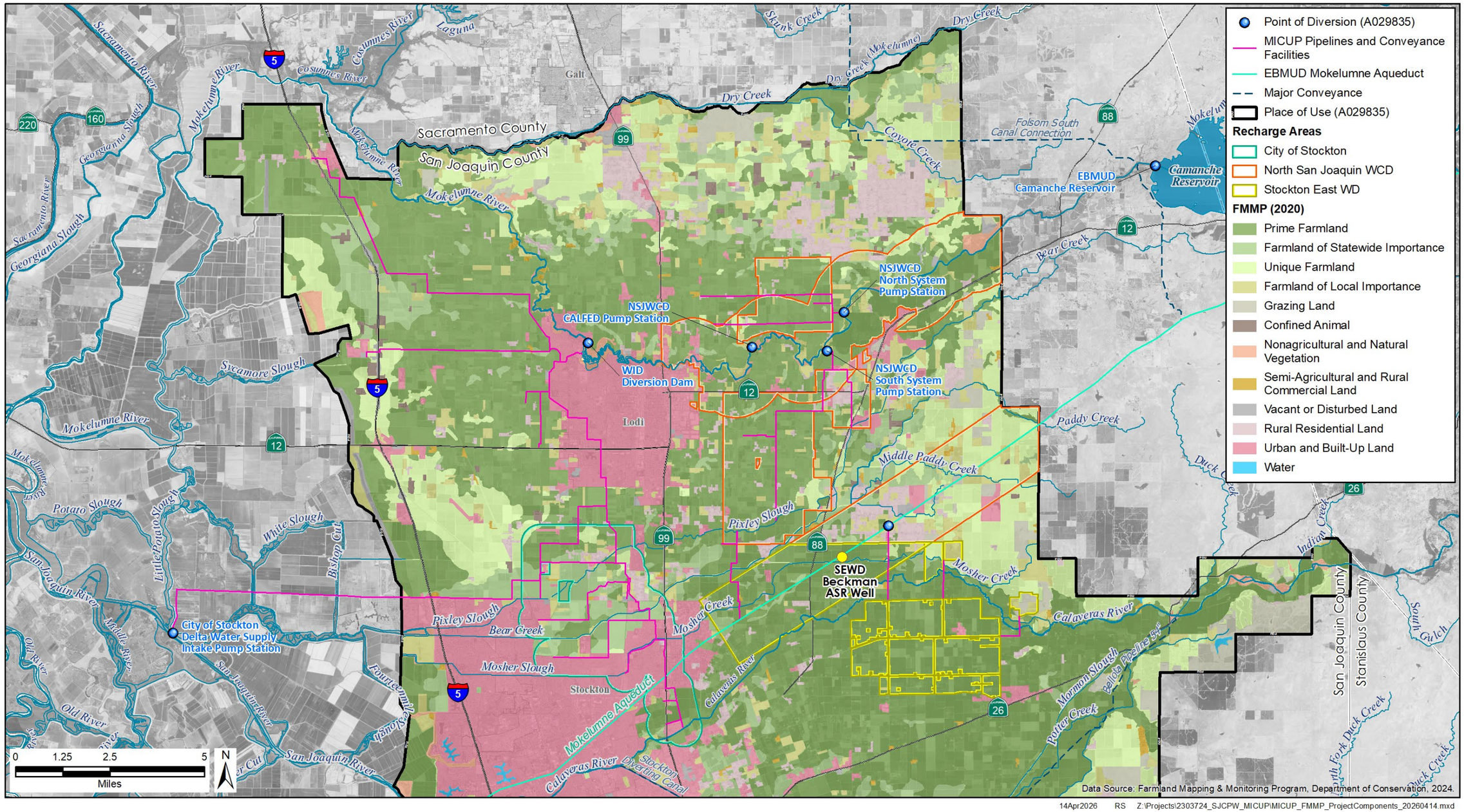
	Factor Scores	Factor Weight	Weighted Factor Scores
Land Evaluation Factors			
Land Capability Classification	78	0.25	20
Storie Index	71	0.25	18
Land Evaluation Subtotal		**0.5**	**37**
Site Assessment Factors			
Project Component Size	100	0.15	15
Water Resource Availability	100	0.15	15
Surrounding Agricultural Land	90	0.15	14
Protected Resource Land	80	0.05	4
Site Assessment Subtotal		**0.5**	**48**
Final LESA Score			**85**

Detailed LESA Model worksheets and Instruction Manual are provided in Appendix D.

Note: Weighted Factor Scores are rounded. Figures may not sum precisely due to rounding adjustments.

As shown in Table 4.2-3, the Final LESA Score for NSJWCD direct surface recharge and ASR well components is 85 out of a possible total of 100. Per thresholds in Table 4.2-2, NSJWCD construction project impacts would be considered significant if the Total LESA Score exceeds 80 points. Therefore, there would be a potentially significant NSJWCD recharge facilities construction impact.

Figure 4.2-5 Important Farmland Resources in Vicinity of Project Components



GEI Consultants, 2026

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Mitigation Measure AG-2 would require NSJWCD to avoid siting new infrastructure in areas designated as Important Farmland whenever possible to minimize conversion of Important Farmland to non-agricultural use. However, this mitigation cannot guarantee prevention of agricultural land conversion and, depending on the final facility footprints, construction of these project components could potentially result in permanent conversion of portions of agricultural lands to non-agricultural use. Therefore, even with implementation of Mitigation Measure AG-2, NSJWCD recharge facilities construction impacts related to conversion of agricultural lands to non-agricultural use would be considered significant and unavoidable.

Stockton East Water District

As shown in Figure 4.2-5, the majority of SEWD project component areas consist of lands designated Prime Farmland and Farmland of Statewide Importance.

PUMP STATIONS AND DIVERSION POINTS

No new or expanded pump stations are proposed by SEWD. Therefore, no SEWD pump station construction impact would occur related to agricultural conversion.

PIPELINE IMPROVEMENTS AND EXTENSIONS

Pipeline construction activities associated with trenching and pipeline installation may temporarily interfere with agricultural activities within construction work areas depending upon location. Excavation for the width and depth of the pipeline trenches may temporarily disturb some agricultural soil and topsoil within mapped Important Farmland areas shown in Figure 4.2-5 and other agricultural lands in the project area. If these soils are exported from the project area after construction, then loss of agricultural soils would occur, adversely affecting Important Farmland.

To avoid adverse impacts to agricultural soils and Important Farmland, implementation of Mitigation Measure AG-1 would require the stockpiling and restoration of agricultural topsoil along pipeline alignments in agricultural areas. During pipeline construction, topsoil would be stockpiled and stored separately from other excavated soils and backfill and would be restored once pipeline installation is complete. Upon completion of construction, the agricultural ground surface would be restored, and agricultural activities could resume. As such, SEWD pipeline construction would not permanently convert mapped Farmland or other agricultural lands to non-agricultural use, and impacts would be less than significant.

RECHARGE FACILITIES

Construction of recharge basins would not preclude the future use of the sites for agricultural activities, as no hardscaping is required for development of the recharge basins; rather, earthen berms would be created to contain water within the proposed direct surface recharge and Flood-Mar areas. While the physical design of the new recharge basins may allow for agricultural use when basins are not actively recharging, this analysis conservatively models the proposed recharge basins as permanent conversions of agricultural land for the purposes of the LESA Model.

Table 4.2-4 summarizes the LESA Model results for SEWD project components. Because in-lieu recharge, Flood-MAR, and pipelines would not permanently convert land uses, they were not included in the acreage totals for the LESA Model.

Table 4.2-4 SEWD – LESA Model Scores for Recharge Facilities

	Factor Scores	Factor Weight	Weighted Factor Scores
Land Evaluation Factors			
Land Capability Classification	79	0.25	20
Storie Index	74	0.25	19
Land Evaluation Subtotal		**0.5**	**38**
Site Assessment Factors			
Project Size	100	0.15	15
Water Resource Availability	100	0.15	15
Surrounding Agricultural Land	90	0.15	14
Protected Resource Land	80	0.05	4
Site Assessment Subtotal		**0.5**	**48**
Final LESA Score			**86**

Detailed LESA Model worksheets and Instruction Manual are provided in Appendix D.

Note: Weighted Factor Scores are rounded. Figures may not sum precisely due to rounding adjustments.

As shown in Table 4.2-4, the Final LESA Score for SEWD project components is 86 out of a possible total of 100. Per thresholds in Table 4.2-2, SEWD construction project impacts would be considered significant if the Total LESA Score exceeds 80 points. Therefore, there would be a potentially significant SEWD recharge facilities construction impact.

Mitigation Measure AG-2 would require SEWD to avoid siting new infrastructure in areas designated as Important Farmland whenever possible to minimize conversion of Important Farmland to non-agricultural use. However, this mitigation cannot guarantee prevention of agricultural land conversion and, depending on the final facility footprints, construction of these project components could potentially result in permanent conversion of portions of agricultural lands to non-agricultural use. Therefore, even with implementation of Mitigation Measure AG-2, SEWD recharge facilities construction impacts related to conversion of agricultural lands to non-agricultural use would be considered significant and unavoidable.

City of Stockton

As shown in Figure 4.2-5, the City of Stockton project component areas consist of lands designated Urban and Built-Up Land, Prime Farmland, Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance.

PUMP STATIONS AND DIVERSION POINTS

The City of Stockton DWTP Groundwater Recharge Basin project component would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at the DWTP. Therefore, no City of Stockton pump station construction impact would occur related to agricultural conversion.

PIPELINE IMPROVEMENTS AND EXTENSIONS

Pipeline construction activities associated with trenching and pipeline installation would temporarily interfere with agricultural activities within construction work areas. Excavation for the width and depth of the pipeline trenches may temporarily disturb some agricultural soil and topsoil within

mapped Important Farmland areas shown in Figure 4.2-5 and other agricultural lands in the project area. If these soils are exported from the project area after construction, then loss of agricultural soils would occur, adversely affecting Important Farmland.

To avoid adverse impacts to agricultural soils and Important Farmland, implementation of Mitigation Measure AG-1 would require the stockpiling and restoration of agricultural topsoil along pipeline alignments in agricultural areas. During pipeline construction, topsoil would be stockpiled and stored separately from other excavated soils and backfill and would be restored once pipeline installation is complete. Upon completion of construction, the agricultural ground surface would be restored, and agricultural activities could resume. As such, City of Stockton pipeline construction would not permanently convert mapped Farmland or other agricultural lands to non-agricultural use, and impacts would be less than significant.

RECHARGE FACILITIES

The City of Stockton Recharge Area consists of some non-agricultural lands, such as the DWTP Groundwater Recharge Project site, and some agricultural lands designated as Important Farmland, as shown in Figure 4.2-5. Use of existing facilities (e.g., City of Stockton's existing stormwater basins) would not result in conversion of agricultural lands to non-agricultural use. Construction of up to 70 acres of new recharge basins within 0.5 miles of existing conveyances would not preclude the future use of the sites for agricultural activities, as no hardscaping is required for development of the recharge basins; rather, earthen berms would be created to contain water within the proposed direct surface recharge areas. While the physical design of the new recharge basins may allow for agricultural use when basins are not actively recharging, this analysis conservatively models the proposed recharge basins as permanent conversions of agricultural land for the purposes of the LESA Model.

Table 4.2-5 summarizes the LESA Model results for the City of Stockton's proposed 70 acres of new recharge basins. Because pipelines would not permanently convert land uses on the ground surface, the proposed pipelines associated with the recharge basins were not included in the acreage totals for the LESA Model.

Table 4.2-5 City of Stockton – LESA Model Scores for Recharge Facilities

	Factor Scores	Factor Weight	Weighted Factor Scores
Land Evaluation Factors			
Land Capability Classification	55	0.25	14
Storie Index	65	0.25	16
Land Evaluation Subtotal		**0.5**	**30**
Site Assessment Factors			
Project Component Size	100	0.15	15
Water Resource Availability	100	0.15	15
Surrounding Agricultural Land	90	0.15	14
Protected Resource Land	80	0.05	4
Site Assessment Subtotal		**0.5**	**48**
Final LESA Score			**78**

Detailed LESA Model worksheets and Instruction Manual are provided in Appendix D.

Note: Weighted Factor Scores are rounded. Figures may not sum precisely due to rounding adjustments.

As shown in Table 4.2-5, the Final LESA Score for City of Stockton is 78 out of a possible total of 100. Per thresholds in Table 4.2-2, a total LESA Score between 60 to 79 would be considered significant unless either the Land Evaluation or Site Assessment subscore is less than 20 points. As shown in Table 4.2-5, neither subscore is less than 20 points for the City of Stockton facilities. Therefore, there would be a potentially significant City of Stockton recharge facilities construction impact.

Mitigation Measure AG-2 would require the City of Stockton to avoid siting new recharge basins in areas designated as Important Farmland whenever possible to minimize conversion of Important Farmland to non-agricultural use. However, this mitigation cannot guarantee prevention of agricultural land conversion and, depending on the final facility footprints, construction of these project components could potentially result in permanent conversion of portions of agricultural lands to non-agricultural use. Therefore, even with implementation of Mitigation Measure AG-2, City of Stockton recharge facilities construction impacts related to conversion of agricultural lands to non-agricultural use would be considered significant and unavoidable.

Operation

The operation of MICUP would involve the diversion, storage, and distribution of water through upgraded and newly constructed infrastructure, as well as ongoing monitoring and maintenance of these facilities. As shown in Figure 4.2-5, a majority of the proposed project components are located on lands designated as Important Farmland.

MICUP does not propose any new or expanded pumping and use of groundwater from the Subbasin. MICUP would serve existing demand for agricultural irrigation on currently cultivated lands that otherwise are supplied by groundwater pumping. The operational impacts are evaluated below for each district.

North San Joaquin Water Conservation District

MICUP Water Right Coordination and Use

Operation of MICUP project components would not interfere with NSJWCD ability to supply agricultural irrigation water to landowners. Rather, MICUP would enable NSJWCD to provide landowners Mokelumne River surface water to irrigate lands otherwise supplied by groundwater pumping. As such, there would not be reduced agricultural water supply compared to existing conditions and, in turn, no indirect conversion of agricultural land due to lack of water supply would occur. ASR injections would not interfere with agricultural operations on adjacent agricultural lands. Flood-MAR recharge would be timed to minimize disruptions to existing agricultural activities. Depending on the recharge regime and agricultural activities, some direct surface recharge basins may also be used for agricultural production when not filled with water.

In addition, implementation of MICUP recharge project components would improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin; this in turn would benefit agricultural lands dependent on groundwater for agricultural irrigation. Operational recharge activities on agricultural lands, such as Flood-MAR, would not preclude the use of those lands for agricultural activities.

Operational activities would support agricultural activities within the project area and would not result in indirect conversion of agricultural lands to non-agricultural use or agricultural-related zoning changes. Therefore, no NSJWCD water right coordination and use operational impact would occur related to indirect agricultural conversion, agricultural zoning conflict, and Williamson Act contract conflict.

MAINTENANCE ACTIVITIES

NSJCWD maintenance activities would not result in conversion of agricultural lands to non-agricultural use, and no NSJWCD maintenance activities operational impact would occur.

Stockton East Water District

MICUP WATER RIGHT COORDINATION AND USE

SEWD's Mosher Creek Recharge Basin project components would divert water from the Mokelumne Aqueduct and convey it to recharge basins via pipelines. This water would be used to recharge the aquifer and would be extracted by private groundwater wells in SEWD that are used for domestic and production agriculture. As such, there would not be reduced agricultural water supply compared to existing conditions and, in turn, no indirect conversion of agricultural land due to lack of water supply would occur.

Overall, MICUP implementation would improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin, which would in turn benefit agricultural lands dependent on groundwater for agricultural irrigation. Recharge activities on agricultural lands, such as Flood-MAR, would not preclude the use of those lands for agricultural activities. Operational activities would support agricultural activities within the project area and would not result in conversion of agricultural lands to non-agricultural use. Therefore, no SEWD water right coordination and use operational impact would occur related to agricultural conversion.

MAINTENANCE ACTIVITIES

SEWD maintenance activities would not result in conversion of agricultural lands to non-agricultural use, and no SEWD maintenance activities operational impact would occur.

City of Stockton

MICUP WATER RIGHT COORDINATION AND USE

Upon completion of all project components, water diverted from the Mokelumne River would be conveyed through existing canals and/or pipelines to the proposed DWTP Groundwater Recharge Basin. The design and construction of the DWTP Groundwater Recharge Basin Project is separate from MICUP but may utilize MICUP water for portions of the year. There would not be reduced agricultural water supply compared to existing conditions and, in turn, no indirect conversion of agricultural land due to lack of water supply would occur.

Overall, MICUP implementation would improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin, which would in turn benefit agricultural lands dependent on groundwater for agricultural irrigation. Operational activities would not result in conversion of agricultural lands to non-agricultural use. Therefore, no City of Stockton water right use and coordination operational impact would occur related to agricultural conversion.

MAINTENANCE ACTIVITIES

The City of Stockton's maintenance activities would be consistent with other types of facility operations and maintenance activities at the DWTP site. Maintenance activities would not result in conversion of agricultural lands to non-agricultural use, and no City of Stockton maintenance activities operational impact would occur.

Mitigation Measures

AG-1 Restore Agricultural Topsoil After Construction

During ground-disturbing construction activities in agricultural areas, agricultural topsoil shall be salvaged and stockpiled by the construction contractor during initial ground disturbance. Upon completion of project component installation, agricultural topsoil shall be spread across the disturbed ground surface where hardscaping has not been applied (e.g., pipeline corridors, well pad disturbance areas outside of the concrete pad). The top six to twelve inches of native topsoil shall be salvaged.

AG-2 Avoid Important Farmland

Implementing agencies shall avoid siting new infrastructure in areas designated as Important Farmland whenever possible to minimize conversion of Important Farmland to non-agricultural use.

Level of Significance

Significant and Unavoidable

Significance Criterion b:	Conflict with existing zoning for agricultural use, or a Williamson Act contract?

Impact AG-2 Construction and operation of MICUP project components would be compatible with existing zoning for agricultural use and Williamson Act Contracts. Impacts would be less than significant.

Construction

Impacts related to conflicts with existing zoning for agricultural use or a Williamson Act contract are limited to operational impacts. No respective construction impacts would occur from infrastructure facilitated by MICUP.

Operation

All Districts

As shown in Figure 4.2-6, the project component areas consist of lands zoned Agriculture, Urban Reserve, City, and Residential. MICUP project components would be constructed on lands zoned for agricultural use. Agricultural zones typically include provisions for various uses that support agricultural activities, such as water infrastructure. Per San Joaquin County Municipal Code Chapter 9-600, utility services and water storage infrastructure are allowable uses in agricultural zones.

MICUP would serve existing demand for agricultural irrigation on currently cultivated lands that otherwise are supplied by groundwater pumping. Operation of MICUP would support agricultural activities on lands zoned for agricultural use. As such, the project would not conflict with existing zoning for agricultural use, and impacts would be less than significant.

As shown in Figure 4.2-7, a multitude of parcels under Williamson Act contracts exist across the project component areas. Water infrastructure is generally considered a compatible use under the Williamson Act because it supports agricultural activities.[16] As such, the project would not conflict with a Williamson Act contract, and impacts would be less than significant.

Mitigation Measures

No mitigation is required.

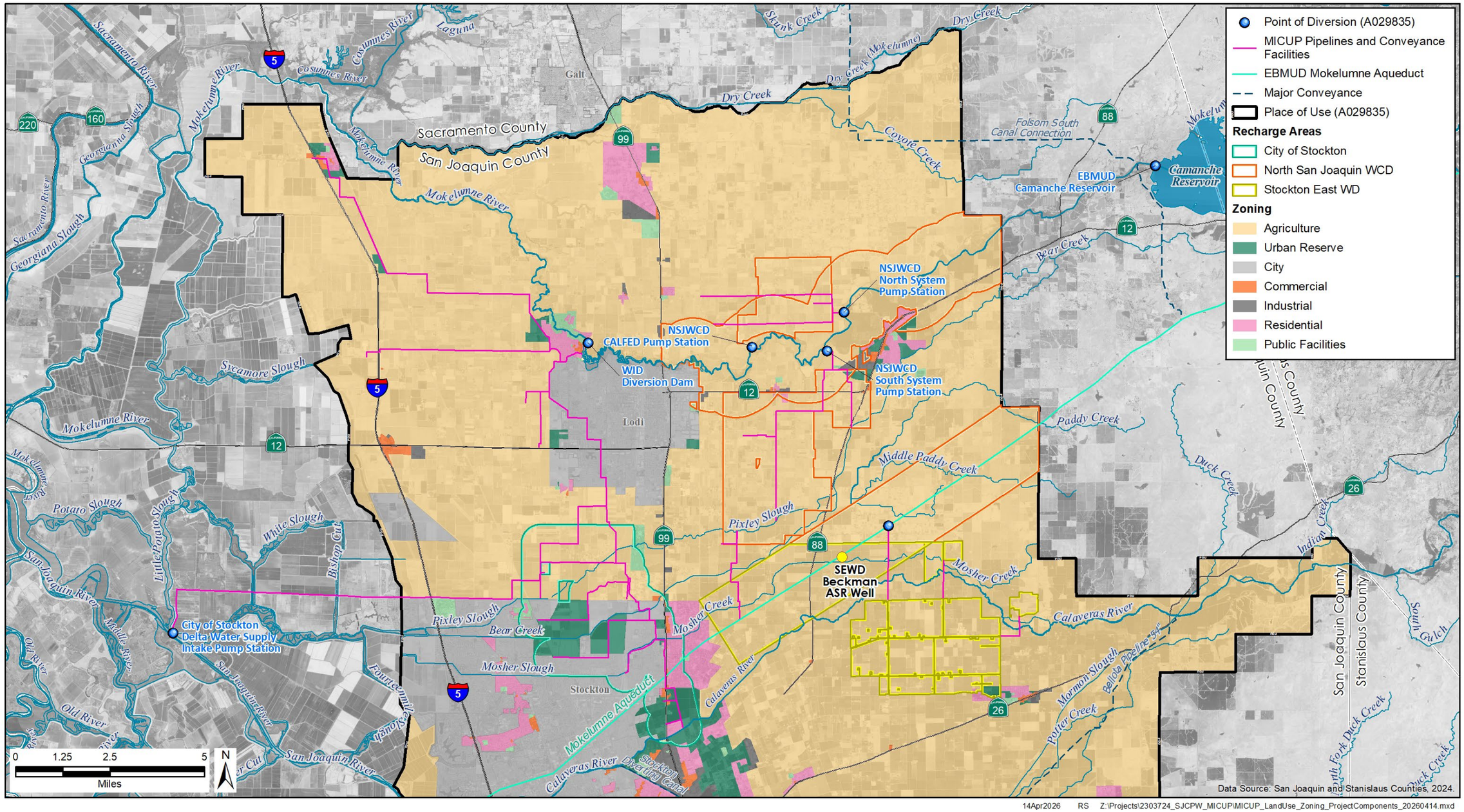
Level of Significance

Less Than Significant

[16] California Department of Conservation. 2024. *Williamson Act & Compatible Use: Land Conservation Act of 1965.* September 12, 2024. https://www.conservation.ca.gov/dlrp/wa/Documents/WA%20Compatibility%209.12.2024.pdf (accessed February 2025)

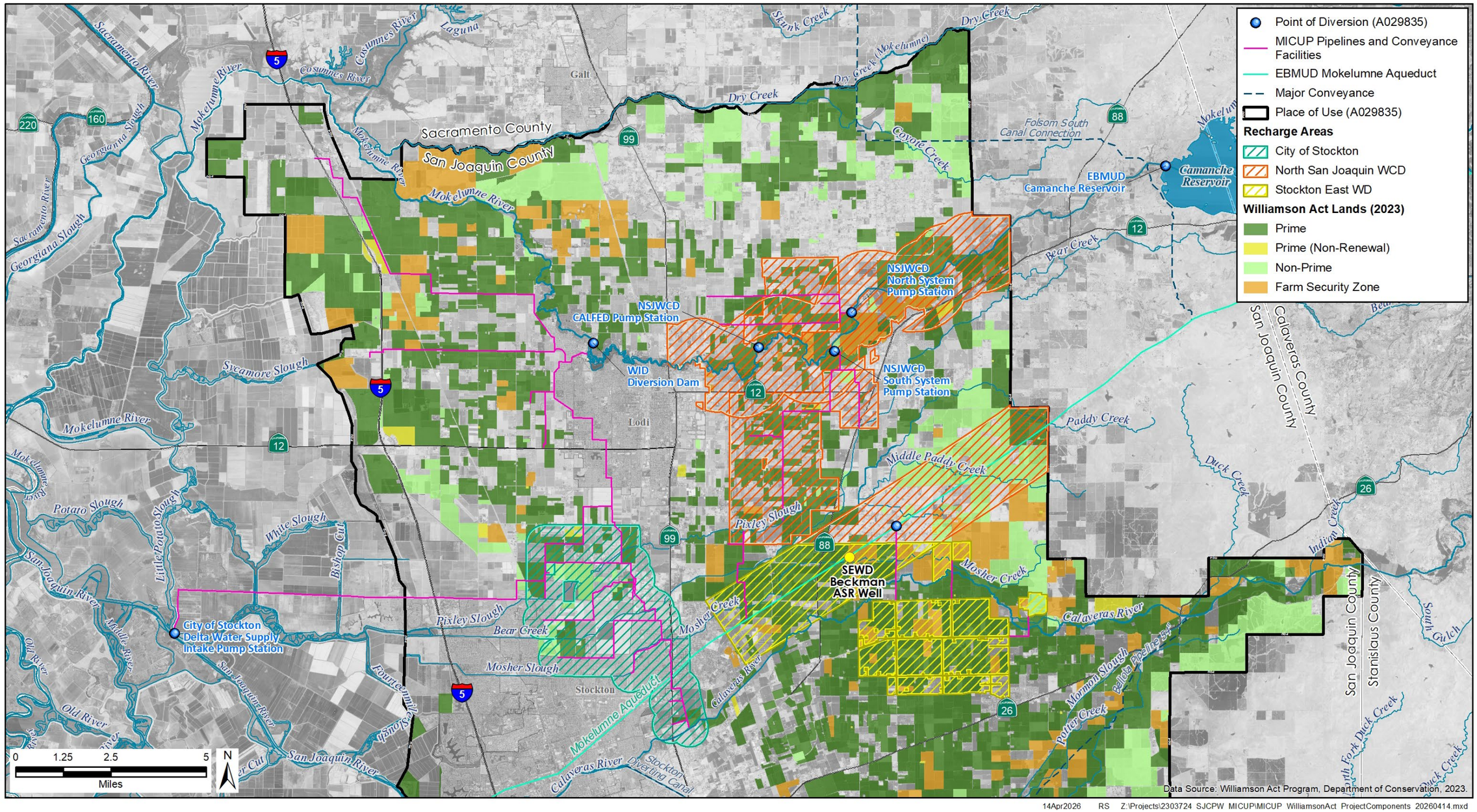
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Figure 4.2-6 Land Use and Zoning in Vicinity of Project Components



GEI Consultants, 2026

Figure 4.2-7 Williamson Act Lands in Vicinity of Project Components



GEI Consultants, 2026

Established Community Division

Significance Criterion d:	Would the proposed project physically divide an established community?

Impact AG-3 IMPLEMENTATION OF MICUP WOULD NOT PHYSICALLY DIVIDE AN ESTABLISHED COMMUNITY. THERE WOULD BE NO IMPACTS.

Construction

Impacts related to physical division of an established community are limited to operational impacts. To the extent that construction activities obstruct roads, it would be temporary and would not constitute a division of an established community. No respective MICUP construction impacts would occur related to potential division of a community.

Operation

All Districts

The proposed pump station, pipeline, and recharge facility upgrades would be operated within the footprint of existing facilities and rights-of-way or, in the case of NSJWCD and SEWD, within existing agricultural areas. As such, there would be no MICUP facilities operation within existing residential land use areas in the project area (including all four MICUP districts jurisdictional areas and the overall Place of Use). Therefore, no project operational impact would occur related to division of an established community.

Mitigation Measures

No mitigation is required.

Level of Significance

No Impact

Land Use Plans, Policies, and Regulations Consistency

Significance Criterion e:	Would the proposed project cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect?

Impact AG-4 IMPLEMENTATION OF MICUP WOULD BE CONSISTENT WITH APPLICABLE LAND USE PLANS, POLICIES, OR REGULATIONS ADOPTED TO AVOID OR MITIGATE ENVIRONMENTAL EFFECTS. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

Impacts related to consistency with applicable land use plans and policies are limited to operational impacts. No respective construction impacts would occur from infrastructure facilitated by MICUP.

Operation

All Districts

As discussed under Section 4.2.4, *Impacts and Mitigation Measures Approach to Analysis,* land use plans from the County of San Joaquin, the City of Lodi, and the City of Stockton would apply to the MICUP project. Specifically, the proposed project is discussed in terms of consistency with agricultural and land use policies contained in the San Joaquin County General Plan, City of Lodi General Plan, City of Stockton General Plan, San Joaquin County Ordinance Code, San Joaquin Right to Farm Ordinance, and SJCOG RTP/SCS Plan.

CONSISTENCY WITH SAN JOAQUIN COUNTY GENERAL PLAN

The MICUP project is intended to develop a supplemental Mokelumne River surface water supply; use surface water and groundwater together to respond to drought and climate change; improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin; use Mokelumne River surface water to irrigate lands otherwise supplied by groundwater pumping; and achieve integrated water supply and environmental benefits in the lower Mokelumne watershed. As such, the proposed project would directly support the San Joaquin County General Plan following goals and policies pertaining to agricultural lands and water management: Goals LU-7, LU-7.1, IS-4, IS-4.1, and IS-4.9. MICUP operations would not conflict with the land use policies of the San Joaquin County General Plan.

CONSISTENCY WITH CITY OF STOCKTON GENERAL PLAN

As discussed in Section 4.2.3, *Regulatory Framework,* the City of Stockton General Plan contain goals and policies related to interagency coordination and preservation of agricultural lands. As a coordinated interagency project within the Subbasin, the proposed MICUP project would support the following policies by improving groundwater levels and providing surface water to irrigate lands otherwise supplied by groundwater pumping: Policies SAF-3.1 and 3.2. As such, MICUP operations would not conflict with the land use policies of the City of Stockton General Plan.

CONSISTENCY WITH CITY OF LODI GENERAL PLAN

As discussed in Section 4.2.3, *Regulatory Framework,* the City of Lodi General Plan contain goals and policies related to preservation of agricultural lands and conservation of agricultural soils. The proposed MICUP project would support agricultural land uses and thereby promote the continuation of existing agricultural operations. As such, the proposed MICUP project would support the following City of Lodi General Plan policies: Policy C-P1 and C-P4. As such, MICUP operations would not conflict with the land use policies of the City of Lodi General Plan.

CONSISTENCY WITH SAN JOAQUIN COUNTY ORDINANCE CODE

As discussed under Impact AG-2, the project would not conflict with zoning in the San Joaquin County Ordinance Code (mapped zones shown in Figure 4.2-6). MICUP operations would not conflict with the land use policies of the San Joaquin County Ordinance Code.

CONSISTENCY WITH SJCOG 2022 RTP/SCS PLAN

As described in Section 4.14, *Effects Found Not To Be Significant,* since MICUP does not extend services into undeveloped areas, propose new housing or businesses, or create infrastructure that could attract additional population growth, it would not induce substantial unplanned population

growth, either directly or indirectly. It would not conflict with transportation-related policies related to maintaining agricultural viability, such as Strategy No. 1: Encourage efficient development patterns that maintain agricultural viability and natural resources.[17] As such, MICUP operations would not conflict with land use policies of the SJCOG 2022 RTP/SCS Plan.

OVERALL

Implementation of MICUP would be generally consistent with applicable land use plans, policies, or regulations adopted to avoid or mitigate environmental effects, and would directly support local general plan policies related to agricultural preservation, conjunctive water use, and interagency coordination for water management. Overall operational MICUP impacts related to land use plans and policies consistency would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

4.2.5 Cumulative Impacts

The geographic scope of the cumulative agriculture and land use/planning analysis is the MICUP Place of Use and surrounding San Joaquin County. The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1 (refer to Chapter 4, *Environmental Impact Analysis*) located in San Joaquin County.

Agricultural Resources

Cumulative projects involve development types that may convert agricultural lands to non-agricultural use. For example, some cumulative projects involve residential or commercial development on agricultural lands. Future development within the cumulative impact analysis area would convert agricultural land to non-agricultural uses and may result in conflicts with agricultural zoning and Williamson Act contracts. In addition, future development adjacent to agricultural land has the potential to result in a loss of farmland due to land use conflicts, which adds to the cumulative conversion of agricultural lands, including areas designated as Important Farmland by the FMMP. Cumulative impacts to agricultural resources would be significant.

Implementation of Mitigation Measures AG-1 and AG-2 would reduce the contribution of the proposed project to cumulative agricultural land impacts. However, the mitigation cannot guarantee prevention of agricultural land conversion and, depending on the final facility footprints, construction of these project components could potentially result in permanent conversion of portions of agricultural lands to non-agricultural use, and impacts would remain significant and unavoidable. The contribution of the proposed project to cumulative impacts to agricultural lands would therefore remain cumulatively considerable post-mitigation.

[17] San Joaquin Council of Governments. 2022. *Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS).* August 2022. https://www.sjcog.org/608/Adopted-2022-RTPSCS-Plan (accessed January 2025)

Like the proposed project, cumulative projects in San Joaquin County would be subject to jurisdictional zoning ordinances and Williamson Act contract restrictions. Cumulative impacts to existing zoning for agricultural use and Williamson Act contracts would be less than significant. The contribution of the proposed project to cumulative impacts to agricultural zoning and Williamson Act contracts would not be cumulatively considerable.

Community Division

Most of the cumulative projects identified in Table 4-1 (refer to Chapter 4, *Environmental Impact Analysis*) involve commercial, residential, agricultural, and infrastructure developments that are either infill projects, conversions, or expansions within existing land use patterns. Future development would be subject to San Joaquin County, City of Lodi, and City of Stockton General Plans and Municipal Codes, including policies which maintain community character and accessibility. Therefore, cumulative impacts related to the physical division of an established community would be less than significant, and the proposed project would not contribute to a cumulatively considerable impact.

Land Use Plan, Policy, or Regulation Consistency

Cumulative projects are subject to the land use plans, policies, and regulations of San Joaquin County and respective cities adopted to avoid or mitigate environmental effects. Therefore, cumulative impacts related to the land use plan, policy, or regulation consistency would be less than significant. Implementation of MICUP would be generally consistent with applicable land use plans, policies, or regulations adopted to avoid or mitigate environmental effects, and would directly support local general plan policies related to agricultural preservation, conjunctive water use, and interagency coordination for water management. The proposed project would not contribute to a cumulatively considerable impact.

Overall Level of Cumulative Significance

Significant and Unavoidable

4.3 Air Quality

4.3.1 Introduction

This section describes existing air quality conditions regionally, within San Joaquin County, and in the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas) as well as the relevant regulatory framework. This section also analyzes the possible impacts related to air quality (specifically regarding emissions of criteria pollutants and toxic air contaminants) that could result from implementation of MICUP.

Information included in this section is based on San Joaquin Valley Air Pollution Control District (SJVAPCD) air quality monitoring data, the project-related construction information included in Chapter 3.0, *Project Description*, and project-specific criteria air pollutants and toxic air contaminants emissions modeling results, which is included as Appendix C to this EIR.

4.3.2 Environmental Setting

Regional Climate and Meteorology

The proposed project area encompasses a large portion of the San Joaquin Valley Air Basin (SJVAB). The SJVAB encompasses the southern half of the California Central Valley and is comprised of eight counties: San Joaquin, Stanislaus, Fresno, Merced, Madera, Kings, Tulare, and western Kern County. The SJVAB is approximately 250 miles long and 35 miles in width (on average) and is bordered by the Sierra Nevada Mountains in the east (8,000 to 14,500 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi Mountains in the south (6,000 to 8,000 feet in elevation).

The overall climate in the SJVAB is warm and semi-arid. The San Joaquin Valley is in a Mediterranean climate zone. Mediterranean climate zones occur on the west coast of continents at 30 to 40 degrees latitude and are influenced by a subtropical high-pressure area most of the year. Mediterranean climates are characterized by sparse rainfall, which occurs mainly in the winter. There is only one wet season during the year and 90 percent of the precipitation falls during October through April. Snow in the San Joaquin Valley is infrequent and thunderstorms seldom occur. Summers are hot and dry. Summertime maximum temperatures often exceed 100 degrees Fahrenheit (°F) in the San Joaquin Valley. The SJVAB's topography has a dominating effect on wind patterns. Winds tend to blow somewhat parallel to the valley and mountain range orientation. In spring and early summer, thermal low-pressure systems develop over the interior basins east of the Sierra Nevada mountain range, and the Pacific High (a high-pressure system that develops over the central Pacific Ocean near the Hawaiian Islands) moves northward. These meteorological developments and the topography produce the high incidence of relatively strong northwesterly winds in the spring and early summer.

The subtropical high-pressure cell is strongest during spring, summer, and fall and produces subsiding air, which can result in temperature inversions in the San Joaquin Valley. A temperature inversion can act like a lid, inhibiting vertical mixing of the air mass at the surface. Any emissions of pollutants can be trapped below the inversion. Most of the surrounding mountains are above the normal height of summer inversions (1,500 to 3,000 feet). Winter-time high-pressure events can often last many weeks with surface temperatures lowering to 30°F. During these events, fog can be

present, and inversions are extremely strong. These wintertime inversions can inhibit vertical mixing of pollutants to a few hundred feet.[1]

Air Pollutant Types, Sources, and Effects

Criteria Air Pollutants

The USEPA has identified criteria air pollutants that are a threat to public health and welfare. These pollutants are called "criteria" air pollutants, because standards have been established for each of them to meet specific public health and welfare standards. Criteria pollutants that are a concern in the SJVAB are described below.

OZONE

Ozone is a highly oxidative unstable gas produced by a photochemical reaction (triggered by sunlight) between nitrogen oxides (NO_X) and reactive organic gases (ROG)/volatile organic compounds (VOC).[2] ROG is composed of non-methane hydrocarbons (with specific exclusions), and NO_X is composed of different chemical combinations of nitrogen and oxygen, mainly nitric oxide and nitrogen dioxide (NO_2). NO_X is formed during the combustion of fuels, while ROG is formed during the combustion and evaporation of organic solvents. As a highly reactive molecule, ozone readily combines with many different atmosphere components. Consequently, high ozone levels tend to exist only while high ROG and NO_X levels are present to sustain the ozone formation process. Once the precursors have been depleted, ozone levels rapidly decline. Because these reactions occur on a regional rather than local scale, ozone is considered a regional pollutant. In addition, because ozone requires sunlight to form, it mainly occurs in concentrations considered serious between April and October. Groups most sensitive to ozone include children, the elderly, people with respiratory disorders, and people who exercise strenuously outdoors.[3] Depending on the level of exposure, ozone can cause coughing and a sore or scratchy throat; make it more difficult to breathe deeply and vigorously and cause pain when taking a deep breath; inflame and damage the airways; make the lungs more susceptible to infection; and aggravate lung diseases such as asthma, emphysema, and chronic bronchitis.

NITROGEN DIOXIDE

NO_2 is a by-product of fuel combustion. The primary sources are motor vehicles and industrial boilers, and furnaces. The principal form of NO_X produced by combustion is nitric oxide (NO), but NO reacts rapidly to form NO_2, creating the mixture of NO and NO_2, commonly called NO_x. NO_2 is a reactive, oxidizing gas and an acute irritant capable of damaging cell linings in the respiratory tract. Breathing air with a high concentration of NO_2 can irritate airways in the human respiratory system. Such exposures over short periods can aggravate respiratory diseases leading to respiratory symptoms (such as coughing, wheezing, or difficulty breathing), hospital admissions, and visits to emergency rooms. Longer exposures to elevated concentrations of NO_2 may contribute to the development of asthma and potentially increase susceptibility to respiratory infections. People with

[1] San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015a. *Guide for Assessing and Mitigating Air Quality Impacts*, March 19, 2015. https://www.valleyair.org/transportation/GAMAQI.pdf (accessed February 2025).
[2] The California Air Resources Board defines VOC and ROG similarly as, "any compound of carbon excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate," (40 Code of Federal Regulations 51.100) with the exception that VOC are compounds that participate in atmospheric photochemical reactions. For the purposes of this analysis, ROG and VOC are considered comparable in terms of mass emissions, and the term ROG is used in this document.
[3] United States Environmental Protection Agency (USEPA). 2025a. "Criteria Air Pollutants." https://www.epa.gov/criteria-air-pollutants (accessed February 2025).

asthma and children and the elderly are generally at greater risk for the health effects of NO_2.[4] NO_2 absorbs blue light and causes a reddish-brown cast to the atmosphere and reduced visibility. It can also contribute to the formation of ozone/smog and acid rain.

SULFUR DIOXIDE

Sulfur dioxide (SO_2) is included in a group of highly reactive gases known as "oxides of sulfur." The largest sources of SO_2 emissions are from fossil fuel combustion at power plants (73 percent) and other industrial facilities (20 percent). Smaller sources of SO_2 emissions include industrial processes such as extracting metal from ore and burning fuels with a high sulfur content by locomotives, large ships, and off-road equipment. Short-term exposures to SO_2 can harm the human respiratory system and make breathing difficult. People with asthma, particularly children, are sensitive to these effects of SO_2.[5]

CARBON MONOXIDE

Carbon monoxide (CO) is a localized pollutant found in high concentrations only near its source. The primary source of CO, a colorless, odorless, poisonous gas, is automobile traffic's incomplete combustion of petroleum fuels. Therefore, elevated concentrations are usually only found near areas of high traffic volumes. Other sources of CO include the incomplete combustion of petroleum fuels at power plants and fuel combustion from wood stoves and fireplaces during the winter. When CO levels are elevated outdoors, they can be of particular concern for people with some types of heart disease. These people already have a reduced ability to get oxygenated blood to their hearts in situations where they need more oxygen than usual. As a result, they are especially vulnerable to the effects of CO when exercising or under increased stress. In these situations, short-term exposure to elevated CO may result in reduced oxygen to the heart accompanied by chest pain, also known as angina.[6]

PARTICULATE MATTER

Particulates less than 10 microns in diameter (PM_{10}) and less than 2.5 microns in diameter ($PM_{2.5}$) are comprised of finely divided solids and liquids such as dust, soot, aerosols, fumes, and mists. Both PM_{10} and $PM_{2.5}$ are emitted into the atmosphere as by-products of fuel combustion and wind erosion of soil and unpaved roads. The atmosphere, through chemical reactions, can form particulate matter. The characteristics, sources, and potential health effects of PM_{10} and $PM_{2.5}$ can be very different. PM_{10} is generally associated with dust mobilized by wind and vehicles. In contrast, $PM_{2.5}$ is generally associated with combustion processes and formation in the atmosphere as a secondary pollutant through chemical reactions. PM_{10} can cause increased respiratory disease, lung damage, cancer, premature death, reduced visibility, and surface soiling. For $PM_{2.5}$, short-term exposures (up to 24-hours duration) have been associated with premature mortality, increased hospital admissions for heart or lung causes, acute and chronic bronchitis, asthma attacks, emergency room visits, respiratory symptoms, and restricted activity days. These adverse health effects have been reported primarily in infants, children, and older adults with preexisting heart or lung diseases.[7]

[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] California Air Resources Board (CARB). 2025a. Inhalable Particulate Matter and Health ($PM_{2.5}$ and PM_{10}). https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health (accessed February 2025).

LEAD

Lead (Pb) is a metal found naturally in the environment, as well as in manufacturing products. The major sources of Pb emissions historically have been mobile and industrial. However, due to the USEPA's regulatory efforts to remove lead from gasoline, atmospheric Pb concentrations have declined substantially over the past several decades. The most dramatic reductions in Pb emissions occurred before 1990 due to the removal of Pb from gasoline sold for most highway vehicles. Pb emissions were further reduced substantially between 1990 and 2008, with reductions occurring in the metals industries at least partly due to national emissions standards for hazardous air pollutants.[8] As a result of phasing out leaded gasoline, metal processing is currently the primary source of Pb emissions. The highest Pb level in the air is generally found near Pb smelters. Other stationary sources include waste incinerators, utilities, and Pb-acid battery manufacturers. Pb can adversely affect the nervous system, kidney function, immune system, reproductive and developmental systems, and cardiovascular system depending on exposure. Pb exposure also affects the oxygen-carrying capacity of the blood. The Pb effects most likely encountered in current populations are neurological in children. Infants and young children are susceptible to Pb exposures, contributing to behavioral problems, learning deficits, and lowered intelligence quotient.[9]

Toxic Air Contaminants

In addition to the criteria pollutants discussed above, Toxic Air Contaminants (TAC) are a diverse group of airborne substances that may cause or contribute to an increase in deaths or serious illness, or that may pose a present or potential hazard to human health. TACs include both organic and inorganic chemical substances that may be emitted from a variety of common sources, including gasoline stations, motor vehicles, dry cleaners, industrial operations, painting operations, and research and teaching facilities. One of the main sources of TACs in California is diesel engine exhaust that contains solid material known as diesel particulate matter (DPM). More than 90 percent of DPM is less than one micron in diameter (about 1/70th the diameter of a human hair) and thus is a subset of $PM_{2.5}$. Because of their extremely small size, these particles can be inhaled and eventually trapped in the bronchial and alveolar regions of the lungs.[10] TACs are different than criteria pollutants, because ambient air quality standards have not been established for TACs. TACs occurring at extremely low levels may still cause health effects and it is typically difficult to identify levels of exposure that do not produce adverse health effects. TAC impacts are described by carcinogenic risk and by chronic (i.e., long duration) and acute (i.e., severe but of short duration) adverse effects on human health. People exposed to TACs at sufficient concentrations and durations may have an increased chance of getting cancer or experiencing other serious health effects. These health effects can include asthma, respiratory symptoms, and decreased lung function.[11]

Valley Fever

Valley Fever or coccidioidomycosis is caused locally by the microscopic fungus *Coccidioides immitis (C. immitis)*. The *Coccidioides* fungus resides in the soil in southwestern United States, northern Mexico, and parts of Central and South America. During drought years, the number of organisms competing with *C. immitis* decreases, and *the C. immitis* remains alive but dormant. When rain

[8] USEPA. 2013. Policy Assessment for the Review of the Lead National Ambient Air Quality Standards, External Review Draft. https://www3.epa.gov/ttn/naaqs/standards/pb/data/010913_pb-draft-pa.pdf (accessed February 2025)
[9] USEPA. 2025a. "Criteria Air Pollutants." https://www.epa.gov/criteria-air-pollutants (accessed February 2025).
[10] CARB. 2022b. Overview: Diesel Exhaust & Health. https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health (accessed September 2023).
[11] Ibid.

finally occurs, the fungal spores germinate and multiply more than usual because of fewer other competing organisms. Later, the soil dries out in the summer and fall, and the fungi can become airborne and potentially infectious. Infection occurs when the spores of the fungus become airborne and are inhaled. The fungal spores become airborne when contaminated soil is disturbed by human activities, such as construction and agricultural activities, and natural phenomena, such as windstorms, dust storms, and earthquakes. About 60 percent of infected persons have no symptoms. The remainder develop flu-like symptoms that can last for a month and tiredness that can sometimes last for longer than a few weeks. Without proper treatment, Valley Fever can lead to severe pneumonia, meningitis, and even death. Symptoms may appear between one to four weeks after exposure. Most cases of Valley Fever (over 65 percent) are diagnosed in people living in the Central Valley and Central Coast regions.

Air Quality

Air quality is a function of both the rate and location of pollutant emissions under the influence of meteorological conditions and topographic features. Atmospheric conditions such as wind speed, wind direction, and air temperature inversions interact with the physical features of the landscape to determine the movement and dispersal of air pollutant emissions and, consequently, their effect on air quality.

Regional Air Quality

The San Joaquin Valley Air Pollution Control District (SJVAPCD) is the regional agency with jurisdiction for regulating air quality within an eight-county area of the Central Valley, which includes San Joaquin, Stanislaus, Merced, Madera, Fresno, Kings, Tulare and the San Joaquin Valley Air Basin portion of Kern.

Local control in air quality management is provided by CARB through county-level or regional (multi-county) air districts. CARB establishes Statewide air quality standards and is responsible for control of mobile emission sources, while the local air districts are responsible for enforcing standards and regulating stationary sources. CARB has established 15 air basins Statewide. San Joaquin County is located in the San Joaquin Valley Air Basin (SJVAB), which is under the jurisdiction of the San Joaquin Air Pollution Control District (SJVAPCD).

AIR POLLUTANT STANDARDS

Air pollutant standards have been identified by USEPA and CARB for the following six criteria air pollutants that affect ambient air quality: ozone, NO_2, CO, SO_2, lead, PM_{10}, and $PM_{2.5}$ These air pollutants are called “criteria air pollutants,” because they are regulated by developing specific public health- and welfare-based criteria as the basis for setting permissible levels. California has also established standards for toxic air contaminants such as visibility-reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. Table 4.3-1 presents the National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) for these aforementioned air pollutants. California air quality standards are identical to or stricter than federal standards for all criteria pollutants. It should be noted that there are no State or federal air quality standards for VOCs, benzene, or DPM.

Ambient air pollutant concentrations in the SJVAB are measured at air quality monitoring stations operated by CARB and BAAQMD. Air quality monitoring stations measure pollutant ground-level concentrations (typically, ten feet above ground level).

AIR POLLUTANT ATTAINMENT DESIGNATIONS

The federal Clean Air Act (CAA) and the California Clean Air Act (CCAA) establish ambient air quality standards and establish regulatory authorities designed to attain those standards. As required by the federal CAA, USEPA has identified criteria pollutants and has established National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. NAAQS have been established for ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and Pb. Under the CCAA, California has adopted the California Ambient Air Quality Standards (CAAQS), which are more stringent than the NAAQS for certain pollutants and averaging periods. Table 4.3-1 presents the current federal and State standards for regulated pollutants and the SJVAB's attainment status for each standard. California has also established CAAQS for sulfates, hydrogen sulfide, and vinyl chloride.

As required by the federal CAA and the CCAA, air basins or portions thereof have been classified as either "attainment" or "nonattainment" for each criteria air pollutant, based on whether the standards have been achieved. In some cases, an area's status is unable to be determined, in which case the area is designated "unclassified". The air quality in an attainment area meets or is better than the NAAQS or CAAQS. A non-attainment area has air quality that is worse than the NAAQS or CAAQS. States are required to adopt enforceable plans, known as a State Implementation Plan (SIP), to achieve and maintain air quality meeting the NAAQS. As shown Table 4.3-2, the SJVAB currently is classified as nonattainment for the one-hour State ozone standard as well as for the federal and State eight-hour ozone standards. The SJVAB is also designated as nonattainment for the federal and State annual arithmetic mean and federal 24-hour $PM_{2.5}$ standards. Additionally, the SJVAB is classified as nonattainment for the State 24-hour and annual arithmetic mean PM_{10} standards. The SJVAB is unclassified or classified as attainment for all other pollutant standards.

Table 4.3-1 Federal and State Air Quality Standards and SJVAB Attainment Status

		State Standard		National Standard	
Pollutant	Averaging Time	Concentration	SJVAB Attainment Status	Concentration	SJVAB Attainment Status
Ozone	8-Hour 1-Hour	0.070 ppm 0.090 ppm	Nonattainment/ Severe Nonattainment	0.070 ppm –	Nonattainment/ Extreme[1]
Carbon Monoxide (CO)	1-Hour 8-Hour	9.0 ppm 20 ppm	Attainment/ Unclassified	9.0 ppm 35 ppm	Attainment/ Unclassified
Nitrogen Dioxide (NO_2)	1-Hour Annual	0.180 ppm 0.030 ppm	Attainment	0.100 ppm 0.053 ppm	Attainment/ Unclassified
Sulfur Dioxide (SO_2)	1-Hour 3-Hour 24-Hour Annual	0.25 ppm – 0.04 ppm –	Attainment	0.075 ppm 0.5 ppm* 0.14 ppm 0.03 ppm	Attainment/ Unclassified
Respirable Particulate Matter (PM_{10})	24-Hour Annual	50 mg/m^3 20 mg/m^3	Nonattainment	150 mg/m^3 –	Attainment
Fine Particulate Matter ($PM_{2.5}$)	24-Hour Annual	– 12 mg/m^3	Nonattainment	35 mg/m^3 9 mg/m^3	Nonattainment
Lead (Pb)	30-Day Quarterly	1.5 mg/m^3 –	Attainment	– 1.5 mg/m^3	No Designation/ Classification

ppm = parts per million; ppb = parts per billion; µg/m^3 = micrograms per cubic meter

[1] Though the San Joaquin Valley was initially classified as serious nonattainment for the 1997 8-hour ozone standard, EPA approved Valley reclassification to extreme nonattainment in the Federal Register on May 5, 2010 (effective June 4, 2010).

Source: San Joaquin Valley Air Pollution Control District 2025. Ambient Air Quality Standards & Valley Attainment Status. https://ww2.valleyair.org/air-quality-information/ambient-air-quality-standards-valley-attainmnet-status/ (accessed February 2025).

Existing Local (Project Area) Air Quality

SJVAPCD operates three air quality monitoring stations in the SJVAB within San Joaquin County. The purpose of the monitoring stations is to measure ambient concentrations of pollutants and determine whether ambient air quality meets the California and federal standards.

The nearest air quality monitoring station to the project area is the Stockton-University Park monitoring station, located at 702 North Aurora Street in Stockton. This station is approximately 3.0 miles away from the City of Stockton WTP Recharge Basin, the closest project component, and approximately 14 miles away from the existing NSJWCD North System, the farthest project component from the monitoring station. This monitoring station measures ozone, PM_{10}, $PM_{2.5}$ and NO_2. Because monitoring is not generally conducted for pollutants for which the SJVAB is in attainment, there is no recent monitoring data available for CO or SO_2.

Table 4.3-2 indicates the number of days that each of the federal and State standards has been exceeded at monitoring stations near the NSJWCD Project Components vicinity in each of the last three years for which data is available. The federal and State 8-hour ozone standards were exceeded in 2022. The federal and State 1-hour ozone standards were exceeded in 2022 as well. Additionally, the PM_{10} State standards were exceeded all three years. The $PM_{2.5}$ federal standards were exceeded all three years. No other federal or State standards were exceeded.

Table 4.3-2 Ambient Air Quality Monitoring Data for the Proposed Project

Pollutant	2021	2022	2023
Ozone (ppm), Worst 1-Hour[1]	0.040	0.141	0.086
Number of days of State exceedances (>0.09 ppm)	0	1	0
Ozone (ppm), 8-Hour Average[1]	0.036	0.113	0.068
Number of days of State exceedances (>0.07 ppm)	0	1	0
Number of days of Federal exceedances (>0.07 ppm)	0	1	0
Nitrogen Dioxide, Worst 1-Hour	0.034	0.044	0.045
Number of days above CAAQS (>0.180 ppm)	0	0	0
Number of days above CAAQS (>0.180 ppm)	0	0	0
Particulate Matter <10 microns, μg/m^3, Worst 24 Hours[1]	72.2	81.3	81.5
Number of days above State standard (>50 μg/m^3)	3	24	23
Number of days above Federal standard (>150 μg/m^3)	0	0	0
Particulate Matter <2.5 microns, μg/m^3, Worst 24 Hours[1]	39.5	51.9	40.6
Number of days above Federal standard (>35 μg/m^3)	1	6	6

ppm = parts per million; μg/m^3 = micrograms per cubic meter

[1] Measurements taken from the Stockton-University Park Station

Source: CARB 2025a iADAM: Air Quality Data Statistics Top 4 Summary. https://www.arb.ca.gov/adam/topfour/topfour1.php (accessed February 2025).

MOBILE EMISSIONS

The primary source of mobile air pollutants (both criteria air pollutant and TACs) in the project area is motor-related vehicle trips associated with the agriculture, urban/incorporated, rural residential, commercial, industrial, rangeland, and open space/natural habitat land uses.

STATIONARY EMISSIONS

The primary source of stationary air pollutants (both criteria air pollutant and TACs) in the project area is building- and infrastructure-related energy use associated with the local residential, commercial, office, utility, industrial, school, semi-public and institutional, and agricultural, rangeland and open space/natural habitat land uses. Other sources of stationary emissions include agricultural and landscape maintenance, and consumer products from residential, institutional, and commercial uses.

Air Pollution Sensitive Receptors

Sensitive Receptor Types

Air pollution does not affect every individual in the population in the same way, and some groups are more sensitive to adverse health effects related to air pollutants exposure than others. Land uses such as residences, schools, day care centers, hospitals, nursing and convalescent homes, and parks are considered to be the most sensitive to poor air quality, because the population groups associated with these uses have increased susceptibility to respiratory distress or, as in the case of residential receptors, their exposure time is greater than that for other land uses. Therefore, these groups are referred to as sensitive receptors. Exposure assessment guidance typically assumes that residences would be exposed to air pollution 24 hours per day, 350 days per year, for 70 years. San Joaquin Air Pollution Control District defines sensitive receptors as children, adults, and seniors occupying or residing in residential dwellings, schools, day care centers, hospitals, and senior-care facilities.

Sensitive Receptors in Project Area

Air pollution sensitive receptors in the project area include single- and multi-family residential land uses, schools, daycares, senior care facilities, and public parks. The agricultural, commercial, utility, and office land uses throughout the project area are not considered air pollution sensitive receptors.

4.3.3 Regulatory Framework

Federal Regulations

Clean Air Act and National Ambient Air Quality Standards

Congress established much of the basic structure of the Clean Air Act (CAA) in 1970, and made major revisions in 1977 and 1990. Six common air pollutants (also known as criteria pollutants) are addressed in the CAA. These are particulate matter, ground-level ozone, CO, sulfur oxides, nitrogen oxides, and lead. USEPA calls these pollutants criteria air pollutants, because it regulates them by developing human health-based and/or environmentally based criteria (science-based guidelines) for setting permissible levels. The set of limits based on human health are called primary standards. Another set of limits intended to prevent environmental and property damage are called secondary standards. The federal standards are called NAAQS. The air quality standards provide benchmarks for determining whether air quality is healthy at specific locations and whether development activities will cause or contribute to a violation of the standards.

The federal standards were set to protect public health, including that of sensitive individuals; thus, USEPA is tasked with updating the standards as more medical research is available regarding the health effects of the criteria pollutants. Primary federal standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

The CAA also requires each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The federal Clean Air Act Amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins, as reported by their jurisdictional agencies.

USEPA Emission Standards for New Off-road Equipment

Before 1994, there were no standards to limit the amount of emissions from off-road equipment. In 1994, USEPA established emission standards for hydrocarbons, NO_X, CO, and PM to regulate new pieces of off-road equipment. These emission standards came to be known as Tier 1. Since that time, increasingly more stringent Tier 2, Tier 3, and Tier 4 (interim and final) standards were adopted by US EPA, as well as by CARB. Each adopted emission standard was phased in over time. New engines built in and after 2015 across all horsepower sizes must meet Tier 4 final emission standards. In other words, new manufactured engines cannot exceed the emissions established for Tier 4 final emissions standards.

State Regulations

California Air Quality Control Plan (State Implementation Plan)

A State Implementation Plan (SIP) is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain federal standards. The SIP for California is administered by CARB, which has overall responsibility for Statewide air quality maintenance and air pollution prevention. California's SIP incorporates individual federal attainment plans for regional air districts—an air district prepares their federal attainment plan, which is sent to CARB to be approved and incorporated into the California SIP. Federal attainment plans include the technical foundation for understanding air quality (e.g., emission inventories and air quality monitoring), control measures and strategies, and enforcement mechanisms.

Areas designated nonattainment must develop air quality plans and regulations to achieve standards by specified dates, depending on the severity of the exceedances. For much of the country, implementation of federal motor vehicle standards and compliance with federal permitting requirements for industrial sources are adequate to attain air quality standards on schedule. For many areas of California, however, additional State and local regulation is required to achieve the standards.

California Clean Air Act and California Ambient Air Quality Standards

The California CAA, signed into law in 1988, requires all areas of the State to make incremental progress toward the achievement of the California Ambient Air Quality Standards (CAAQS). CARB is the State air pollution control agency and is a part of CalEPA. CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California, and for implementing the requirements of the California CAA. CARB overseas local district compliance with federal and California laws, approves local air quality plans, submits the State implementation plans

to the USEPA, monitors air quality, determines and updates State area designations and maps, and sets emissions standards for new mobile sources and off-road vehicles pursuant to California waiver and authorization requests, consumer products, small utility engines, and fuels.

The California CAA requires CARB to establish ambient air quality standards for California, known as CAAQS. Similar to the NAAQS, CAAQS have been established for criteria pollutants and standards are established for vinyl chloride, hydrogen sulfide, sulfates, and visibility-reducing particulates. In general, the CAAQS are more stringent than the NAAQS on criteria pollutants. The California CAA requires all local air districts to endeavor to make incremental progress toward attaining the CAAQS. The California CAA specifies that local air districts focus attention on reducing the emissions from transportation and area-wide emission sources and provides districts with the authority to regulate indirect sources as long as the regulations do not infringe on local land use authority.

In 2017, CARB released a technical advisory on reducing air pollution exposure from near high-volume roadways that is a technical supplement to CARB's air quality and Land Use Handbook: A Community Health Perspective. Since the publication of the handbook, research has demonstrated the public health, climate, financial and other benefits of compact, infill development along transportation corridors, and that exposures can be reduced with new strategies. As described in the technical advisory, California has implemented various measures to improve air quality and reduce exposure to roadway vehicle emissions. These include the Diesel Risk Reduction Plan, which aims to reduce particulate matter emissions from diesel vehicles. The continued electrification of California's vehicle fleet would also reduce $PM_{2.5}$ levels, and ongoing efforts to reduce emissions from cars and trucks and to move vehicles towards "zero emission" alternatives will continue to drive down roadway vehicle pollution.

California Health and Safety Code Section 39655 and California Code of Regulations Title 17 Section 93000 (Substances Identified as Toxic Air Contaminants)

CARB identifies substances as TACs as defined in Health and Safety Code Section 39655 and listed in Title 17, Section 93000 of the California Code of Regulations, "Substances Identified as Toxic Air Contaminants." A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. In general, for those TACs that may cause cancer, there are thresholds set by regulatory agencies below which adverse health impacts are not expected to occur. This contrasts with the criteria pollutants for which acceptable levels of exposure can be determined and for which the state and federal governments have set ambient air quality standards. According to the California Almanac of Emissions and Air Quality, the majority of the estimated health risk from TACs for the State of California can be attributed to relatively few compounds, the most important of which is DPM from diesel-fueled engines.

California Low-emission Vehicle Program

CARB first adopted Low-Emission Vehicle (LEV) program standards in 1990. These first LEV standards ran from 1994 through 2003. LEV II regulations, running from 2004 through 2010, represent continuing progress in emission reductions. As the State's passenger vehicle fleet continues to grow and more sport utility vehicles and pickup trucks are used as passenger cars rather than work vehicles, the more stringent LEV II standards were adopted to provide reductions necessary for California to meet federally mandated clean air goals outlined in the 1994 State Implementation Plan. In 2012, CARB adopted the LEV III amendments to California's LEV regulations. These

amendments, also known as the Advanced Clean Car Program, include more stringent emission standards for model years 2017 through 2025 for both criteria pollutants and greenhouse gas (GHG) emissions for new passenger vehicles.

California On-Road Heavy-duty Vehicle Program

CARB has adopted standards for emissions from various types of new on-road heavy-duty vehicles. Section 1956.8, Title 13, California Code of Regulations contains California's emission standards for on-road heavy-duty engines and vehicles, and test procedures. CARB has also adopted programs to reduce emissions from in-use heavy-duty vehicles including the Heavy-Duty Diesel Vehicle Idling Reduction Program, the Heavy-Duty Diesel In-Use Compliance Program, the Public Bus Fleet Rule and Engine Standards, and the School Bus Program and others.

California Airborne Toxics Control Measure for Asbestos

CARB has adopted Airborne Toxics Control Measures for sources that emit a particular TAC. If there is a safe threshold for a substance at which there is no toxic effect, the control measure must reduce exposure below that threshold. If there is no safe threshold, the measure must incorporate Best Available Control Technology to minimize emissions. In July 2001, CARB approved an Air Toxic Control Measure for construction, grading, quarrying and surface mining operations to minimize emissions of naturally occurring asbestos. The regulation requires application of best management practices (BMPs) to control fugitive dust in areas known to have naturally occurring asbestos and requires notification to the local air district prior to commencement of ground-disturbing activities. The measure establishes specific testing, notification and engineering controls prior to grading, quarrying, or surface mining in construction zones where naturally occurring asbestos is located on projects of any size. There are additional notification and engineering controls at work sites larger than one acre in size. These projects require the submittal of a "Dust Mitigation Plan" and approval by the air district prior to the start of a project.

Construction sometimes requires the demolition of existing buildings where construction occurs. Asbestos is also found in a natural state, known as naturally occurring asbestos. Exposure and disturbance of rock and soil that naturally contain asbestos can result in the release of fibers into the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present. San Joaquin County is located in an area likely to not contain naturally occurring asbestos.

Verified Diesel Emission Control Strategies

USEPA and CARB tiered off-road emission standards only apply to new engines and off-road equipment can last several years. CARB has developed Verified Diesel Emission Control Strategies (VDECS), which are devices, systems, or strategies used to achieve the highest level of pollution control from existing off-road vehicles, to help reduce emissions from existing engines. VDECS are designed primarily for the reduction of diesel PM emissions and have been verified by CARB. There are three levels of VDECS, the most effective of which is the Level 3 VDECS. Tier 4 engines are not required to install VDECS because they already meet the emissions standards for lower tiered equipment with installed controls.

California Diesel Risk Reduction Plan

CARB Diesel Risk Reduction Plan has led to the adoption of new state regulatory standards for all new on-road, off-road, and stationary diesel-fueled engines and vehicles to reduce DPM emissions by about 90 percent overall from year 2000 levels. The projected emission benefits associated with the full implementation of this plan, including federal measures, are reductions in DPM emissions and associated cancer risks of 75 percent by 2010, and 85 percent by 2020.

Tanner Air Toxics Act and Air Toxics Hot Spots Information and Assessment Act

TACs in California are primarily regulated through the Tanner Air Toxics Act (AB 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588), also known as the Hot Spots Act. To date, CARB has identified more than 21 TACs and has adopted the USEPA list of HAPs as TACs.

Carl Moyer Memorial Air Quality Standards Attainment Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program), a partnership between CARB and local air districts, issues grants to replace or retrofit older engines and equipment with engines and equipment that exceed current regulatory requirements to reduce air pollution. Money collected through the Carl Moyer Program complements California's regulatory program by providing incentives to effect early or extra emission reductions, especially from emission sources in environmental justice communities and areas disproportionately affected by air pollution. The program has established guidelines and criteria for the funding of emissions reduction projects.

Regional and Local Regulations

Ozone Attainment Plans

The *Extreme Ozone Attainment Demonstration Plan*, adopted by the SJVAPCD Governing Board October 8, 2004, sets forth measures and emission-reduction strategies designed to attain the federal one-hour ozone standard by November 15, 2010, as well as an emissions inventory, outreach, and rate of progress demonstration. This plan was approved by the USEPA on March 8, 2010; however, the USEPA's approval was subsequently withdrawn effective November 26, 2012, in response to a decision issued by the U.S. Court of Appeals for the Ninth Circuit (Sierra Club v. EPA, 671 F.3d 955) remanding USEPA's approval of these SIP revisions. Concurrent with the USEPA's final rule, CARB withdrew the 2004 Plan. The SJVAPCD developed a new plan for the one-hour ozone standard, the 2013 Plan for the Revoked 1-Hour Ozone Standard, which it adopted in September 2013.

The 2007 Ozone Plan, approved by CARB on June 14, 2007, demonstrates how the SJVAB would meet the federal eight-hour ozone standard. The 2007 Ozone Plan includes a comprehensive list of regulatory and incentive-based measures to reduce emissions of ozone and particulate matter precursors throughout the SJVAB. Additionally, this plan calls for major advancements in pollution control technologies for mobile and stationary sources of air pollution, and an increase in state and federal funding for incentive-based measures to create adequate reductions in emissions to bring the entire SJVAB into attainment with the federal eight-hour ozone standard.

On April 16, 2009, the SJVAPCD Governing Board adopted the *Reasonably Available Control Technology Demonstration for Ozone State Implementation Plans (2009 RACT SIP)*. In part, the *2009 RACT SIP* satisfied the commitment by the SJVAPCD for a new reasonably available control technology analysis for the one-hour ozone plan (see discussion of the USEPA withdrawal of approval in the *Extreme 1-Hour Ozone Attainment Demonstration Plan* summary above) and was intended to prevent all sanctions that could be imposed by USEPA for failure to submit a required SIP revision for the one-hour ozone standard. With respect to the eight-hour standard, the plan also assesses the SJVAPCD's rules based on the adjusted major source definition of 10 tons per year (due to the SJVAB's designation as an extreme subsequently nonattainment area), evaluates SJVAPCD rules against new *Control Techniques Guidelines* promulgated since August 2006, and reviews additional rules and amendments that had been adopted by the Governing Board since August 17, 2006, for reasonably available control technology consistency.

The *2013 Plan for the Revoked 1-Hour Ozone Standard* was approved by the Governing Board on September 19, 2013. Based on implementation of the ongoing control measures, preliminary modeling indicates that the SJVAB will attain the one-hour standard before the final attainment year of 2022 and without relying on long-term measures under the federal CAA Section 182(e)(5).

On June 19, 2014, the Governing Board adopted the *2014 Reasonably Available Control Technology Demonstration for the 8-Hour Ozone State Implementation Plan* that includes a demonstration that the SJVAPCD rules implement RACT. The plan reviews each of the NO_x reduction rules and concludes that they satisfy requirements for stringency, applicability, and enforceability, and meet or exceed RACT. The plan's analysis of further ROG reductions through modeling and technical analyses demonstrates that added ROG reductions will not advance the SJVAB's ozone attainment. Each ROG rule evaluated in the 2009 RACT SIP has been subsequently approved by the USEPA as meeting RACT within the last two years. The subsequent attainment strategy, therefore, focuses on further NO_X reductions.

SJVAPCD adopted the *2020 Reasonably Available Control Technology (RACT) Demonstration for the 2015 8-Hour Ozone Standard* in June 2020. This plan satisfies CAA requirements and ensures expeditious attainment of the 70 parts per billion eight-hour standard.

SJVAPCD adopted the *2022 Plan for the 2015 8-Hour Ozone Standard* on December 15, 2022. This plan uses extensive science and research, state of the art air quality modeling, and the best available information in developing a strategy to attain the federal 2015 national ambient air quality standard (NAAQS) for ozone of 70 ppb as expeditiously as practicable. Building on decades of developing and implementing effective air pollution control strategies, this plan demonstrates that the reductions being achieved by the SJVAPCD and CARB strategy (72 percent reduction in NO_X emissions by 2037) ensures expeditious attainment of the 2015 8-hour ozone standard by the 2037 attainment deadline.

SJVAPCD adopted the *2023 Maintenance Plan and Redesignation Request for the Revoked 1-Hour Ozone Standard* on June 15, 2023. This maintenance plan demonstrates SJVAPCD's consistency with all five criteria of Section 107(d)(3)(E) of the CAA to terminate all anti-backsliding provisions for the revoked 1-hour ozone standard, including Section 185 nonattainment fees. This Maintenance Plan also includes a demonstration that would ensure the area remains in attainment of the 1-hour ozone NAAQS through 2036. Therefore, SJVAPCD is requesting to be redesignated to attainment for the 1-hour ozone NAAQS and requesting termination of all anti-backsliding obligations.

Particulate Matter Attainment Plan

In June 2007, the SJVAPCD Board adopted the *2007 PM_{10} Maintenance Plan and Request for Redesignation*. This plan demonstrates how PM_{10} attainment in the SJVAB will be maintained in the future. Effective November 12, 2008, USEPA redesignated the SJVAB to attainment for the PM_{10} NAAQS and approved the 2007 PM_{10} Maintenance Plan.

In April 2008, the SJVAB Board adopted the *2008 $PM_{2.5}$ Plan* and approved amendments to Chapter 6 of the *2008 $PM_{2.5}$ Plan* on June 17, 2010. This plan was designed to addresses USEPA's annual $PM_{2.5}$ standard of 15 µg/m³, which was established by USEPA in 1997. In December of 2012, the SJVAPCD adopted the *2012 $PM_{2.5}$ Attainment Plan*, which addresses USEPA's 24-hour $PM_{2.5}$ standard of 35 µg/m³, which was established by USEPA in 2006. In April 2015, the SJVAPCD Board adopted the *2015 Plan for the 1997 $PM_{2.5}$ Standard* that addresses the USEPA's annual and 24-hour $PM_{2.5}$ standards established in 1997 after the SJVAB experienced higher $PM_{2.5}$ levels in winter 2013–2014 due to the extreme drought, stagnation, strong inversions, and historically dry conditions, and the SJVAPCD was unable to meet the initial attainment date of December 31, 2015.

SJVAPCD adopted the *2016 Moderate Area Plan for the 2012 $PM_{2.5}$ Standard* on September 15, 2016. This plan addresses the USEPA federal annual $PM_{2.5}$ standard of 12 µg/m³, established in 2012. This plan includes an attainment impracticability demonstration and request for reclassification of the Valley from Moderate nonattainment to Serious nonattainment.

SJVAPCD adopted the *2018 Plan for the 1997, 2006, and 2012 $PM_{2.5}$ Standards* in November 2018. This plan addresses the USEPA federal 1997 annual $PM_{2.5}$ standard of 15 µg/m³ and the 24-hour $PM_{2.5}$ standard of 65 µg/m³; the 2006 24-hour $PM_{2.5}$ standard of 35 µg/m³; and the 2012 annual $PM_{2.5}$ standard of 12 µg/m³. The plan demonstrates attainment of the federal $PM_{2.5}$ standards as expeditiously as practicable as required under the federal CAA. The district is currently developing the 2023 Plan for the 2012 Annual $PM_{2.5}$ Standard.

San Joaquin Valley Air Pollution Control District Regulations

The proposed project site is located within the jurisdiction of the SJVAPCD, which regulates air pollutant emissions throughout the SJVAB. The SJVAPCD enforces regulations and administers permits governing stationary sources. Pursuant to Assembly Bill 205 subsection 25545.1(b)(1), the CEC retains exclusive authority over permitting and supersedes any applicable statute, ordinance, or regulation of a local air quality management district. In the absence of CEC jurisdiction, the following SJVAPCD regional rules and regulations are related to the proposed project:

- **Regulation VIII (Fugitive PM_{10} Prohibitions)** contains rules developed pursuant to USEPA guidance for "serious" PM_{10} nonattainment areas. Rules included under this regulation limit fugitive PM_{10} emissions from the following sources: construction, demolition, excavation, extraction, and other earth moving activities, bulk materials handling, carryout and track-out, open areas, paved and unpaved roads, unpaved vehicle/equipment traffic areas, and agricultural sources.
- **Rule 2201 (New and Modified Stationary Source Review Rule)** applies to all new stationary sources or modified existing stationary sources that are subject to the SJVAPCD permit requirements. The rule requires review of the new or modified stationary source to ensure that the source does not interfere with the attainment or maintenance of ambient air quality standards.
- **Rule 4101 (Visibility)** limits the visible plume from any source to 20 percent opacity.

- **Rule 4102 (Nuisance)** prohibits the discharge of air contaminants or other materials in quantities that may cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health, or safety of any such person or the public.
- **Rule 4601 (Architectural Coatings)** limits volatile organic compound (VOC) emissions from architectural coatings. This rule specifies architectural coatings storage, cleanup, and labeling requirements.
- **Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations)** limits VOC emissions by restricting the application and manufacturing of certain types of asphalt for paving and maintenance operations and applies to the manufacture and use of cutback asphalt, slow cure asphalt and emulsified asphalt for paving and maintenance operations.
- **Rule 8021 (Construction, Demolition, Excavation, Extraction, And Other Earthmoving Activities)** limits fugitive dust emissions from construction and other earthmoving activities.
- **Rule 9510 (Indirect Source Review)** requires certain development projects to mitigate exhaust emissions from construction equipment greater than 50 horsepower to 20 percent below statewide average NO_X emissions and 45 percent below statewide average PM_{10} exhaust emissions. This rule also requires applicants to reduce baseline emissions of NO_X and PM_{10} emissions associated with operations by 33.3 percent and 50 percent respectively over a period of 10 years.

San Joaquin County General Plan

The County of San Joaquin has established a series of provisions in the San Joaquin County 2035 General Plan that relate to the physical development of the County. Several goals and policies contained in the General Plan relate to air quality.[12] Applicable goals related to air quality are as follows:

Goal PHS-5 To protect public health, agricultural crops, scenic resources, and the built and natural environments from air pollution.

- **PHS-5.1: Air Quality Monitoring.** The County shall participate in programs to monitor harmful air contaminants to determine their impacts.
- **PHS-5.2: San Joaquin Valley Air Pollution Control District Coordination.** The County shall coordinate with the San Joaquin Valley Air Pollution Control District (SJVAPCD) during the review of new development projects which have the potential for causing adverse air quality impacts.
- **PHS-5.7: TAC Exposure Reduction Measures for New Development**. The County shall require new development projects to implement all applicable best management practices that will reduce exposure of sensitive receptors (e.g., hospitals, schools, daycare facilities, elderly housing and convalescent facilities) to toxic air contaminants.
- **PHS-5.9: Particulate Emissions from Construction.** The County shall support SJVAPCD efforts to reduce PM_{10} and PM2.5 emissions from construction, grading, excavation, and demolition to the maximum extent feasible and consistent with State and Federal regulations.

[12] County of San Joaquin. 2016. General Plan. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf (accessed February 2025)

City of Stockton General Plan

The City of Stockton has established a series of goals, policies, and implementation measures in the City of Stockton 2040 General Plan Air Quality Element to improve air quality through a regional approach and interagency cooperation, improve air quality by reducing air emissions related to transportation, and improve air quality to minimize impacts to human health.[13] Applicable policies and actions related to air quality are as follows:

- **Policy LU-6.4:** Ensure that land use decisions balance travel origins and destinations in as close proximity as possible, and reduce vehicle miles traveled (VMT).
  - **Action LU-6.4A**. Maintain a reasonable balance between potential job generation and local workforce availability with a goal of one job for each employed resident.
  - **Action LU-6.4B.** Maintain a reasonable proximity and balance (i.e., magnitude) between job generating uses, housing opportunities, and resident services and amenities, including transit and active transportation.
  - **Action LU-6.4C.** Reduce Vehicle Miles Traveled (VMT) per household by planning new housing in closest proximity to employment centers, improving and funding public transportation and ridesharing, and facilitating more direct routes for pedestrians and bicyclists.
- **Policy SAF-4.1:** Reduce air impacts from mobile and stationary sources of air pollution
  - **Action SAF-4.1A**. Require the construction and operation of new development to implement best practices that reduce air pollutant emissions, including:
    - Use of low-emission and well-maintained construction equipment, with idling time limits.
    - Development and implementation of a dust control plan during construction.
    - Installation of electrical service connections at loading docks, where appropriate.
    - Installation of Energy Star-certified appliances.
    - Entering into Voluntary Emissions Reduction Agreements with the San Joaquin Valley Air Pollution Control District.
  - **Action SAF-4.1B.** Use the results of the Health Risk Assessment required by the California Air Toxics "Hot Spots" Act to establish appropriate land use buffer zones around any new sources of toxic air pollutants that pose substantial health risks.
  - **Action SAF-4.1C.** Require the use of electric-powered construction and landscaping equipment as conditions of project approval when appropriate.
  - **Action SAF-4.1D.** Limit heavy-duty off-road equipment idling time to meet the California Air Resources Board's idling regulations for on-road trucks.
- **Policy SAF-4.3:** Coordinate with the San Joaquin Valley Air Pollution Control District and non-profit organizations to promote public awareness on air quality issues and consistency in air quality impacts analyses.
  - **Action SAF-4.3A.** Distribute educational materials from the San Joaquin Valley Air Pollution Control District on the City's website and at its Permit Center.

[13] City of Stockton. 2024. Envision Stockton 2040 General Plan. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf (accessed February 2025)

- **Action SAF-4.3B.** Coordinate review of development project applications with the San Joaquin Valley Air Pollution Control District to ensure that air quality impacts are consistently identified and mitigated during CEQA review.

City of Lodi General Plan

The City of Lodi has established a series of goals, policies, and implementation measures in the 2024 General Plan, adopted in 2010, to address climate change and reduce air quality.[14] Air Quality-related goals include:

- **C-P48:** Require all construction equipment to be maintained and tuned to meet appropriate EPA and CARB emission requirements and when new emission control devices or operational modifications are found to be effective, such devices or operational modifications are to be required on construction equipment.
- **C-P49:** Continue to require mitigation measures as a condition of obtaining permits to minimize dust and air emissions impacts from construction.
- **C-P50:** Require contractors to implement dust suppression measures during excavation, grading, and site preparation activities. Techniques may include, but are not limited to:
  - Site watering or application of dust suppressants;
  - Phasing or extension of grading operations;
  - Covering of stockpiles;
  - Suspension of grading activities during high wind periods (typically winds greater than 25 miles per hour); and
  - Revegetation of graded areas.
- **C-P51:** Cooperate with other local, regional, and State agencies in developing and implementing air quality plans to achieve State and Federal Ambient Air Quality Standards and address cross-jurisdictional and regional transportation and air quality issues.
- **C-P52:** Use the San Joaquin Valley Air Pollution Control District's (SJVAPCD) Guide for Assessing and Mitigating Air Quality Impacts for determining and mitigating project air quality impacts and related thresholds of significance for use in environmental documents. The City shall consult with the SJVAPCD during CEQA review for projects that require air quality impact analysis and ensure that the SJVAPCD is on the distribution list for all CEQA documents.
- **C-P53:** Support recommendations to reduce air pollutants found in the San Joaquin Valley Air Pollution Control District (SJVAPCD) local attainment plans and use its regulatory authority to mitigate "point" sources of air pollution (e.g., factories, power plants, etc.).
- **C-P54:** Ensure that air quality impacts identified during the project-level CEQA review process are fairly and consistently mitigated. Require projects to comply with the City's adopted air quality impact assessment and mitigation process, and to provide specific mitigation measures as outlined in policies of Chapter 5: Transportation.
- **C-P57:** Review, support, and require implementation (as applicable) of San Joaquin Valley Air Pollution Control District guidance and recommendations (including those identified in the Guide for Assessing and Mitigating Air Quality Impacts) in regards to several key issues including:

[14] City of Lodi. 2010. Lodi General Plan. https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF (accessed February 2025)

- Environmental Assessment;
- Air Quality Mitigation Agreements;
- Integrated Planning;
- Air Quality Education;
- Congestion Management/Transportation Control Measures;
- Toxic and Hazardous Pollutant Emissions;
- Fugitive Dust and PM10 Emissions; and
- Energy Conservation and Alternative Fuels.

Additionally, Chapter 2: Land Use, Chapter 4: Community Design and Livability, and Chapter 5: Transportation also contain related policies that seek to improve air quality and reduce emissions through land use, transportation, and urban design strategies. It should be noted that although the horizon year of this general plan is one year out of date, the City is in the process of updating several General Plan Elements.

4.3.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 CEQA Guidelines Appendix G significance criteria questions related to Air Quality.

Would MICUP (the proposed project):

a) Conflict with or obstruct implementation of the applicable air quality plan?
b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard?
c) Expose sensitive receptors to substantial pollutant concentrations?
d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Approach to Analysis

This section presents the methodology used for the analysis of construction and operational emissions for the proposed project. Criteria pollutant and GHG emissions for proposed project construction and operation were calculated using the methodologies and factors implemented in the California Emissions Estimator Model (CalEEMod), Version 2022. The format of the project information was not ideal for use in the CalEEMod model; rather, the methodologies, data inputs and emission factors were incorporated into an Excel workbook.

CalEEMod is a Statewide land use emissions computer model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with both construction and operations from a variety of land use projects. The model allows for the use of default data (e.g., emission factors, trip lengths, meteorology, source inventory) provided by the various California air districts to account for local requirements and conditions, and/or user-defined inputs. The calculation methodology and input data used in CalEEMod can be found in the CalEEMod User's Guide Appendices A through H. The emission calculations details and methodologies are provided in Appendix C of the user's guide, and the default data tables provide the inputs, which are provided in Appendix G of the user's guide.

Construction Criteria Pollutant and TAC Emissions

Construction-related emissions are limited in duration but may still cause adverse air quality impacts. Construction associated with implementation of the proposed project would generate emissions from three primary sources: the operation of construction vehicles (e.g., scrapers, loaders, dump trucks, etc.); ground disturbance during site preparation and grading, which creates fugitive dust; and the application of asphalt, paint, or other oil-based substances.

At this time, there are many unknowns associated with constructing the individual project components. The equipment fleet, number of equipment days, total months and excavation quantities were provided. This information was used to develop maximum annual and daily emissions estimates of criteria air pollutant and TAC emissions associated with construction.

The OEHHA recommends evaluating risk exposure from short-term projects (e.g., construction projects) lasting more than two months. However, there is not specific information available to reasonably quantify individual project health risk. Furthermore, the pipeline projects are anticipated to move linearly and not expose sensitive receptors for long period of time.

Operation Criteria Pollutant and TAC Emissions

Long-term operational criteria pollutant and TAC emissions associated with implementation of the proposed project are discussed qualitatively by comparing the proposed project to the appropriate air quality plan goals, policies, and control measures. The proposed project is anticipated to have minimal sources of operational criteria pollutant and TAC emissions, primarily associated with a few passenger vehicle trips for periodic maintenance. It is anticipated that the proposed project would require quarterly trips for monitoring, maintenance and inspection. This would result in minimal operational emissions of criteria pollutant and TAC emissions. As such, operational emissions impacts are discussed qualitatively below.

Odors

The impact analysis qualitatively evaluates the types of land uses facilitated by the proposed project to evaluate whether major sources of anticipated odors would be present and, if so, whether those sources would likely generate objectionable odors.

EIR Scoping Comments Consideration

No comments relevant to CEQA were received in response to the EIR NOP specific to air quality that need to be addressed in the impacts discussion.

Specific Thresholds of Significance

Consistency with Air Quality Plan

The applicable air quality plan is the Extreme Ozone Attainment Demonstration Plan, 2007 PM_{10} Maintenance Plan and Request for Redesignation, and SJVAPCD regional rules and regulations, which identify measures to:

- Reduce emissions and reduce ambient concentrations of air pollutants; and
- Safeguard public health by reducing exposure to the air pollutants that pose the greatest health risk, with an emphasis on protecting the communities most heavily affected by air pollution.

The proposed project would be consistent with the Extreme Ozone Attainment Demonstration Plan, PM_{10} Maintenance Plan and Request for Redesignation, and SJVAPCD regional rules and regulations if it would support these plans' goals, include applicable control measures, and not disrupt or hinder implementation of these plans' control. Consistency with these plans is the basis for determining whether the proposed project would conflict with or obstruct implementation of an applicable air quality plan.

Per Section 7.12 of the SJVAPCD's Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI), the SJVAPCD has determined that projects with emissions above the thresholds of significance for criteria pollutants would conflict with/obstruct implementation of the SJVAPCD's air quality plans.[15] Project emissions that remain below SJVAPCD significance thresholds would demonstrate consistency with the air quality plans.

Annual Construction and Operational Criteria Air Pollutant Emissions Thresholds

Appendix G of the CEQA Guidelines (14 CCR 15000 et seq.) indicates that, where available, the significance criteria established by the applicable air quality management district or air pollution control district may be relied on to determine whether a project would have a significant impact on air quality. The SJVAPCD recommends the use of quantitative thresholds to determine the significance of temporary construction-related pollutant emissions and long-term operational-related pollutant emissions. These thresholds are shown in Table 4.3-3.

Table 4.3-3 SJVAPCD Air Quality Significance Thresholds

Pollutant	Operation Thresholds (Tons per Year)	Construction Thresholds (Tons Per Year)
NO_X	10	10
ROG[1]	10	10
PM_{10}	15	15
$PM_{2.5}$	15	15
SO_X	27	27
CO	100	100

NO_X = oxides of nitrogen; ROG = reactive organic gases; PM_{10} = coarse particles of a diameter of 10 microns or less; $PM_{2.5}$ = fine particles of a diameter less than 2.5 microns; SO_X = sulfur oxide; CO = carbon monoxide

[1] ROG are formed during combustion and evaporation of organic solvents. ROG are also referred to as volatile organic compounds.

Source: Appendix N

Daily Construction and Operational Criteria Air Pollutants Emissions Thresholds

In addition to the annual SJVAPCD thresholds outlined above, SJVAPCD has published the Ambient Air Quality Analysis Project Daily Emissions Assessment guidance, which is summarized in Section 8.4.2, Ambient Air Quality Screening Tools, of the SJVAPCD's Guidance for Assessing and Mitigating Air Quality Impacts (GAMAQI), adopted in March 2015.

SJVAPCD recommends comparing project attributes with the following screening criteria as a first step to evaluating whether the project would result in the generation of CO concentrations that could substantially contribute to an exceedance of the significance thresholds. The proposed project could result in a significant impact to localized CO concentrations if:

[15] San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015a. *Guide for Assessing and Mitigating Air Quality Impacts*, March 19, 2015. https://www.valleyair.org/transportation/GAMAQI.pdf (accessed July 2021).

- A traffic study for the proposed project indicates that the Level of Service (LOS) on one or more streets or at one or more intersections in the proposed project vicinity will be reduced to LOS E or F; or
- A traffic study indicates that the proposed project will substantially worsen an already existing LOS F on one or more streets at more one or more intersections in the project vicinity.

The GAMAQI provides a screening threshold of 100 pounds per day of any of the following pollutants: NO_X, ROG, PM_{10}, $PM_{2.5}$, SO_X, and CO. The screening threshold was used to evaluate localized construction activities and operational activities separately. Per SJVAPCD's GAMAQI and Rule 9510 – Indirect Source Review, when assessing the significance of project-related impacts on local air quality, the impacts may be significant if on-site emissions from construction or operational activities exceed the 100 pounds per day screening level after implementation of all enforceable mitigation measures. The proposed project would be subject to Rule 9510 because it would develop more than 9,000 square feet, which is the ambient air quality analysis screening level threshold for unconventional land use developments not identified as residential, commercial, or industrial (e.g., a solar facility).

If the screening criteria is exceeded for any pollutant, an ambient air quality assessment (AAQA) can be conducted following District Rule 2201 AAQA Modeling. An AAQA uses air dispersion modeling to determine if emission increases from a project's construction or operational activities would cause or contribute to a violation of the ambient air quality standards. If modeled concentrations combined with background concentrations would result in an exceedance of a NAAQS or CAAQS, then SJVAPCD Rule 2201 requires that the maximum modeled concentration of each pollutant be compared to its corresponding Significant Impact Level (SIL). If modeled concentrations do not exceed the Significant Impact Level (SIL), then the proposed project would not result in a violation of ambient air quality standards and mitigation for that pollutant is not required. The SIL are identified in Table 4.3-4.

Table 4.3-4 Ambient Air Quality Assessment Localized Thresholds (mg/m³)

Averaging Time	NAAQS				CAAQS				SIL			
	1hr	8hr	24hr	Annual	1hr	8hr	24hr	Annual	1hr	8hr	24hr	Annual
NO_2	188	–	–	100	339	–	–	57	7.5	–	–	1
CO	40,000	10,000	–	–	23,000	10,000	–	–	2,000	500	–	–
SO_2	196	–	–	–	655	–	105	–	7.8	–	–	–
PM_{10} Exhaust	–	–	–	–	–	–	–	–	–	–	5	1
PM_{10} Fugitive	–	–	–	–	–	–	–	–	–	–	10.4	2.1

NA = Not applicable; NO_X = oxides of nitrogen; CO = carbon monoxide; PM_{10} = coarse particles of a diameter of 10 microns or less; SIL = Significant Impact Level

Source: Appendix N

Odors

The project should be evaluated to determine the likelihood that the project would result in nuisance odors. Any project with the potential to frequently expose members of the public to objectionable odors should be deemed to have a significant impact. Nuisance odors may be assessed qualitatively taking into consideration of project design elements and proximity to off-site

receptors that potentially would be exposed objectionable odors. Due to the subjective nature of odor impacts, the number of variables that can influence the potential for an odor impact, and the variety of odor sources, there are no quantitative or formulaic methodologies to determine if potential odors would have a significant impact. Rather, projects must be assessed on a case-by-case basis.

Impact Evaluation

Air Quality Management Plans Consistency

Significance Criterion a:	Would the proposed project conflict with or obstruct implementation of the applicable air quality plan?

Impact AQ-1 THE PROPOSED PROJECT WOULD NOT CONFLICT WITH OR OBSTRUCT IMPLEMENTATION OF AN SJVAPCD AIR QUALITY PLAN WITH THE IMPLEMENTATION OF MITIGATION. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION.

The SJVAPCD has prepared several air quality attainment plans to achieve ozone and particulate matter standards, the most recent of which include:

- 2020 Reasonably Available Control Technology (RACT) Demonstration for the 2015 8-Hour Ozone Standard
- 2013 Plan for the Revoked 1-Hour Ozone Standard, 2007 PM_{10} Maintenance Plan and Request for Re-designation
- 2012 $PM_{2.5}$ Plan
- 2015 Plan for the 1997 $PM_{2.5}$ Standard

The SJVAB is in attainment for CO, SO_2, and Pb, and there are no attainment plans for those pollutants.

Per Section 7.12 of the *GAMAQI*, the SJVAPCD has determined that projects with emissions above the thresholds of significance for criteria pollutants would conflict with/obstruct implementation of the SJVAPCD's air quality plans. Accordingly, the analysis of the proposed project's consistency with applicable air quality plans is based on an evaluation of the proposed project's potential to exceed SJVAPCD thresholds of significance for criteria pollutants during construction, which is discussed in detail under Impact AQ-2. As discussed below, operational emissions would consist of a minimal increase in O&M emissions and are therefore evaluated qualitatively.

Construction

Proposed project construction has the potential to conflict with existing air quality plans due to an exceedance of NO_x, ROG, and CO emissions above SJVAPCD thresholds. This would be considered a potentially significant impact.

Implementation of Mitigation Measure AQ-1, which requires usage of Tier 4 Final equipment during construction, would reduce such criteria pollutant emissions associated with proposed project construction to levels below SJVAPCD significance threshold (as discussed in further detail under

Impact AQ-2 below).[16] Therefore, MICUP construction impacts related to air quality management plans consistency would be less than significant with mitigation.

Operation

Vehicle trips related to operation and maintenance of proposed MICUP facilities would be nominal and incorporated into existing facility operational plans. Vehicle trips are directly associated with pollutant emissions due to the combustion of fuel in internal combustion engines, which releases criteria pollutants such as NO_x, CO, and PM into the atmosphere. Criteria pollutant emissions associated with the nominal addition of vehicle trips would be less than significant.

Additionally, there would be some energy consumption during project operation related to facilities operation and pumping to convey water that would result in indirect criteria pollutant emissions (i.e., relying on grid power that is produced off site from power plant fossil fuel combustion). The energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. For example, 2,625 KW of power is anticipated to operate the Aqueduct's pump facilities during the diversion period.[17] This energy consumption may result in indirect pollutant emissions associated with power plants that rely on the combustion of fossil fuels to create electricity. However, each component would maximize energy efficiency and reduce use of non-renewably sourced energy; this could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. Furthermore, indirect criteria pollutant emissions related to off-site power plant energy use are subject to local, State, and federal emissions control measures, which are considered the maximum feasible level of mitigation for power plant stack emissions. These measures would help to reduce MICUP overall operational emissions and energy consumption emissions. As such, it is assumed that MICUP operational use and maintenance activities across the three Partner Agency areas would not exceed SJVAPCD thresholds and, thus, would not conflict with implementation of existing air quality plans.

Based on this analysis, the resulting emissions from vehicle trips during operation do not exceed the applicable SJVAPCD thresholds for criteria pollutants. Therefore, the project would not result in a significant air quality impact under CEQA. Therefore, MICUP operational impacts related to air quality management plans consistency would be less than significant.

Mitigation Measures

Implement Mitigation Measure AQ-1, included under Impact AQ-2 below.

Level of Significance

Less than Significant with Mitigation

[16] It should be noted that per the City of Stockton's 2025 EIR Addendum for the Delta Water Treatment Plant Groundwater Recharge Basins Project, construction impacts associated with the DWTP recharge basins and dry wells were found to be significant and unavoidable for NOx and ROG emissions. While use of alternative equipment (electric, alternative fuel, catalyst equipped) is proposed under MM AIR-1b in the Addendum, they do not explicitly state that Tier 4 equipment would be used. However, because the Addendum proposes the use of alternative equipment, we can reasonably conclude the EIR Tier 4 mitigation is consistent with the MM AIR-1b as an 'alternative equipment' option.

[17] The Aqueduct is a 3,500 HP system, according to information provided to Rincon. Assuming about 0.75 kw per HP for the pumping facilities, this produces an energy consumption estimate of 2,625 KW to operate the pumps.

Criteria Air Pollutants Emissions Compared to Air Quality Standards

Significance Criterion b:	Would the proposed project result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard?

Impact AQ-2 IMPLEMENTATION OF MICUP WOULD RESULT IN THE GENERATION OF AIR POLLUTANTS DURING CONSTRUCTION OF INDIVIDUAL COMPONENTS THAT IN TURN COULD AFFECT LOCAL AIR QUALITY. HOWEVER, IMPLEMENTATION OF THE PROPOSED PROJECT WOULD NOT RESULT IN A CUMULATIVELY CONSIDERABLE NET INCREASE OF CONSTRUCTION CRITERIA POLLUTANTS. WITH IMPLEMENTATION OF MITIGATION, IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

Construction of the proposed project would require a varying construction schedule depending on the project component. Construction of the proposed project components would generate criteria air pollutant emissions from entrained dust, off-road equipment use, vehicle emissions, and architectural coatings. Off-site criteria air pollutant emissions would be generated by construction worker daily commute trips and heavy-duty diesel haul and vendor truck trips. Construction criteria air pollutant emissions would vary substantially from day to day, depending on the level of activity, the specific type of operation, and, for dust, the prevailing weather conditions.

North San Joaquin Water Conservation District

The following sections briefly describe the construction activities and estimated emissions associated with the proposed project components under the North San Joaquin Water Conservation District (NSJWCD).

EXPANDED USE OF NORTH, SOUTH AND CALFED SYSTEM

NSJWCD can utilize MICUP water by increasing diversions from the Mokelumne River using its existing North, South, and CalFed Systems. The NSJWCD also plans to increase the capacity of these systems to take MICUP water. This construction activity is anticipated to require 36 months for the North System and 28 months for the South System (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-3 and Table 3-11 of this Draft EIR and the corresponding excavation amounts are provided in Appendix C, along with additional supporting calculation details.[18]

As demonstrated in Table 4.3-5, the construction emissions are below the annual significance thresholds for these proposed project components.

[18] Since construction air emissions modeling was complete, the total length of pipeline anticipated to be installed under the refined project design for NSJWCD project components has been updated and reduced from 198,950 linear feet to approximately 189,900 linear feet. This reduction in pipeline length would correspondingly reduce the amount of excavation and related construction activities required. As a result, construction-related emissions associated with pipeline installation would be lower than those estimated in the emissions analysis for NSJWCD components. Therefore, the emissions analysis for the NSJWCD project components is conservative, and actual construction emissions are expected to be less than those disclosed in this document.

Table 4.3-5 NSJWCD North, South and CalFed System Construction Emissions (tons per year)

NSJWCD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
North and CalFed Systems	< 1	1	1	< 1	< 1	< 1
South System	< 1	1	1	< 1	< 1	< 1
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

North and South System are shown separately, as each component has a unique equipment list and construction duration.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

As demonstrated in Table 4.3-6, the construction emissions are below the corresponding daily significance thresholds for these proposed project components. Impacts would be less than significant for these project components.

Table 4.3-6 NSJWCD North, South and CalFed System Construction Emissions (lbs. per day)

NSJWCD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
North and CalFed Systems	25	14	18	< 1	1	1
South System	25	15	18	< 1	1	1
SJVAPCD Significance Thresholds	100	100	100	100	100	100
Exceed SJVAPCD Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

North and South System are shown separately, as each component has a unique equipment list and construction duration.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

EXPANDED USE OF PRIVATE PUMPS FOR FLOOD-MAR AND IN-LIEU RECHARGE

The existing private pumps PODs and Flood-MAR sites may require improvements such as increasing the pump capacity and adding fish screens to convey water off the Mokelumne River onto the adjacent agricultural fields and other locations. This construction activity is anticipated to require 58 months (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-3 of this Draft EIR and the corresponding excavation amounts are provided in Appendix C, along with additional supporting calculation details.

As demonstrated in Table 4.3-7, the construction emissions are below the annual significance thresholds for these proposed project components.

Table 4.3-7 NSJWCD PODs Construction Emissions (tons/year)

NSJWCD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Expanded Use of Private Pumps (PODs)	< 1	< 1	< 1	< 1	< 1	< 1
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	**No**	**No**	**No**	**No**	**No**	**No**

[1]Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

As demonstrated in Table 4.3-8, the construction emissions are below the corresponding daily significance thresholds for these project components. Impacts would be less than significant for these proposed project components.

Table 4.3-8 NSJWCD PODs Construction Emissions (lbs. per day)

NSJWCD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Expanded Use of Private Pumps (PODs)	25	14	18	< 1	1	1
SJVAPCD Significance Thresholds	100	100	100	100	100	100
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

DIRECT RECHARGE (ASR WELLS AND RECHARGE BASINS)

The ASR wells off the East Bay Municipal Utility District (EBMUD) Mokelumne Aqueduct would require construction of one new intertie structure into the aqueduct and construction of 20 individual wells; construction of the ASR wells is anticipated to require 80 months. Construction of Recharge Basins additionally are anticipated to require 100 months (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-3 of this Draft EIR and the corresponding excavation amounts are provided in Appendix C, along with additional supporting calculation details.

As demonstrated in Table 4.3-9, the construction emissions are below the annual significance thresholds for these proposed project components.

Table 4.3-9 NSJWCD Direct Recharge Construction Emissions (tons/year)

NSJWCD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
ASR Wells	< 1	< 1	< 1	< 1	< 1	< 1
Recharge Basins	< 1	4	3	< 1	< 1	< 1
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

As demonstrated in Table 4.3-10, the construction emissions are below the corresponding daily significance thresholds for these project components. Impacts would be less than significant for these proposed project components.

Table 4.3-10 NSJWCD Direct Recharge Construction Emissions (lbs. per day)

NSJWCD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
ASR Wells	25	12	14	< 1	1	1
Recharge Basins	27	35	32	< 1	5	3
SJVAPCD Significance Thresholds	100	100	100	100	100	100
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

Stockton East Water District

The following sections briefly describe the construction activities and estimated emissions associated with the proposed project components under the Stockton East Water District (SEWD).

BECKMAN ASR WELL/ASR WELLS OFF MOKELUMNE AQUEDUCT

The existing Beckman ASR Well (included in *ASR Wells off Mokelumne Aqueduct* in Table 3-11 of this Draft EIR) would be upgraded to inject MICUP water into the aquifer. This construction activity is anticipated to require 4 months (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-4 of this Draft EIR and the corresponding excavation amounts are provided in Appendix C, along with additional supporting calculation details. However, specific offroad construction fleets were not provided, so it is assumed that the Beckman ASR Well construction activity would have similar daily emissions to those in Table 4.3-10 and fewer annual emissions than those presented in Table 4.3-9. Impacts would be less than significant for these proposed project components.

WEST LINDEN & MOSHER CREEK RECHARGE AREAS

SEWD would construct a new Mokelumne Aqueduct intertie and up to 4 ASR wells and 142 dry wells within the recharge areas. The water conveyed from the Mokelumne Aqueduct to the West Linden Recharge Area and then to other recharge facilities, ASR wells, and dry wells would be pressurized off the Mokelumne Aqueduct and conveyed through approximately 70,000 linear feet of pipeline.

For the Mosher Creek Recharge Areas, pipelines would be extended from the West Linden Recharge Area to new recharge basins near Mosher Creek at Tully Dam and East Mosher Creek at Messick Road. This construction activity is anticipated to require 24 months for the West Linden Project and 6 months for the recharge basins (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-4 of this Draft EIR and the corresponding excavation amounts are provided in Appendix C, along with additional supporting calculation details.

As demonstrated in Table 4.3-11, the construction emissions are below the annual significance thresholds for these proposed project components.

Table 4.3-11 SEWD West Linden and Mosher Creek Construction Emissions (tons/year)

SEWD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
West Linden	1	3	3	< 1	< 1	< 1
Mosher Creek	< 1	3	3	< 1	< 1	< 1
East Mosher Creek	< 1	2	2	< 1	< 1	< 1
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

As demonstrated in Table 4.3-12, the construction emissions are below the corresponding daily significance thresholds for these project components. Impacts would be less than significant for these proposed project components.

Table 4.3-12 SEWD West Linden and Mosher Creek Construction Emissions (lbs. per day)

SEWD	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
West Linden	26	25	28	< 1	2	1
Mosher Creek	27	37	32	< 1	6	3
East Mosher Creek	27	37	32	< 1	6	3
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

City of Stockton

DWTP RECHARGE BASIN

The Delta Water Treatment Plant (DWTP) Groundwater Recharge Basin component would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at the DWTP. No new pipelines would be constructed. The proposed recharge basins and dry wells (nine in total) would be built onsite at the DWTP. This construction activity is anticipated to require 4 months for the dry well construction (please refer to Table 3-10 of this Draft EIR). As demonstrated in Table 4.3-15, the construction criteria air pollutant emissions are below the annual significance thresholds for these proposed project components.

Table 4.3-13 City of Stockton DWTP Recharge Basin Construction Emissions (tons/year)

City of Stockton	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
DTWP Recharge Basins (Dry Wells)	< 1	< 1	< 1	< 1	< 1	< 1
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding. NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

As demonstrated in Table 4.3-16, the construction emissions are below the corresponding daily significance thresholds for these proposed project components. Impacts would be less than significant.

Table 4.3-14 City of Stockton DWTP Recharge Basin Construction Emissions (lbs. per day)

City of Stockton	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
DTWP Recharge Basins (Dry Wells)	26	23	27	< 1	2	1
SJVAPCD Significance Thresholds	100	100	100	100	100	100
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

STORMWATER BASINS

The City of Stockton would utilize existing infrastructure to convey MICUP water to the existing stormwater basins for groundwater recharge. No new pipelines or other infrastructure would be constructed. As such, it can be concluded that no emissions would be released during this phase. Even in the most conservative scenario, in which some emissions are released during this phase, they would be minimal and no greater than the emissions estimates provided in Table 4.3-5 through Table 4.3-12 above. Impacts would be less than significant.

RECHARGE BASINS

The City of Stockton would build up to 70 acres of new recharge basins. Lateral pipelines would need to be built to convey water to these basins. A conservative estimate of the lateral pipeline needed is assumed to be 6,000 linear feet of 18-inch diameter pipeline, depending on the final basin locations. Construction activity is anticipated to require 30 months (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-5 of this Draft EIR and the corresponding excavation amounts are provided in Appendix C, along with additional supporting calculation details.

As demonstrated in Table 4.3-15, the construction criteria air pollutant emissions are below the annual significance thresholds for these proposed project components.

Table 4.3-15 City of Stockton Recharge Basins Construction Emissions (tons/year)

City of Stockton	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Recharge Basins	< 1	4	4	< 1	1	< 1
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

As demonstrated in Table 4.3-16, the construction emissions are below the corresponding daily significance thresholds for these proposed project components. Impacts would be less than significant.

Table 4.3-16 City of Stockton Recharge Basins Construction Emissions (lbs. per day)

City of Stockton	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
Recharge Basins	27	36	33	< 1	5	3
SJVAPCD Significance Thresholds	100	100	100	100	100	100
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

Overall

The combined proposed project impacts were also analyzed against the regional annual and daily SJVAPCD significance thresholds to determine potential worst case criteria pollutant emissions impacts. As demonstrated in Table 4.3-17, the potential overlapping construction of all MICUP components could exceed the SJVAPCD annual significance thresholds for NO_X. This is because the potential proposed project construction schedules are not fully known nor has a commitment to Tier 4 standard diesel construction equipment been made. Therefore, impacts could be potentially significant.

Implementation of Mitigation Measure AQ-1 would help reduce impacts. Mitigation Measure AQ-1 would require the use of Tier 4 certified equipment for Scrapers used during construction. Application of Tier 4 Final construction equipment can be used to reduce NO_X emissions such that an exceedance of the SJVAPCD annual threshold would not be exceeded. Tier 4 standards can reduce NO_X emissions an additional 90 percent and beyond those built into the engine designs of Tier 3 standard equipment.[19]

Table 4.3-17 Overall Proposed Project Construction Overlapping Unmitigated Annual Emissions (tons/year)

	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
NSJWCD	1	6	5	< 1	1	< 1
SEWD	1	9	8	< 1	1	< 1
City of Stockton	1	4	4	< 1	1	< 1
All Projects	**3**	**19**	**17**	**< 1**	**3**	**1**
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	No	**Yes**	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

[19] DieselNet. USA: Nonroad Diesel Engines. Available at: https://dieselnet.com/standards/us/nonroad.php (accessed January 2025)

Implementation of Mitigation Measure AQ-1 can reduce NOx emissions to less than significant levels. Mitigation Measure AQ-1 offers two avenues for reducing emissions. One is to incorporate an average fleetwide percentage of Tier 4 Final construction equipment for each project component. It was determined that if a project component commits to at least 55 percent of the equipment achieving Tier 4 Final emissions controls, then emissions will remain less than significant. This was determined by developing a horsepower-weighted emission factor for each criteria pollutant, for CalEEMod default and CalEEMod Tier 4 Final equipment emission factors. These emission factors were used to determine the percentage of the construction equipment fleet requiring Tier 4 Final emissions controls to achieve less than significant emissions, as demonstrated in Table 4.3-18.

Table 4.3-18 Overall Proposed Project Construction Overlapping Annual Emissions, Tier 4 Final Mitigation Applied to 55 percent+ of Construction Equipment (tons/year)

	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
NSJWCD	1	3	6	< 1	< 1	< 1
SEWD	1	5	10	< 1	1	< 1
City of Stockton	< 1	2	5	< 1	< 1	< 1
All Projects	**2**	**9.7**	**21**	**< 1**	**1**	**1**
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

Alternatively, project components that deploy scrapers for construction as identified in Tables 3.7 through 3.10 of the project description can commit to Tier 4 Final levels of emissions control for that equipment for the duration of the construction schedule. Emission estimates for the overall project when scrapers incorporate Tier 4 Final emissions controls are presented in Table 4.3-19, below. Therefore, with the incorporation of Mitigation Measure AQ-1, impacts would be reduced to levels that are less than significant.

Table 4.3-19 Overall Proposed Project Construction Overlapping Annual Emissions, Tier 4 Final Mitigation Applied to Scrapers (tons/year)

	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
NSJWCD	<1	3	5	<1	1	<1
SEWD	1	5	8	<1	1	<1
City of Stockton	<1	1	4	<1	1	<1
All Projects	**2**	**9.2**	**16**	**<1**	**2**	**1**
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceed SJVAPCD Threshold?	No	No	No	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded. Some numbers may not add up due to rounding.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

Furthermore, as shown in Table 4.3-20, the simultaneous construction of all NSJWCD project components could exceed the SJVAPCD daily significance thresholds for ROG. The potential overlapping of all MICUP components also could exceed SJVAPCD daily significance thresholds for ROG, NO_X and CO. Impacts could be potentially significant.

Generally, when the SJVAPCD daily significance thresholds are exceeded, an ambient air quality assessment (AAQA) should be conducted following District Rule 2201 *AAQA Modeling*, as outlined in the SJVAPCD GAMAQI. However, due to the wide-spread construction activities, it is unlikely that an AAQA would be necessary. ROG does not have a NAAQS to model to compare against and CO is very unlikely to ever cause an exceedance based on the background ambient concentrations presented in Table 4.3-2. NO_X emissions could be potentially significant; however, each individual proposed project component would be under the SJVAPCD significance threshold and would further be reduced after implementation of Mitigation Measure AQ-1 (please refer to Appendix C). Each region is separated geographically to such an extent that overlapping emissions contributions, were they to occur, would not contribute to an exceedance of the NAAQS or CAAQS. Therefore, MICUP construction impacts related to daily emissions would be less than significant with mitigation.

Table 4.3-20 Overall Proposed Project Construction Overlapping Daily Emissions (lbs. per day)

	ROG	NO_X	CO	SO_2	PM_{10}	$PM_{2.5}$
NSJWCD	125	71	97	<1	10	4
SEWD	77	62	88	<1	12	5
City of Stockton	51	40	58	<1	7	3
All Projects	**254**	**172**	**243**	**1**	**28**	**12**
SJVAPCD Significance Thresholds	100	100	100	100	100	100
Exceed SJVAPCD Threshold?	**Yes**	**Yes**	**Yes**	No	No	No

Includes compliance with Rule 8021 dust control measures, which account for watering.

Bold values indicate where thresholds are exceeded.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{2.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

Operation

Operational activities would include MICUP water right coordination and use as well as maintenance. There would be some limited energy consumption that would result in indirect emissions (i.e., relying on grid power which is produced offsite from fossil fuel combustion). The energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. For example, 2,625 KW of power is anticipated to operate the Aqueduct's pump facilities during the diversion period.[20] However, each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. Furthermore, indirect criteria pollutant emissions from power plant use are subject to local, state, and federal control measures, which can be considered the maximum feasible level of mitigation for stack emissions. These measures would help to reduce MICUP overall operational coordination and use energy consumption, including non-renewable

[20] The Aqueduct is a 3,500 HP system, according to information provided to Rincon. Assuming about 0.75 kw per HP for the pumping facilities, this produces an energy consumption estimate of 2,625 KW to operate the pumps.

energy consumption and result in minimal emissions of criteria air pollutants. These measures would help to reduce MICUP's overall operational energy consumption and result in minimal emissions of criteria air pollutants.

Maintenance activities are described in Section 3.0, *Project Description*. Operation and maintenance of MICUP facilities would not require additional staff. Vehicle trips related to operational and maintenance of proposed MICUP facilities would be nominal and incorporated into existing facility plans. As such, any potential increase in emissions associated with the proposed project would be minimal. Therefore, MICUP operational impacts related to criteria pollutant emissions would be less than significant.

Mitigation Measures

AQ-1 Utilize Tier 4 Final Equipment During Construction

There are two (2) conditions incorporating Tier 4 Final construction equipment that will reduce emissions below significance thresholds for construction of proposed project components. All individual project components must identify and select one of the following emissions reductions strategies:

1. Incorporate a minimum of 55 percent Tier 4 Final equipment to the construction fleet for the duration of project construction; or
2. For individual project components that have scrapers as identified in Tables 3.7 through 3.10 of this Draft EIR, incorporate Tier 4 Final controls to all scraper equipment types for 100 percent of the project construction duration.

Level of Significance

Less than Significant with Mitigation

Toxic Air Contaminants Emissions Exposure

Significance Criterion c:	Would the proposed project expose sensitive receptors to substantial pollutant concentrations?

Impact AQ-3 Construction activities for individual MICUP components lasting longer than two months and/or located within 1,000 feet of sensitive receptors could expose sensitive receptors to substantial pollutant concentrations. Impacts would be less than significant with mitigation.

Construction

The primary TAC of concern associated with proposed project construction is diesel particulate matter (DPM), which is typically measured as exhaust PM_{10} from diesel-fueled sources. Construction of the proposed project would require the use of heavy-duty construction equipment and diesel trucks which would emit DPM. However, the use of US EPA Tier 4 equipment would drastically reduce the emissions of DPM, a known carcinogen. CARB's Air Quality and Land Use Handbook: A Community Health Perspective (April 2005) recommends against siting sensitive receptors within 500 feet of a freeway, urban roads with 100,000 vehicles/day, or rural roads with 50,000 vehicles/day, and within 1,000 feet of industrial land uses such as warehouses and distribution centers with more than 100 truck trips per day. While these siting distances are not particular to

construction activities, the primary source of TAC emissions from both freeways and construction equipment is DPM. Therefore, for this analysis it is assumed that projects within 1,000 feet of sensitive receptors have a potential to result in a significant impact. Concentrations of air pollutants from construction emission sources to this distance would drop off rapidly as air dispersion occurs, minimizing potential exposure to potential health risks. According to the Office of Environmental Health Hazard Assessment (OEHHA) in their 2015 *Air Toxics Hot Spots Program Guidance Manual*, cancer risk should be assessed for projects lasting longer than two months.

The individual proposed project components have stationary components (like pump station upgrades, well installations, etc.) and/or linear moving components (like pipeline installation/upgrades). The linear components are not anticipated to result in health risk impacts due to the limited exposure duration for sensitive receptors. However, the stationary proposed project components may meet the criteria discussed above to result in potential health risk impact due to potential proximity to sensitive receptors and construction duration. This would be considered a potentially significant impact.

Implementation of Mitigation Measure AQ-2 requires a project component-specific HRA or use of Tier 4 Final construction equipment. Any use of Tier 4 Final construction equipment, short-term nature of construction activities (i.e., those less than 2 months in duration), and relatively far distance of sensitive receptors (greater than 1,000 feet) would result in less than significant impacts as applicable to individual proposed project components. However, implementation of Mitigation Measure AQ-2 would reduce any potentially significant individual proposed project component impacts to a less-than-significant level. Therefore, construction impacts related to TACs exposure would be less than significant with mitigation.

North San Joaquin Water Conservation District

Expanded Use of North, South and CalFed System

The North, South, and CalFed Systems are expected to produce TAC emissions from construction activity, which is anticipated to require 36 months for the North System and 28 months for the South System. As part of this project component, the existing pumping stations would be modernized and expanded to improve efficiency. The North System Pump Station and the CalFed Pump Station would be completely replaced and expanded. Aging underground pipelines would be systematically replaced with larger-diameter concrete pipes, which would continue to enhance the overall system performance. Lastly, PVC lateral pipelines would be tied into the main network to facilitate water recharge on farms and connections to recharge basins.

The DPM emissions are expected to remain below SJVAPCD significance thresholds. However, there may be the potential to adversely impact sensitive receptors for project components associated with pump station construction within 1,000 feet of any sensitive receptors, as applicable. The pipeline activities are not anticipated to result in health risk impacts due to the limited exposure duration for sensitive receptors. However, due to pump station construction and its stationary nature, impacts would be considered potentially significant.

Expanded Use of Private Pumps for Flood-MAR and In-lieu Recharge

The expanded private pumps and Flood-MAR sites phase will produce TAC emissions from construction activity, anticipated to require 58 months. Impacts would be considered potentially significant for construction activities that would occur for a duration exceeding 2 months within 1,000 feet of an individual sensitive receptor. As demonstrated above, the DPM emissions are

expected to remain below SJVAPCD significance thresholds for this construction phase. However, due to the stationary nature of pump construction and potential to occur within 1,000 feet of a sensitive receptor, expanded use of private pumps for Flood-MAR and in-lieu recharge may have the potential to adversely impact sensitive receptors.

DIRECT RECHARGE (ASR WELLS AND RECHARGE BASINS)

The ASR wells off the EBMUD Mokelumne Aqueduct would require construction of one new intertie structure into the aqueduct. This construction activity is anticipated to require 80 months for the ASR wells and 100 months for the Recharge Basins and would likely produce TAC emissions from offroad equipment use and hauling activities. As demonstrated above, the DPM emissions are expected to remain below SJVAPCD significance thresholds for this construction phase. Even so, construction of the individual project components may have the potential to adversely impact nearby sensitive receptors (i.e., within 1,000 feet of activity for a total duration of 2 months).

OVERALL

As described in detail above, implementation of Mitigation Measure AQ-2 requiring a project component-specific HRA or use of Tier 4 Final construction equipment would reduce any potentially significant individual component construction impacts to a less-than-significant level. Therefore, NSJWCD construction impacts related to TAC emissions exposure would be less than significant with mitigation.

Stockton East Water District

The following sections briefly describe the construction activities and estimated emissions associated with the project components under the Stockton East Water District (SEWD).

BECKMAN ASR WELL

The existing Beckman ASR Well would be upgraded to inject MICUP water into the aquifer. This construction activity is anticipated to require 4 months and produce TAC emissions. As demonstrated above, the DPM emissions are expected to remain below SJVAPCD significance thresholds. The individual project components appear to be greater than 1,000 feet from the nearest sensitive receptor, so it is not anticipated to have the potential to adversely impact sensitive receptors. Impacts would be less than significant.

WEST LINDEN PROJECT & MOSHER CREEK RECHARGE BASIN PROJECTS AREAS

SEWD would construct a new Mokelumne Aqueduct intertie and up to 4 ASR wells and 142 dry wells within the recharge areas. This construction activity will produce TAC emissions and is anticipated to require 24 months for the West Linden Project and 6 months for the recharge basins. As demonstrated above, the DPM emissions are expected to remain below SJVAPCD significance thresholds. However, the individual project components may have the potential to adversely impacts sensitive receptors. Impacts would be considered potentially significant for construction activities that would occur for a duration exceeding 2 months within 1,000 feet of an individual sensitive receptor.

OVERALL

Implementation of Mitigation Measure AQ-2 requiring a project component-specific HRA or use of Tier 4 Final construction equipment would reduce any potentially significant individual proposed project component construction impacts to a less-than-significant level. Therefore, SEWD construction impacts related to TAC emissions exposure would be less than significant with mitigation.

City of Stockton

DWTP RECHARGE BASIN PROJECT

The DWTP Groundwater Recharge Basin Project would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities. No new pipelines would be constructed. The proposed recharge basins and dry wells would be built onsite at the DWTP.

The proposed recharge basins and dry wells would be built on site at the DWTP. This construction activity is anticipated to require 4 months for the dry wells and 30 months for the recharge basins, resulting in TAC emissions. As demonstrated above, the DPM emissions are expected to remain below SJVAPCD significance thresholds. There are potentially air quality sensitive receptors within 1,000 feet of the project component construction areas to the south of the facility. Therefore, City of Stockton construction impacts related to TAC emissions exposure would be potentially significant and subject to Mitigation Measure AQ-2.

If construction activity was to occur within 1,000 feet of the sensitive receptors to the south of the project site for a duration of greater than 2 months, then implementation of Mitigation Measure AQ-2 would require a project component-specific HRA or use of 100 percent Tier 4 Final construction equipment to reduce potentially significant individual proposed project component impacts to less than significant.

STORMWATER BASINS

The City of Stockton would utilize existing infrastructure to convey MICUP water to the existing stormwater basins for groundwater recharge. No new pipelines or other infrastructure, such as dry wells or recharge basins would be constructed. The City of Stockton would utilize existing infrastructure to convey MICUP water to existing stormwater basins for groundwater recharge. Because no new construction activities—such as installation of pipelines, dry wells, or recharge basins—would occur, no construction-related emissions of TACs would be generated. As a result, Mitigation Measure AQ-2 would not apply to this project component, and no potentially significant air quality impacts related to TAC exposure are anticipated.

RECHARGE BASINS

The City of Stockton would build up to 70 acres of new recharge basins. Lateral pipelines would need to be built to convey water to these basins. It is assumed that up to two basin sites would be identified within the half mile buffer on either side of the existing WID canals. A conservative estimate of the lateral pipeline needed is assumed to be 6,000 linear feet of 18-inch diameter pipeline, depending on the final basin locations.

These construction activities would generate TAC emissions, including DPM and could occur within 1,000 feet of sensitive receptors. Although DPM emissions are expected to remain below SJVACPD significance thresholds, the proximity and duration of construction near receptors could result in

potentially significant impacts. Therefore, implementation of Mitigation Measure AQ-2 would be required, including either a project component-specific HRA or the use of 100 percent Tier 4 Final construction equipment, to reduce TAC exposure impacts to less than significant.

Valley Fever (All Districts)

Construction activities that include ground disturbance can result in fugitive dust, which can cause fungus Coccidioides spores to become airborne if they are present in the soil. These spores can cause Valley Fever. Workers who disturb soil where fungal spores are found, whether by digging, operating earthmoving equipment, driving vehicles, or by working in dusty, wind-blown areas, are more likely to breathe in spores and become infected. It is not a contagious disease and secondary infections are rare. Construction activities associated with the proposed project would include ground-disturbing activities that could result in an increased potential for exposure of nearby residents and on-site workers to airborne spores, if they are present. Compliance with dust control measured required by SJVAPCD Rule 8021 would minimize personnel and public exposure to Valley Fever and reduce the potential risk of nearby resident and on-site worker exposure to Valley Fever. However, without additional controls, the impacts resulting from the proposed project would still be potentially significant.

Mitigation Measure AQ-3 is provided to ensure that personnel and public exposure to Valley Fever is minimized to the greatest extent feasible. Therefore, MICUP construction Valley Fever TAC exposure impacts would be less than significant with mitigation .

Operation

All Districts

TACs

There are not anticipated to be project sources of combustion-related TAC emissions during project operation. Vehicle trips related to operation and maintenance of proposed MICUP facilities would be nominal and incorporated into existing facility plans. In addition, energy consumption related to operation of pump facilities would not result in direct, on-site emissions that could result in TAC emissions. As such, any potential increase in TAC emissions associated with proposed project operation would be minimal and so would any potential health risk impacts associated with TAC emissions. Therefore, operational impacts related to TAC emissions exposure would be less than significant.

CO Hotspots

A CO hotspot is a localized concentration of CO that is above a CO ambient air quality standard. Localized CO hotspots can occur at intersections with heavy peak hour traffic. Specifically, hotspots can be created at intersections where traffic levels are sufficiently high such that the local CO concentration exceeds the federal one-hour standard of 35.0 parts per million (ppm) or the federal and state eight-hour standard of 9.0 ppm.[21]

The entire SJVAB is in conformance with state and federal carbon monoxide standards and no air quality monitoring stations report carbon monoxide levels in the SJVAPCD jurisdiction. Additionally, CARB no longer reports carbon monoxide concentrations anywhere in California. Based on the low

[21] SJVAPCD. 2024. Ambient Air Quality Standards & Valley Attainment Status. https://ww2.valleyair.org/air-quality-information/ambient-air-quality-standards-valley-attainmnet-status/ (accessed January 2024).

background level of carbon monoxide in the SJVAB (indicated by the lack of monitoring at state or local levels), the low and the ever-improving emissions standards for new sources in accordance with state and federal regulations, and that the project would result in approximately two worker visits up to twice per week, as estimated by the Applicant during operational and maintenance activities. The proposed project would not cause the LOS on affected roadways to be reduced to LOS E or F and would not substantially worsen an existing LOS F roadway. As such, the proposed project would not create new carbon monoxide hotspots.

It should be noted that as demonstrated under Impact AQ-2, CO emissions during construction for the overall proposed project would potentially exceed ambient air quality standards based on daily emissions from overlapping projects. However, due to the very large geographical footprint of the proposed project, any potentially overlapping individual proposed project components would not be in such close proximity with large enough emissions to contribute to a CO hotspot. As such, proposed project operation would not expose sensitive receptors to substantial carbon monoxide concentrations. Therefore, localized air quality exposure impacts related to carbon monoxide hot spots would be less than significant.

Mitigation Measures

AQ-2 Conduct Quantitative Construction Health Risk Assessment Prior to Construction

A quantitative construction health risk assessment shall be prepared by the implementing agency for individual proposed project components that will be within 1,000 feet of a sensitive receptor for a period of greater than 2 months unless the project component includes 100-percent fleetwide use of Tier 4 Final equipment. Under these conditions, a quantitative HRA will be used to assess, determine, and mitigate toxic air contaminants to reduce and demonstrate that health risk impacts to any nearby sensitive receptors will be less than significant. A quantitative HRA will not be necessary for project components that incorporate 100% Tier 4 Final construction equipment for equipment greater than 50 horsepower.

AQ-3 Prepare Fugitive Dust Control Plan Prior to Construction and Minimize Valley Fever Exposure During Construction

Prior to site preparation, grading activities, or ground disturbance, the Applicant shall prepare a Fugitive Dust Control Plan for the proposed project. The Fugitive Dust Control Plan shall include the following at a minimum:

- Equipment, vehicles, and other items shall be cleaned thoroughly of dust before they are moved off-site to other work locations.
- Wherever possible, grading, and trenching work shall be phased so that earth-moving equipment works well ahead or down-wind of workers on the ground.
- The area immediately behind grading or trenching equipment shall be sprayed with water before ground workers move into the area.
- If a water truck runs out of water before dust is dampened sufficiently, ground workers exposed to dust are to leave the area until a full truck resumes water spraying.
- All heavy-duty earth-moving vehicles shall be closed-cab and equipped with a High Efficiency Particulate Arrestance (HEPA) filtered air system.
- N95 respirators shall be provided to onsite workers for the duration of the construction period.

- Workers shall receive training to recognize the symptoms of Valley Fever and shall be instructed to promptly report suspected symptoms of work-related Valley Fever to a supervisor.
- A Valley Fever informational handout shall be provided to all on-site construction personnel. The handout shall provide, at a minimum, information regarding the symptoms, health effects, preventative measures, and treatment.

Level of Significance

Less Than Significant with Mitigation

Objectionable Odors

Significance Criterion d:	Would the proposed project result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Impact AQ-4 MICUP WOULD NOT CREATE OBJECTIONABLE ODORS THAT COULD ADVERSELY AFFECT A SUBSTANTIAL NUMBER OF PEOPLE. IMPACTS RELATED TO ODORS WOULD BE LESS THAN SIGNIFICANT.

Construction

All Districts

The State of California Health and Safety Code Sections 41700 and 41705 and SJVAPCD Rule 4102 prohibit emissions from any source whatsoever in such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to the public health or damage to property. An unreasonable odor discernible at the property line of the defined project area would be considered a significant odor impact. The proposed project would generate oil and diesel fuel odors during construction from equipment use as well as odors related to asphalt paving. The odors would be limited to the construction period and would be intermittent and temporary. Furthermore, such odors would dissipate rapidly with distance from in-use construction equipment. With respect to operation, the CARB Air Quality and Land Use Handbook: A Community Health Perspective (2005) provides recommendations regarding the siting of new sensitive land uses near potential sources of odors (e.g., sewage treatment plants, landfills, recycling facilities, biomass operations, autobody shops, fiberglass manufacturing, and livestock operations). Therefore, MICUP construction impacts related to exposure to objectional odors would be less than significant.

Operation

All Districts

Proposed project operations are not identified on the list of potential sources of odors ((e.g., sewage treatment plants, landfills, recycling facilities, biomass operations, autobody shops, fiberglass manufacturing, and livestock operations) and would not have odor sources during normal operations. As such, the proposed project would not generate objectionable odors affecting a substantial number of people. Therefore, MICUP operational impacts related to exposure to objectional odors would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

4.3.5 Cumulative Impacts

Impacts of the proposed project would be considered cumulatively considerable if they would have the potential to combine with other past, present, or reasonably foreseeable projects to become significant. A list of closely related past, present, and reasonably foreseeable projects are provided in Table 4-1 of Chapter 4.0, *Environmental Analysis*.

Criteria Air Pollutants

Air pollution is largely a cumulative issue, as air pollutants from individual projects contribute to the cumulative sum of total air pollutants in the SJVAB. Based on SJVAPCD thresholds in the GAMAQI, a project would have a significant cumulative impact if it is inconsistent with the applicable adopted federal and state air quality plans. Based on the GAMAQI, inconsistencies with applicable adopted air quality plans are determined based on a project's potential to emit criteria pollutants above applicable SJVAPCD thresholds. Construction and operation of cumulative projects could result in emissions of NO_x, PM_{10}, and $PM_{2.5}$ which could exceed SJVAPCD thresholds and worsen the SJVAB's nonattainment statuses for ozone and particulate matter. Accordingly, cumulative impacts related to air quality would be significant.

As discussed under Impact AQ-1 and Impact AQ-2, the proposed project would exceed SJVAPCD criteria pollutant emissions thresholds. It was concluded that modeling per the SJVAPCD AAQA methodology and comparison to ambient air quality standards would not be necessary, as discussed in Impact AQ-2. Implementation of Mitigation Measure AQ-1 would reduce emissions from the proposed project to below SJVAPCD significance thresholds. Therefore, the proposed project would not contribute considerably to cumulative air quality impacts related to criteria air pollutants or conflicts with an applicable air quality management plan. Impacts would be less than significant with mitigation.

Toxic Air Contaminants

The SJVAPCD considers TAC emissions to be a localized issue. In general, TAC concentrations are typically highest near the emissions sources and decline with increased distance. CARB recommends distances that should be incorporated when siting new sources or sensitive receptors near a source of TACs. This generally ranges from 500 to 1,000 feet depending on the source category (CARB 2005). Therefore, in the absence of any specific guidance from the SJVAPCD, the potential cumulative impacts from TACs were analyzed based on a radius of 1,000 feet measured from the project component locations. The proposed project components may be located within 1,000 feet of any existing sensitive receptors. Therefore, cumulative health risk impacts would be less than significant with implementation of Mitigation Measure AQ-2.

Odors

Cumulative projects would adversely affect sensitive receptors from odor emissions if cumulative projects were typical odor-producing land uses. Construction of cumulative projects would result in construction equipment-related odors; however, the temporary nature of construction would ensure less than significant cumulative odor impacts. The cumulative projects are not defined as

odor-producing land uses and, thus, would not combine to result in substantial cumulative odors during operation. Therefore, cumulative impacts related to odors would be less than significant.

Overall Level of Cumulative Significance

Less than Significant with Mitigation Measures AQ-1, AQ-2 and AQ-3.

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4.4 Biological Resources

4.4.1 Introduction

This section describes known existing biological resources in the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas), a relevant regulatory framework, and technical information to evaluate the extent of effects on biological resources through the implementation of the proposed project. This section provides mapping of existing land cover types and aquatic resources within the entire Place of Use. However, the description of the environmental setting focuses primarily on conditions within areas that could be impacted by construction and operation of project components for each Mokelumne River Integrated Conjunctive Use Program (MICUP) partner agency. This approach is used, because outside of the project component locations, changes to the environment from MICUP within the Place of Use are limited to providing additional groundwater for existing beneficial uses that rely on pumping of groundwater pumping and temporarily providing surface water for existing agricultural irrigation uses that currently rely on groundwater. Additionally, fish and other aquatic species within the Mokelumne River that may experience changes in flows from diversion of surface water under MICUP are considered.

The information in this section is based on database searches to identify special-status species with potential to occur within the project area. The potential to occur for each species is based on a suitability analysis of vegetation communities and habitat types occurring within the project area, as well as known occurrence records. Appendix E1 provides documentation supporting this section, including species lists generated from the California Department of Fish and Wildlife (CDFW) California Natural Diversity Database (CNDDB),[1] the United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation System (IPaC),[2] and California Native Plant Society (CNPS) Inventory of Rare and Endangered Plants of California.[3]

4.4.2 Environmental Setting

This section summarizes the research that was performed to characterize the environmental setting of the project area including vegetation communities and land cover types, sensitive natural communities, special-status species, and wildlife movement corridors.

Biological Resources Definitions

The following terminology related to biological resources is used in this section.

- **Land cover** – is the physical material on the land surface of the earth. Land cover includes flora, concrete, built structures, vegetation, bare ground, water and more.
- **Habitat** - the natural home or environment of an animal, plant or organism.
- **Plant succession** – is the gradual process in which plant communities are replaced by other communities over time. Also known as ecological succession.

[1] California Department of Fish and Wildlife (CDFW). 2024. California Natural Diversity Database, Wildlife and Habitat Data Analysis Branch, RareFind Version 6. Commercial version. Available at: https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data.
[2] United States Fish and Wildlife Service (USFWS). 2024. Information for Planning and Consultation (IPaC). Species list generator. Available at: https://ecos.fws.gov/ipac/.
[3] California Native Plant Society (CNPS). 2024. Inventory of Rare and Endangered Plants (online edition, v802). California Native Plant Society, Sacramento, California. Available at: http://www.rareplants.cnps.org.

- **Climax stand** – the final stage of stand (habitat) development when all species are climax species.
- **Hydrophytes** – are plants which only grow in or on water.
- **Annual plant** – a plant that completes its life cycle, from germination to the production of seeds, within one growing season and then dies.
- **Perennial plant** – a plant that lives more than two years and regrows each spring.
- **Cotyledon** – the first leaf or one of the first pair or whorl of leaves developed by the embryo of a seed plant.
- **Angiosperm** – a class of vascular plants that have male and female reproductive structures enclosed in a flower, that have seeds which arise from ovules contained in the ovaries, and that produce dry or fleshy fruits after double fertilization.
- **Monocots** – an herbaceous angiospermous plant (such as a grass, lily, or palm) having an embryo with a single cotyledon, usually parallel-veined leaves, and floral organs arranged in multiples of three.
- **Anaerobic conditions** – are conditions where there is no oxygen, or where oxygen is not available for biological processes.
- **Pelagic fish** – fish that inhabit the upper layers of open water.
- **Anadromous fish** – fish that migrate up rivers from the sea to spawn.
- **Anadromy** – the process by which fish spend part of their lives in both freshwater and salt water. Anadromous fish are born in freshwater, migrate to the ocean to grow, and then return to their birthplace to spawn.

Species Database Queries

Database searches were performed of the following to identify special-status species, designated critical habitats, aquatic resources, and other sensitive biological resources with the potential to occur in the project area:

- Bumble Bee Watch Online Occurrence Database[4]
- CDFW CNDDB[5]
- CNPS Online Inventory of Rare, Threatened and Endangered Plants of California[6]
- eBird Online Occurrence Database[7]
- iNaturalist Online Occurrence Database[8]
- National Oceanic and Atmospheric Association (NOAA) Endangered Species Act (ESA) Designated Critical Habitat Mapper[9]

[4] Xerces Society, The. 2024. Data accessed from the Bumble Bee Mapper, a project by the Xerces Society, Wildlife Preservation Canada, and the Faculty of Environmental and Urban Change, York University. Available at: https://www.bumblebeewatch.org/.
[5] CDFW. 2024. California Natural Diversity Database, Wildlife and Habitat Data Analysis Branch, RareFind Version 6. Commercial version. Available at: https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data.
[6] CNPS. 2024. Inventory of Rare and Endangered Plants (online edition, v802). California Native Plant Society, Sacramento, California. Available at: http://www.rareplants.cnps.org.
[7] eBird. 2024. eBird: An online database of bird distribution and abundance [web application]. Available at: https://ebird.org/explore.
[8] iNaturalist. 2024. An online database of wildlife distribution and abundance. Available at: https://www.inaturalist.org.
[9] National Marine Fisheries Service (NMFS). 2024. National ESA Critical Habitat Mapper. Online Application. Available at: https://www.fisheries.noaa.gov/resource/map/national-esa-critical-habitat-mapper.

- NOAA Essential Fish Habitat (EFH) Mapper[10]
- USFWS National Wetlands Inventory (NWI)[11]
- USFWS Designated Critical Habitat Mapper[12]
- USFWS IPaC[13]
- Western Monarch Milkweed Mapper Online Occurrence Database[14]
- California Department of Forestry and Fire Protection CALFIRE Fire and Resource Assessment Program (FRAP) Vegetation Layer[15]

The USFWS IPaC System was queried to identify federally listed species and designated critical habitats that have the potential to occur in the project area. A query of the CNDDB provided a list of processed and unprocessed occurrences for special-status species in the entirety of San Joaquin County. Lastly, the CNPS database was queried to identify special-status plant species with the potential to occur in San Joaquin County. Raw data from the database queries are provided in Appendix E1.

Vegetation Communities and Other Land Cover Types

Place of Use Land Cover Summary and Descriptions

Land cover types are based on the FRAP 2024 dataset, because it compiles the best available land cover data ranging from 1990 to present for California into a single dataset. No fieldwork was conducted to verify land cover types within the Place of Use. Land cover names are based on the California Wildlife Habitat Relationships system.[16] The following discussion describes what landcover types are present within project component areas for each MICUP partner agency and then describes habitat characteristics for each land cover type. Landcover types were mapped within designated recharge areas, including pump stations and pumps along the Mokelumne River, and along proposed pipeline located outside of designated recharge areas by applying a 50-foot buffer along either side of the pipeline alignment.

The FRAP dataset did not identify wetlands, seasonal wetlands or vernal pools within the project area. However, these sensitive habitats were identified in the project area based on the NWI dataset and provide habitat to special-status species and are discussed below in the *Aquatic Resources* section.

Land cover types within the Place of Use are shown in Figure 4.4-1 and Figure 4.4-2. Land cover types within the project component areas for each of the three MICUP partner agencies are shown in Figure 4.4-3 through Figure 4.4-8. Five major land cover types were identified within the project

[10] National Oceanic and Atmospheric Administration (NOAA). 2024. Essential Fish Habitat Mapper. Online Application. Available at: https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper. Accessed November 2024.
[11] USFWS. 2024.National Wetland Inventory – Wetlands Mapper Web Portal. Available at: https://fwsprimary.wim.usgs.gov/wetlands/apps/wetlands-mapper/.
[12] USFWS. 2024. Critical Habitat for Threatened and Endangered Species Web Portal. Available at: https://fws.maps.arcgis.com/home/webmap/viewer.html?webmap=9d8de5e265ad4fe09893cf75b8dbfb77.
[13] USFWS. 2024. Information for Planning and Consultation (IPaC). Species list generator. Available at: https://ecos.fws.gov/ipac/.
[14] Xerces Society, The. 2024. Data accessed from the Western Monarch Milkweed Mapper, a project by the Xerces Society, U.S. Fish and Wildlife Service, Idaho Department of Fish and Game, and Washington Department of Fish and Wildlife. Available at: www.monarchmilkweedmapper.org.
[15] California Department of Forestry and Fire Protection (Cal Fire eGIS). 2024. California Vegetation – WHRTYPE. Downloaded in November 2024 via: https://gis.data.ca.gov/maps/35b4d77128264b3bacd31d9685f974b7/about
[16] CDFW. 2024. California Wildlife Habitat Relationships System. Online Database. Available at: https://wildlife.ca.gov/Data/CWHR/Wildlife-Habitats.

components areas (Table 4.4-1). Agricultural land cover types dominate the project component areas at 50,340 acres, followed by developed/disturbed at 5,927acres, uplands at 1,766 acres, riparian and wet vegetated at 1,142 acres, and aquatic landcover communities at 340 acres, as shown in Figure 4.4-1 through Figure 4.4-8. Table 4.4-1 provides acreage summaries for the vegetation communities and land cover types identified in the project components area. Each vegetation community and land cover type are described in more detail below.

Table 4.4-1 Vegetation/Land Cover Types within the Project Components Areas

Vegetation/Land Cover Type	Approximate Project Area Acreage	Likely a Listed Sensitive Natural Community*	Present in NSJWCD	Present in SEWD	Present in City of Stockton
Agriculture					
Cropland	967	No	X	X	X
Deciduous orchard	23,429	No	X	X	X
Dryland grain crops	172	No	X	X	X
Evergreen orchard	405	No	X	X	
Irrigated grain crops	1,203	No	X	X	X
Irrigated hayfield	3,395	No	X	X	X
Irrigated row and field crops	1,081	No	X	X	X
Pasture	1,038	No	X	X	
Vineyard	18,650	No	X	X	X
Subtotal	**50,340**				
Aquatic					
Lacustrine	91	Yes	X	X	X
Riverine	242	Yes	X	X	X
Open Water	6	Yes	X		
Subtotal	**340**				
Developed/Disturbed					
Barren	68	No	X		
Urban	5,859	No	X	X	X
Subtotal Developed/Disturbed	**5,927**				
Riparian and Wet Vegetated					
Fresh Emergent Wetlands	166	Yes	X	X	X
Wet Meadow	4	Yes			X
Valley Foothill Riparian	971	Yes	X	X	X
Subtotal Riparian	**1,142**				
Uplands					
Annual Grasslands	1,684	No	X	X	X
Eucalyptus	17	No	X		X
Oak Woodlands	66	Yes	X		X
Subtotal Uplands	**1,766**				
Total	**59,515**				

* Sensitive Communities as listed by CDFW and subject to jurisdictional protections. Communities can be identified here: https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities

Figure 4.4-1 Vegetation and Land Cover Types within the Place of Use – North

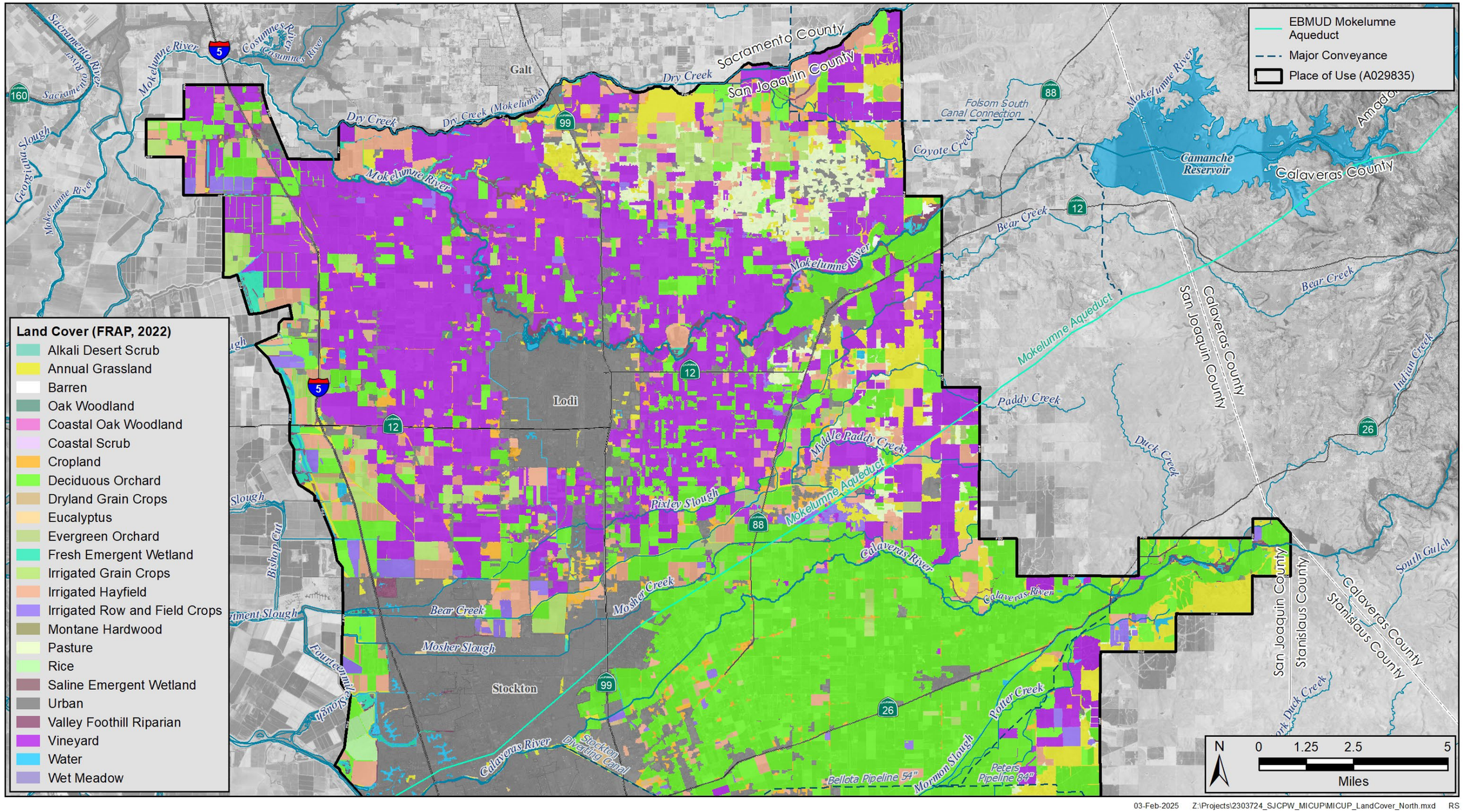
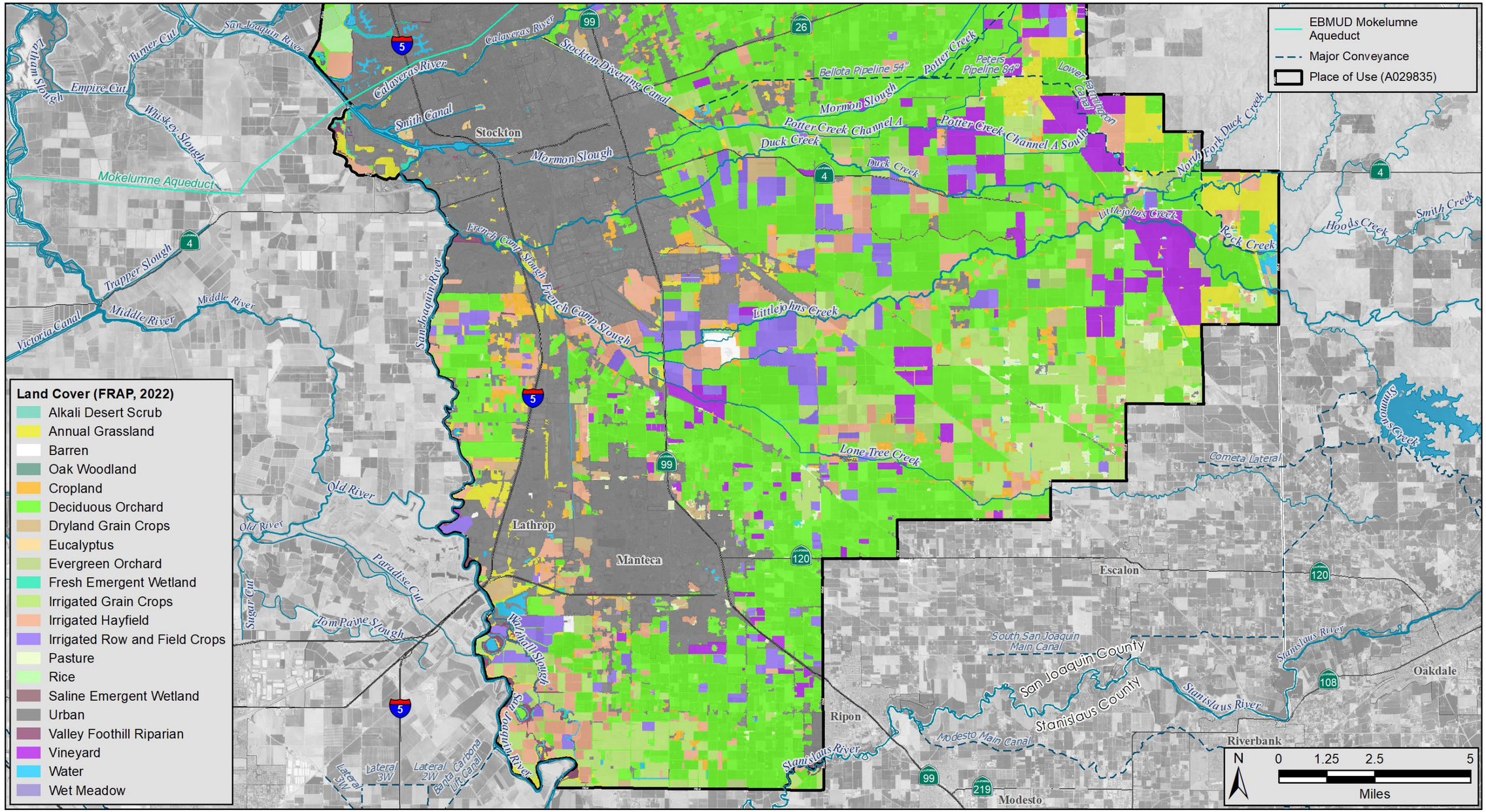


Figure 4.4-2 Vegetation and Land Cover Types within the Place of Use – South



03-Feb-2025 Z:\Projects\2303724_SJCPW_MICUP\MICUP_LandCover_South.mxd RS

Figure 4.4-3 Vegetation and Land Cover Types within NSJWCD Project Components Flood-MAR Recharge Area

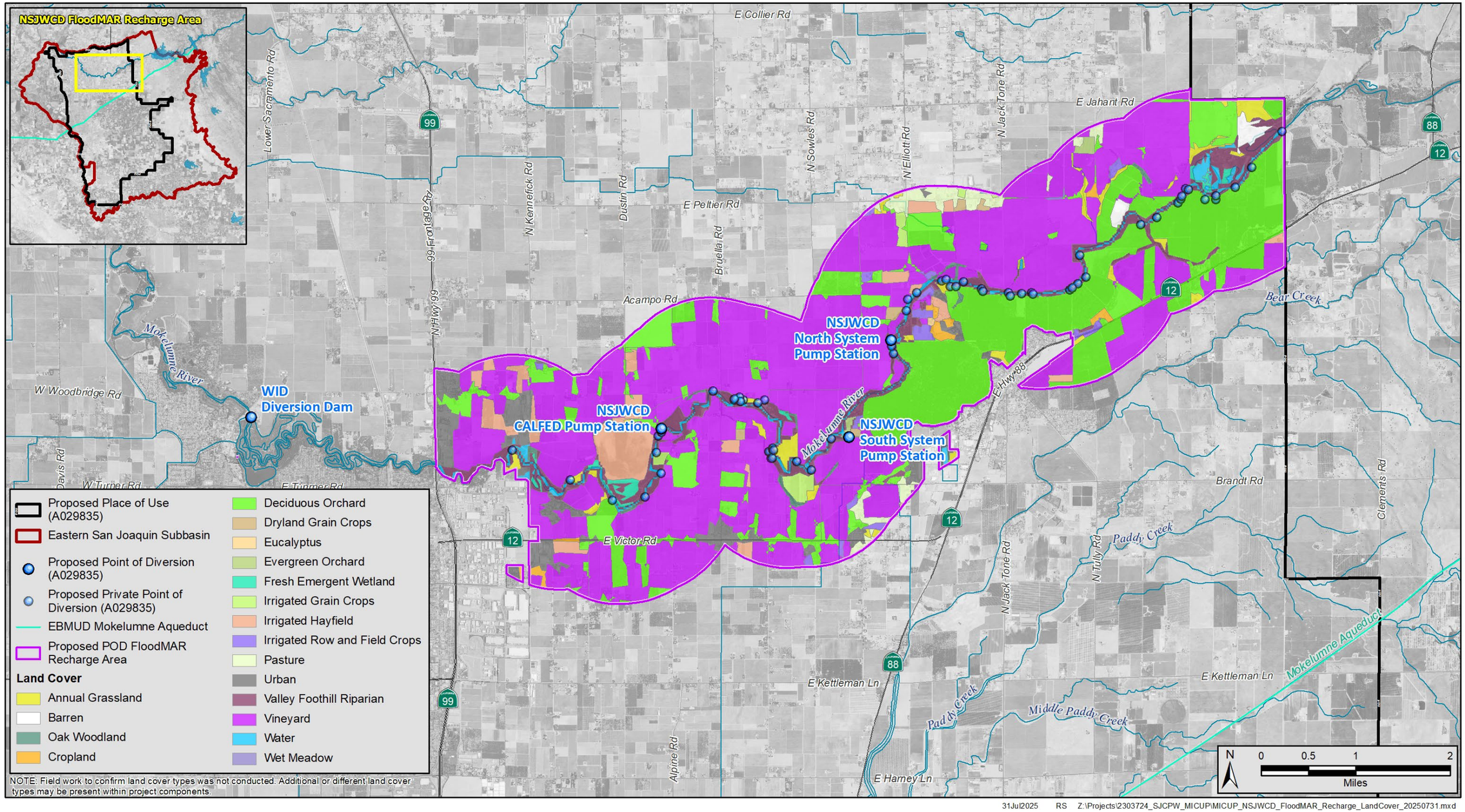


Figure 4.4-4 Vegetation and Land Cover Types within NSJWCD Project Components North System Recharge Area

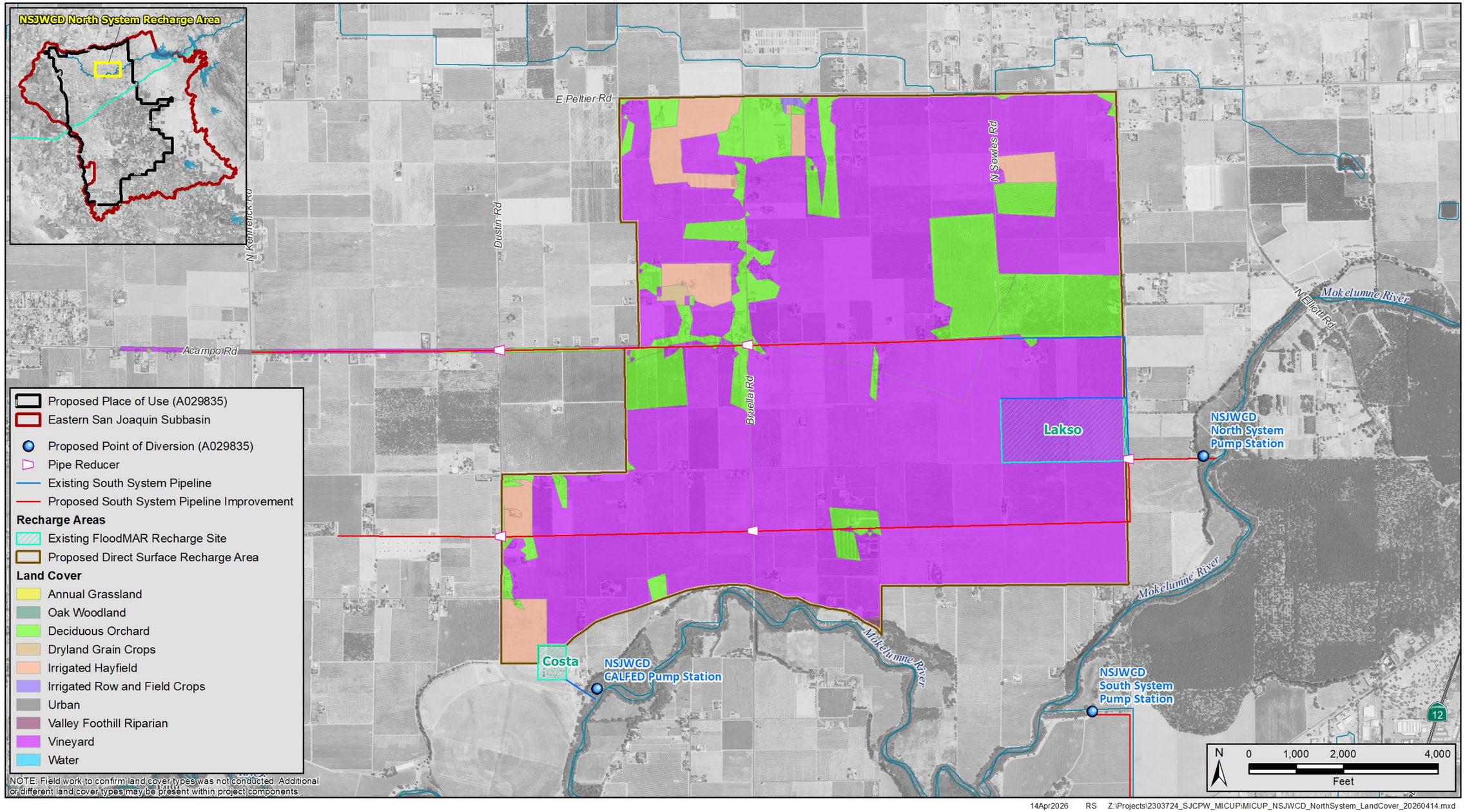


Figure 4.4-5 Vegetation and Land Cover Types within NSJWCD Project Components South System Recharge Area

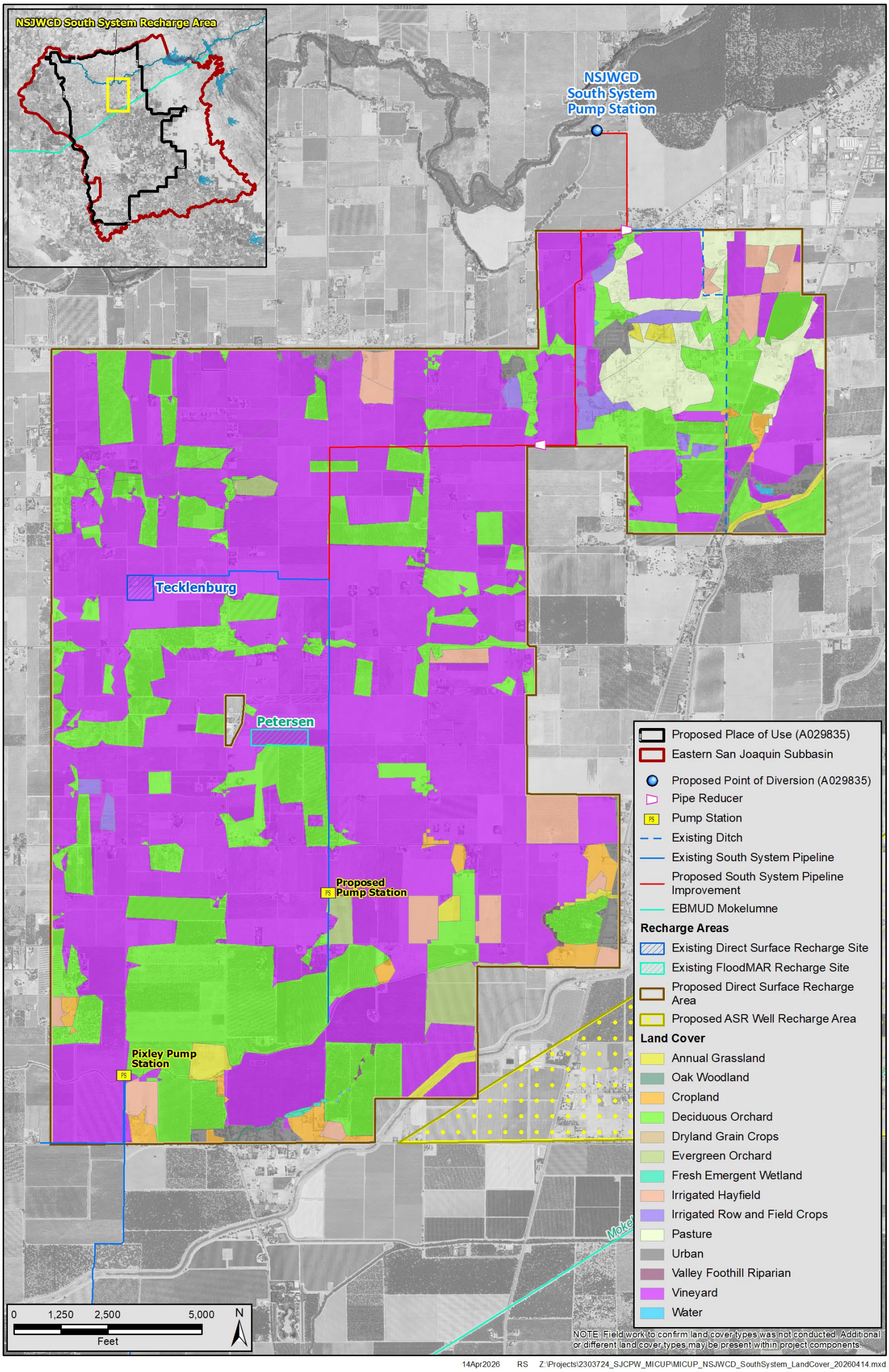


Figure 4.4-6 Vegetation and Land Cover Types within NSJWCD Project Components ASR Well Recharge Area

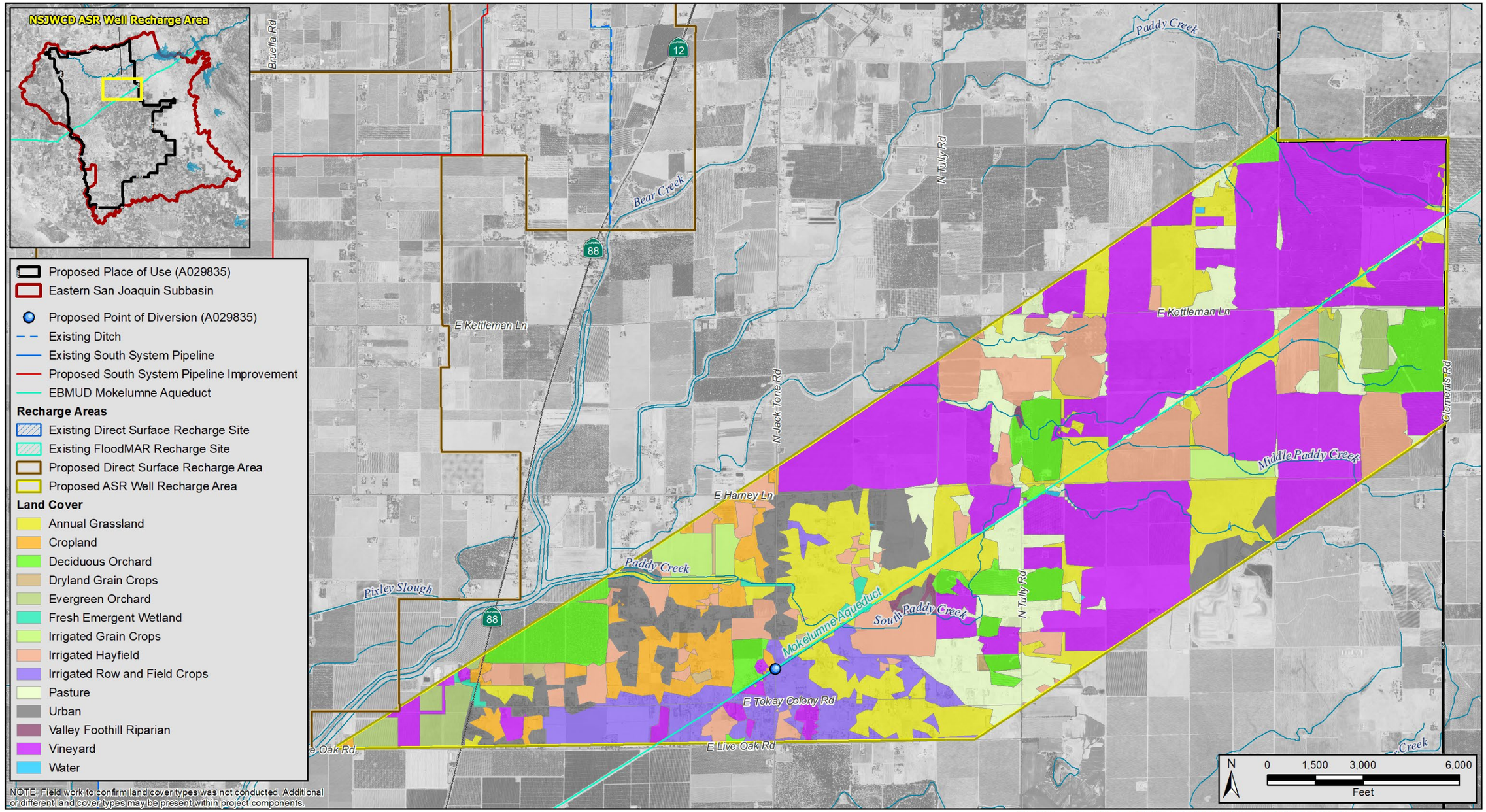


Figure 4.4-7 Vegetation and Land Cover Types within SEWD Project Components

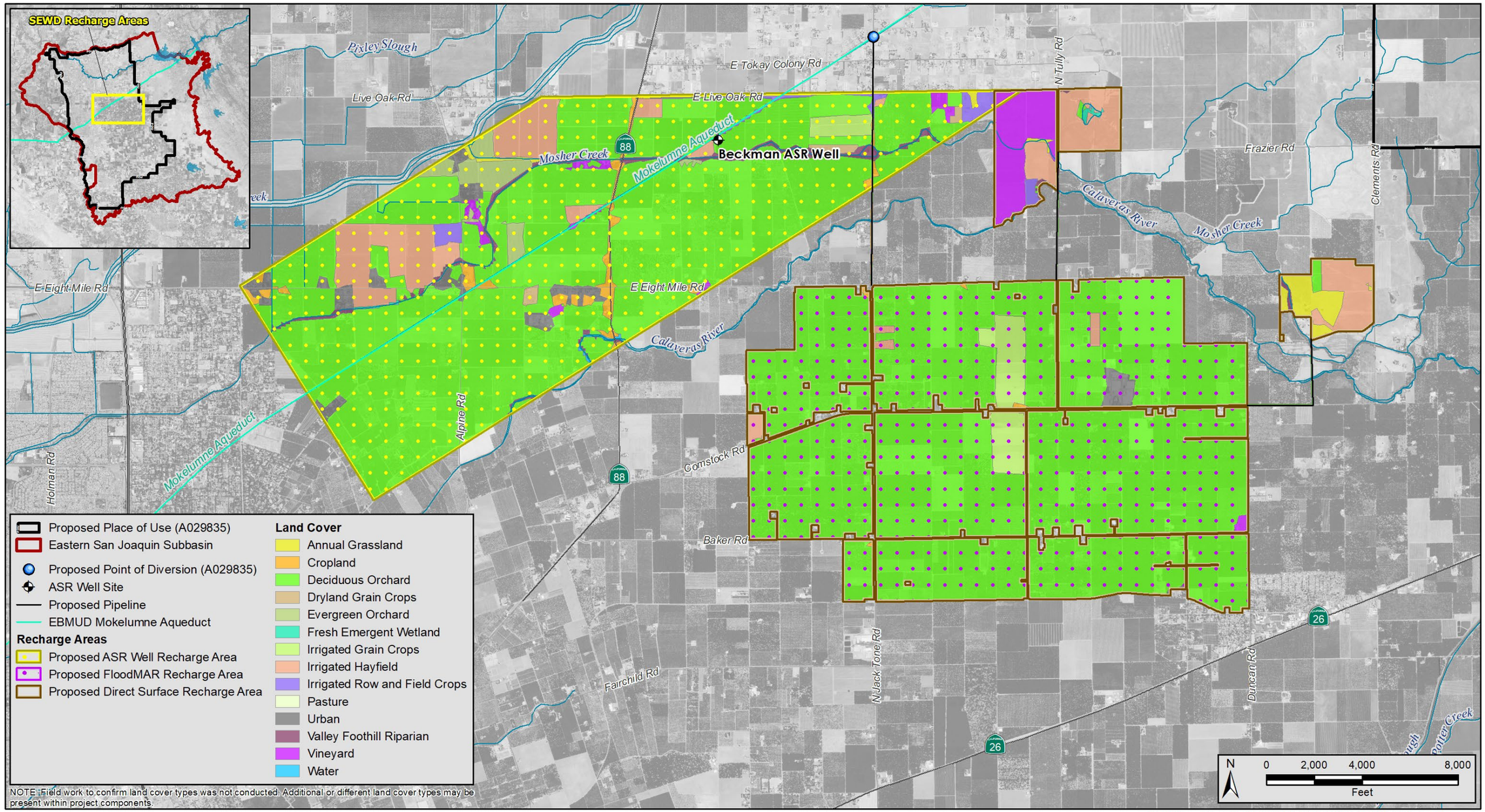
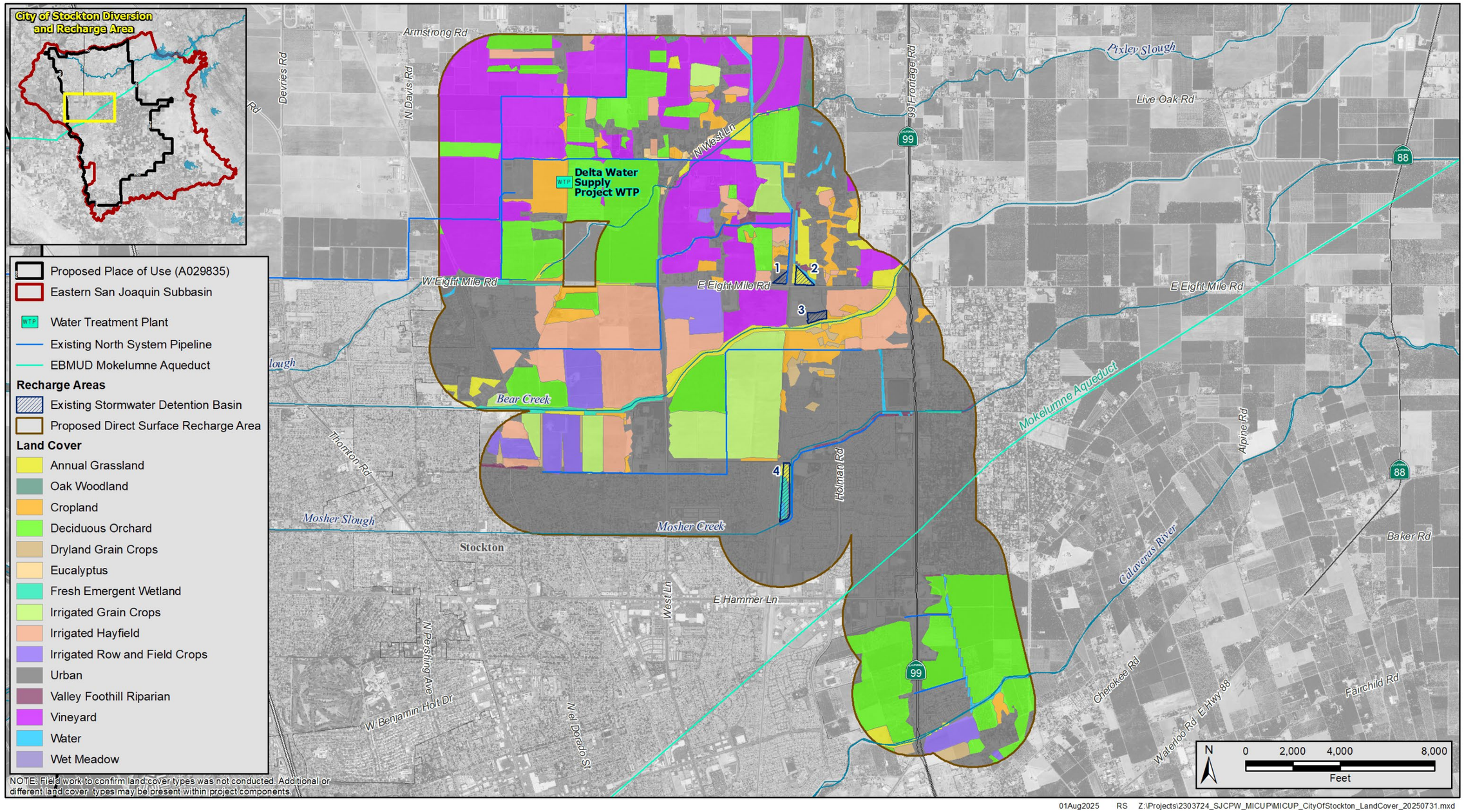


Figure 4.4-8 Vegetation and Land Cover Types within City of Stockton Project Components



AGRICULTURE

Agricultural land cover type includes a diversity of developed fields where vegetation includes a variety of sizes, shapes, and growing patterns, thus different uses by wildlife. Table 4.4-2 provides a description of crop types per agricultural classification within the FRAP dataset. Habitats in the agricultural classification do not conform to normal plant habitat stages and crop rotations occur often.

Table 4.4-2 Crop Types Per Agricultural Classification

Agricultural Classification	Crop Types
Cropland	Tomatoes, corn, or wheat
Deciduous orchard	Almonds, walnuts, peaches
Dryland grain crops	Cereal rye, barley, wheat
Evergreen orchard	Oranges, avocados, lemons
Irrigated grain crops	Corn, dry beans, safflower
Irrigated hayfield	Alfalfa, hay
Irrigated row and field crops	Tomatoes, cotton, lettuce
Pasture*	Bermuda grass, ryegrass, tall fescue
Vineyard	Grapes, kiwi fruit, boysenberries

* While pasture could be functionally considered an annual grasslands, due to the level of disturbance typically associated with it due to grazing and planting, it is categorized in agriculture.

Irrigation to the various agricultural crops varies in method, but agricultural ditches (described under Fresh Emergent Wetlands below) generally occur along field perimeters providing an upland/channel interface habitat.

Agricultural lands may be used by a variety of common wildlife, such as killdeer (*Charadrius vociferus*), yellow-billed magpie (*Pica nuttalli*), American crow (*Corvus brachyrhynchos*), savannah sparrow (*Passerculus sandwichensis*), California ground squirrel (*Otospermophilus beecheyi*), California meadow vole (*Microtus californicus*), a variety of waterfowl, and more. These lands also provide suitable habitat for sensitive wildlife species, including but not limited to Swainson's hawk (*Buteo swainsoni),* burrowing owl (*Athene cunicularia*), giant garter snake (*Thamnophis gigas*), pallid bat (*Antrozous pallidus),* and western red bat (*Lasiurus blossevillii)*.

ANNUAL GRASSLAND

Annual grasslands habitats are open grasslands composed of native and non-native annual plant species. Native grasslands consist of climax stands of perennial bunchgrasses on wetter sites and annual alluvial plains on drier sites. Species composition is greatly influenced by seasonal and annual fluctuations in weather patterns as well as grazing pressure. Common annual grasslands species include wild oats (*Avena* spp.), soft chess (*Bromus hordeaceus*), and other brome species (*Bromus* spp.). This land cover type occurs statewide and is abundant in the eastern portion of San Joaquin County, although it predominantly occurs within disjointed patches among agricultural lands within the project area.

Grasslands provide foraging, cover, and nesting for a wide variety of wildlife species, although many species require specific elements within a grassland matrix to use grassland habitat. For example,

vernal pools, logs, rock outcrops, and small mammal burrows are features that occur within grasslands and provide habitat for invertebrate, amphibian, reptile, and mammal species such as fairy shrimp, frogs, salamanders, snakes, lizards, rodents, and mesocarnivores. Many bird species nest and forage within grasslands, including raptors, various waterfowl, wading birds, and songbirds.

AQUATIC

Aquatic land cover classification includes lacustrine, riverine, and open water. Lacustrine habitats are inland depressions or dammed riverine channels containing standing water, which may vary from small ponds to large permanently flooded lakes or reservoirs. Intermittent types of lacustrine do not generally support fish species, while permanent systems do.[17] Riverine habitat types include intermittent or continually running water, such as rivers and streams, where the habitat originates at some elevated water source and flows downward. Aquatic habitats are associated with fresh emergent wetlands where the boundary between deep-water habitat is the deep-water edge that is at about 2.5 meters in depth.

Within the project area, these aquatic habitats predominantly occur as the Mokelumne and Calaveras Rivers, various sloughs and creeks, freshwater ponds interspersed through agricultural lands, and unlined canals within the City of Stockton project component area.

Open water zones of large rivers or freshwater ponds provide resting escape and cover for numerous species of waterfowl. Near-shore waters provide foraging habitat for waterfowl, herons, shorebirds, belted kingfisher, and numerous other passerine and songbird species. Additionally, many insectivorous such as swallows, swifts and flycatchers, hunt their prey over water. Common mammals found in larger open water zones include river otter, mink, muskrat, and beaver.

BARREN

Barren land cover type is characterized by open, bare areas with either soil or hardscaped materials such as gravel or rock that may have been subject to recent or continued disturbance. These areas are largely devoid of vegetation. As mapped by the FRAP dataset, there are only two barren areas within the project area, located within the northeastern end of NSJWCD's project components and appear to be a rock quarry or crushing site. It should be anticipated that barren habitat would increase if field surveys were conducted because surveys with a finer mapping scale would likely identify agricultural access roads and graveled access roads as the barren land cover type.

Avian wildlife that relies on open ground cover for nesting in small scrape nests include plovers such as killdeer, stilts, avocets, several gull species, terns, nighthawks and poorwills. While reptiles such as lizards and snakes utilize open ground for basking.

EUCALYPTUS

Eucalyptus land cover includes single species thickets of red gum (*Eucalyptus camaldulensis*) or blue gum (*E. globulus*), with little to no understory to scattered trees over a well-developed herbaceous and shrubby understory. Generally, there are few native overstory species associated with this habitat, while the understory is commonly annual grasslands and other weedy species. Eucalyptus thickets are known to become established along stream courses, encroaching upon existing riparian vegetation and located at lower elevations where freezing temperatures do not often occur.

[17] CDFW. 2024. California Wildlife Habitat Relationships System. Online Database. Available at: https://wildlife.ca.gov/Data/CWHR/Wildlife-Habitats.

Within the project area, eucalyptus occurs in two locations. At one location within the City of Stockton project components immediately north of East Eight Mile Road on West Lane, and a second location within NSJWCD project components west of N Elliott Road and south of the Mokelumne River, across the river from the NSJWCD North System Pump Station.

Although this is a non-native land cover type, it does support native wildlife. American crow, common raven (*Corvus corax*), barn owl (*Tyto alba*), red-tailed hawk (*Buteo jamaicensis*), and red-shouldered hawk (*Buteo lineatus*) all utilize these trees for roosting, nesting, and perching. Eucalyptus trees with stringy or furrowed bark provide habitat for bats and small vertebrates such as lizards and snakes.

FRESH EMERGENT WETLAND

Fresh emergent wetland is characterized by erect hydrophytes (water-loving plants), generally perennial monocots, that are adapted to growing in the anaerobic conditions of frequent flooding or saturation. Typical fresh emergent wetland vegetation species include cattails (*Typha latifolia*), bulrushes (*Scirpus* spp.), sedges (*Cyperus* spp.), and Baltic rush (*Juncus balticus*). Fresh emergent wetland may occur in association with terrestrial habitats or aquatic habitats such as riverine, lacustrine, or water. The boundary between fresh emergent wetlands and deep-water habitats is the deep-water edge that is at about 2 meters in depth.

Within the project area this land cover type generally occurs around the Mokelumne River, and along other aquatic resources, such as canals, freshwater ponds, and the Calaveras River. This habitat type can be expected to be found around river tie-in locations.

Fresh emergent wetlands provide food, cover, and water to numerous mammals, birds, reptiles and amphibians, with some species relying on this habitat for their entire life cycle.

OAK WOODLANDS

Oak woodland habitat types include blue oak, blue oak-foothill pine, and valley oak woodlands classifications within the FRAP dataset. Blue oak woodland generally occurs on gentle slopes, forming an open savanna-like strand that is dominated by mature blue oak (*Quercus douglasii*) trees, rarely with shrubs and often occurring on rock outcrops. Typical understory is an extension of annual grasslands. Valley oak woodlands also form savanna-like strands with partially closed canopies of this winter deciduous species. Denser stands are located along natural drainages. With little to no grazing in this habitat classification, the understory develops into a partial shrub layer with poison oak (*Toxicodendron diversilobum*), toyon (*Heteromeles arbutifolia*), and coffeeberry (*Frangula californica*). Grazing has resulted in the lack of oak recruitment, with most valley oak woodlands being mature.

Blue oak-foothill pine woodland occurs on higher elevation slopes and is dominated by blue oak and foothill pine (*Pinus sabiniana*) in the overstory, although this habitat type includes a diversity of mixed hardwood, conifer, and shrub species. Interior live oak (*Quercus wislizeni*) and California buckeye (*Aesculus californica*) are two common associates of this habitat type. Patches of shrubs and annual grasses and forbs make up the understory of blue oak-foothill pine woodland.

Within the project area, valley oak woodlands occur in disjointed patches predominantly around Mokelumne River. Additionally, there are several small patches within City of Stockton project components amid the agricultural lands. These are likely remnants of natural oak woodlands dominated by valley oak (*Quercus lobata*) that occurred prior to development of agriculture within the San Joaquin Valley.

Oak woodlands provide important habitat for a variety of animals, especially bird and mammal species. Oak woodland with a mosaic (varied) structure offers several types of niches for species in all taxa, bird and bat species in particular. Mammals such as striped skunk (*Mephitis mephitis*), woodrats (*Neotoma* spp.), and raccoon (*Procyon lotor*) use woodlands for foraging, breeding, and cover.

URBAN

Urban land cover includes areas that have been developed for residential, commercial and recreational land use, including all of the associated landscaped vegetation such as tree grove, street strip, shade trees and lawn, and shrub cover. Additionally, roadways are included in the urban land classification. The structure of urban vegetation varies in height, spacing, crown shape, understory conditions, and species composition. Canopy can be continuous or discontinuous.

Urban land cover within the project area is largely within City of Stockton project components, as it is closest to downtown Stockton at the southern end, has the town of Lodi in the middle, and the town of Thornton in the north. Additionally, the City of Stockton project components are located between two major roadways, Interstate 5 and State Route 99. NJSWCD has mapped several patches of urban located around the towns of Lodi and Lockeford, along State Route 99 and E Waterloo Road.

Three urban categories that are relevant to wildlife include: downtown, urban residential, and suburbia; with the heaviest concentration of development in downtown followed in concentric zones. The progression outwards of decreasing development and increasing vegetation influences wildlife. In downtowns, rock dove (*Columba livia*), house sparrow (*Passer domesticus*), and starling (*Sturnus vulgaris*) occur. As a varied mosaic of vegetation increases further from downtown, avian species, such as scrub jay (*Aphelocoma californica*) and mockingbird (*Mimus polyglottos*), start to occupy the space. Urban residential mammal associates include raccoon, Virginia opossum (*Didelphis virginiana*), and striped skunk. Some amphibians such as California slender salamander (*Batrachoseps attenuatus*) may occur.

Additionally, urban land use components such as buildings and domestic landscaping provide habitat for some wildlife species such as house finch (*Carpodacus mexicanus*) who build their nests on structures, and less abundant species like black phoebe (*Sayornis nigricans*), cliff swallow (*Petrochelidono pyrrhonota)*, and barn swallow (*Hirundo rustica*), also use buildings, especially near water. Additionally, bat species such as pallid bat, Townsend's big-eared bat, western red bat, and other common bat species are known to roost in bridges, buildings and barns within urban land covers, while foraging around light sources and man-made aquatic resources, such as ponds and canals. Ruderal vegetation such as introduced grasses and weeds often develops on abandoned parcels and untended spaces between parcels.

VALLEY FOOTHILL RIPARIAN

Valley foothill riparian habitats are vegetated corridors along aquatic habitat types, such as streams and riverbanks. Mature riparian canopy has a coverage of 20 to 80 percent, with winter deciduous species such as Fremont cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), and valley oak. Subcanopy and understory shrub layers provide additional canopy coverage and include species such as alders (*Alnus* spp*.),* boxelder (*Acer negundo*), Oregon ash (*Fraxinus latifolia*), blackberry (*Rubus armeniacus*), poison oak, wild grape (*Vitis californica*) and willows (*Salix* spp.). The herbaceous layers consist of sedges, rushes, grasses, miner's lettuce (*Claytonia perfoliata*), mugwort

(*Artemisia douglasiana*), poison-hemlock (*Conium maculatum*), and hoary nettle (*Urtica dioica* ssp. *holosericea*).

Within the project area, valley foothill riparian land cover occurs along waterways of the Mokelumne River, Calaveras River, and all associated tributaries.

Riparian corridors are extremely important habitats for many terrestrial wildlife, as they provide food, water, migration and dispersal corridors, escape, nesting, and thermal coverage. Some wildlife species utilize riparian corridors as permanent habitat, while others are transient or temporal visitors. Nesting and roosting habitat for migratory songbirds such as warblers (Parulidae), vireos (Vireonidae), grosbeaks (Cardinalidae and Fringillidae), flycatchers (Tyrannidae), raptors (Buteos and Accipters), and bat (Chiroptera) species. Additionally, the canopy and sub-canopy layers provide shade and protection of the water features and their aquatic inhabitants. Many fish inhabiting the waterways of riparian habitats require the shade of streamside vegetation and undercut banks for rearing and cover.

Project Area

As follows is a discussion of vegetation communities and land use cover within project component areas for each of the three MICUP partner agencies.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

Land cover types within the North San Joaquin Water Conservation District (NSJWCD) project components and vicinity (Figure 4.4-3 to Figure 4.4-6) include: annual grasslands, barren, oak woodlands (blue oak - foothill pine and blue oak), agriculture (cropland, deciduous orchard, dryland grain crops, evergreen orchard, irrigated grain crops, irrigated hayfield, irrigated row and field crops, pasture, vineyard), fresh emergent wetlands, eucalyptus, aquatic (lacustrine, riverine, and open water), urban, and valley foothill riparian.

STOCKTON EAST WATER DISTRICT

Land cover types within the Stockton East Water District (SEWD) project components and vicinity (Figure 4.4-7) include: annual grasslands, agriculture (cropland, deciduous orchard, dryland grain crops, evergreen orchard, irrigated grain crops, irrigated hayfield, irrigated row and field crops, pasture, vineyard), fresh emergent wetlands, aquatic (lacustrine and riverine), urban, and valley foothill riparian.

CITY OF STOCKTON

Land cover types within the proposed direct surface recharge area for the City of Stockton (Figure 4.4-8) include: annual grasslands, oak woodlands (blue oak- foothill pine and valley oak, agriculture (cropland, deciduous orchard, dryland grain crops, irrigated grain crops, irrigated hayfield, irrigated row and field crops, vineyard), fresh emergent wetlands, eucalyptus, aquatic (lacustrine and riverine), urban, valley foothill riparian, and wet meadow. The City of Stockton Points of Diversion and pipeline conveyance are existing facilities that would not be modified under MICUP, and therefore, land cover conditions are not provided at or within vicinity of these existing facilities.

Aquatic Resources

Place of Use Aquatic Resources Summary and Descriptions

The USFWS NWI[18] database was utilized to identify potentially jurisdictional aquatic resources within the project area. Aquatic resources within the Place of Use are mapped in Figure 4.4-9 and Figure 4.4-10. The following aquatic resources were identified in the project area: agricultural ditches, freshwater forested/shrub wetlands, freshwater pond, riverine, and vernal pools, as shown in Figure 4.4-11 through Figure 4.4-16.[19] Additionally, vernal pools were identified using CDFW's vernal pool habitat data, which are included on the aquatic resources maps for each project component.

Acreages for aquatic resources are not provided as they were not included in the FRAP dataset and overlap landcover types mapped by the FRAP dataset.

Aquatic resources identified from the NWI and other sources such as CDFW are described below.

AGRICULTURAL DITCHES

Ditches, consisting of agricultural and flood control drainage ditches, are likely to be the most common type of waters in the project area other than the Mokelumne River. Ditches can be large (up to 30 feet wide) and typically separate roads from agricultural fields; or ditches can be smaller which run along field edges and connect via culverts to the roadside ditches. Ditches generally have steep banks and can be barren or are commonly dominated by bulrush, cattail, common reed (*Phragmites australis*), and Johnsongrass (*Sorghum halepense*). The hydrology of these ditches is dependent on irrigation runoff, stormwater runoff, and pumping from aquatic rivers. It is possible that some of these ditches may be jurisdictional wetlands on the basis of either being built in hydric soils and/or directing surface hydrology links to navigable waters (e.g., streams, rivers, and tidal sloughs).

A variety of wildlife use wetland ditches, including but not limited to northwestern pond turtle (*Actinemys marmorata*), giant garter snake, wading birds, songbirds, semi-aquatic mammals, and frogs.

FRESHWATER FORESTED/SHRUB WETLANDS

Wetlands are areas that are periodically or permanently inundated by surface or groundwater, and support specific vegetation adapted for life in damp soil. On a regional and national level, wetlands are recognized as important due to high inherent value to fish and wildlife. Wetlands also provide water recharge, filtration, and purification functions. Inland marshes and seasonal wetlands contained within ditches also provide valuable foraging, cover, and resting habitat for a variety of bird and mammal species.

Fresh emergent wetlands provide food, cover, and water to numerous mammals, birds, reptiles and amphibians, with some species relying on this habitat for their entire life cycle.

[18] USFWS. 2024. National Wetlands Inventory Mapper. Accessed on December 17, 2024 via: https://www.fws.gov/program/national-wetlands-inventory/wetlands-mapper
[19] CDFW. 2024. California Central Valley Vernal Pool Habitat GIS Data (zip). Downloaded on December 17, 2024 via: https://wildlife.ca.gov/Data/GIS/Clearinghouse

Figure 4.4-9 Aquatic Resources within the Place of Use - North

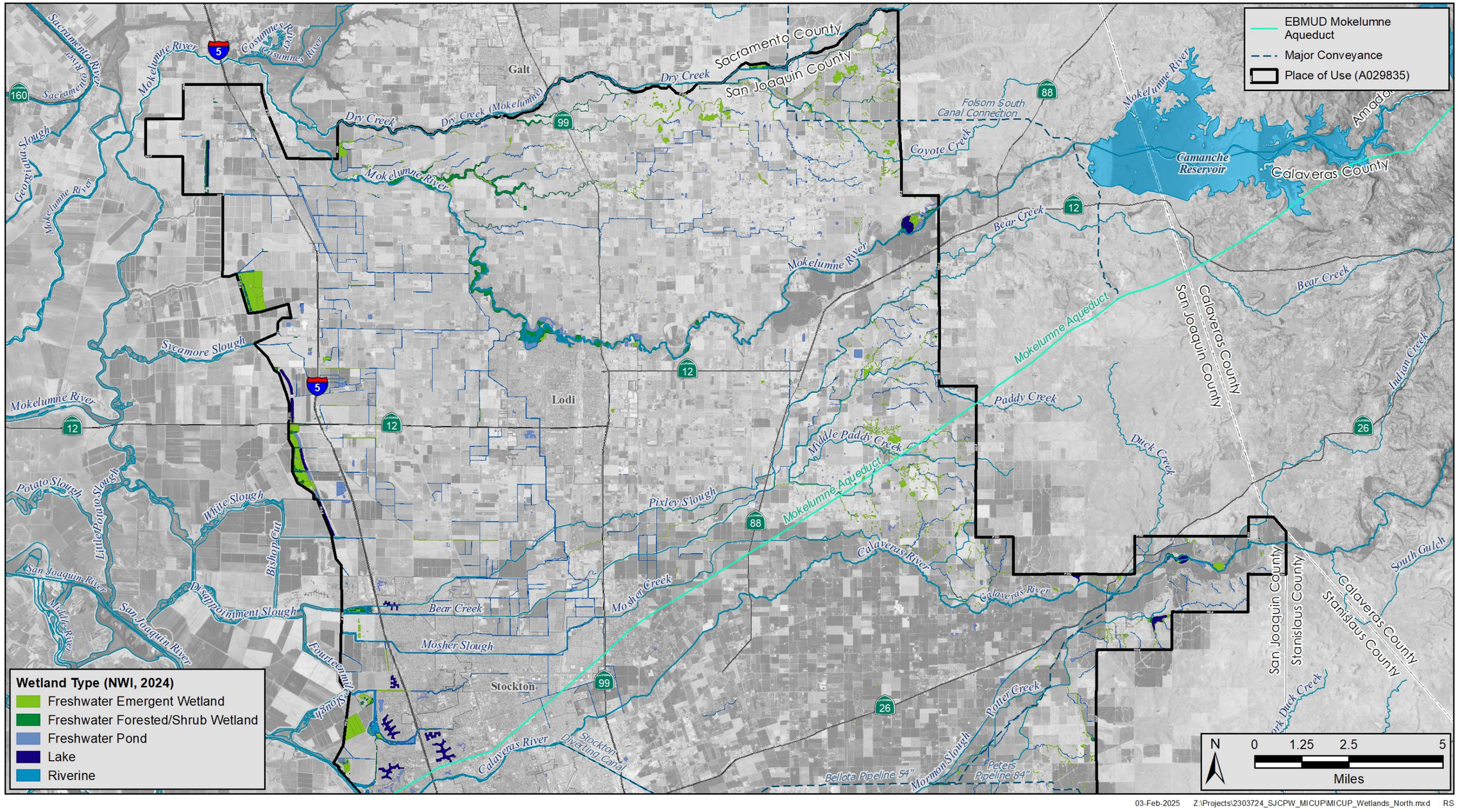
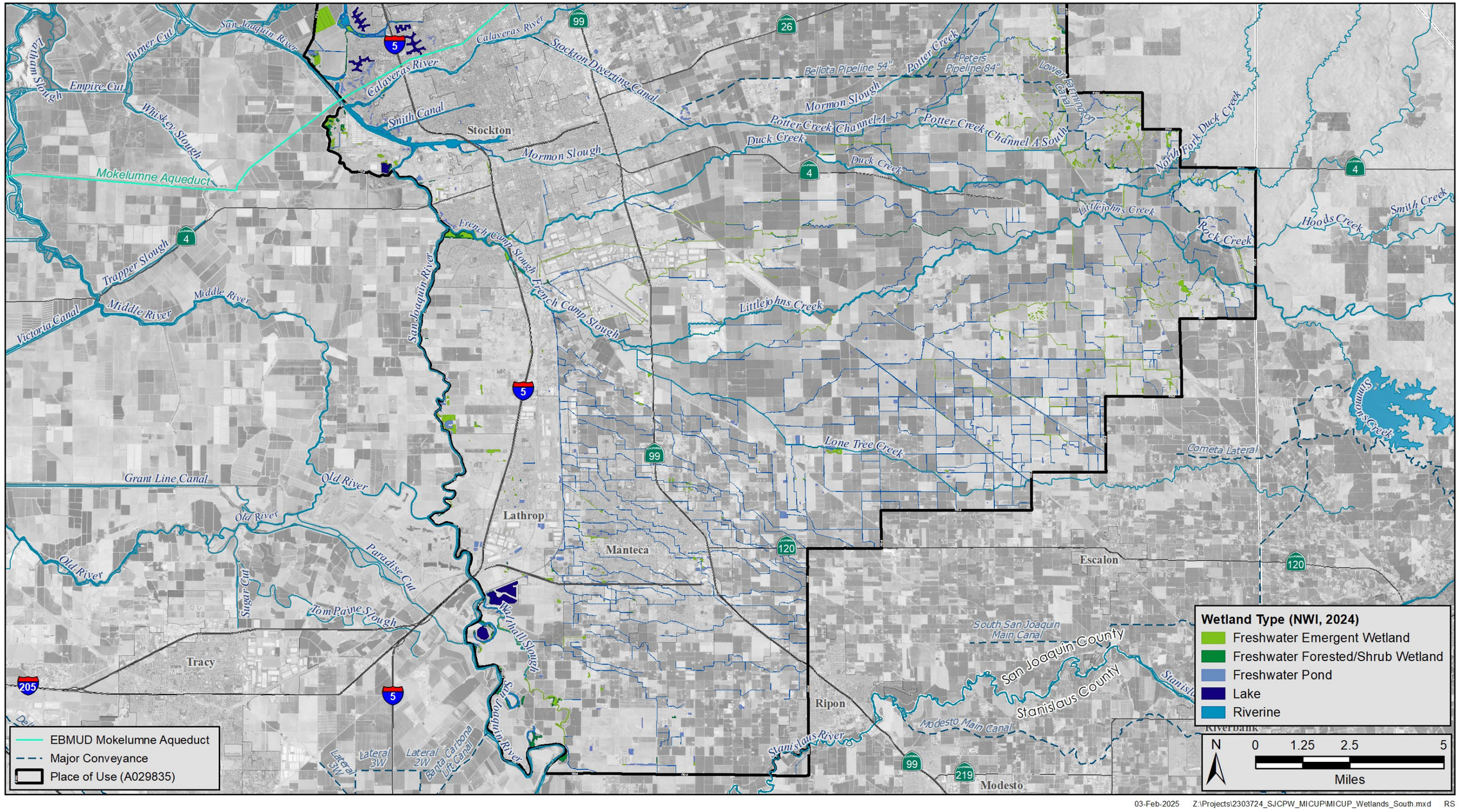


Figure 4.4-10 Aquatic Resources within the Place of Use – South



03-Feb-2025 Z:\Projects\2303724_SJCPW_MICUP\MICUP_Wetlands_South.mxd RS

Figure 4.4-11 Aquatic Resources within NSJWCD Project Components Flood-MAR Recharge Area

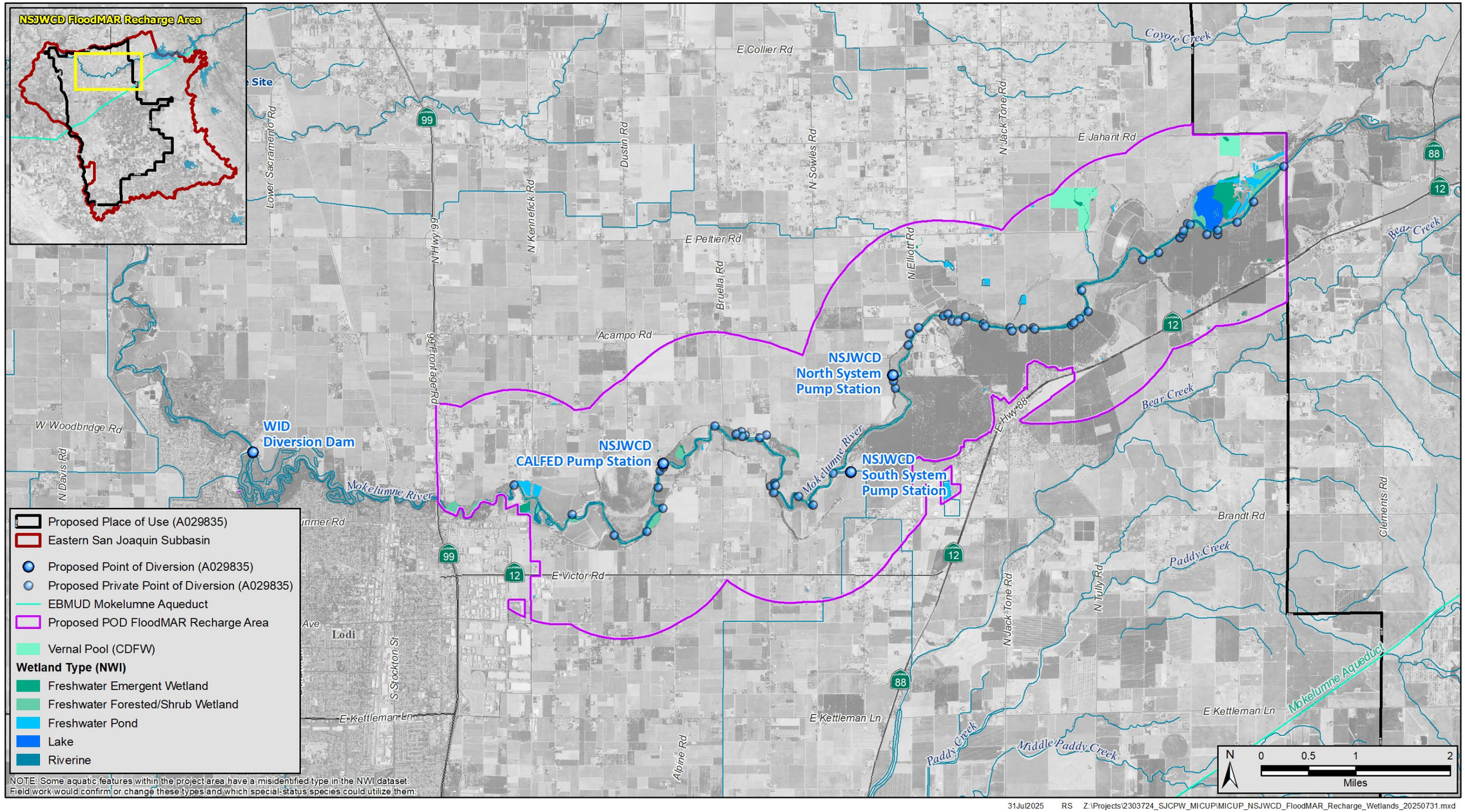


Figure 4.4-12 Aquatic Resources within NSJWCD Project Components North System Recharge Area

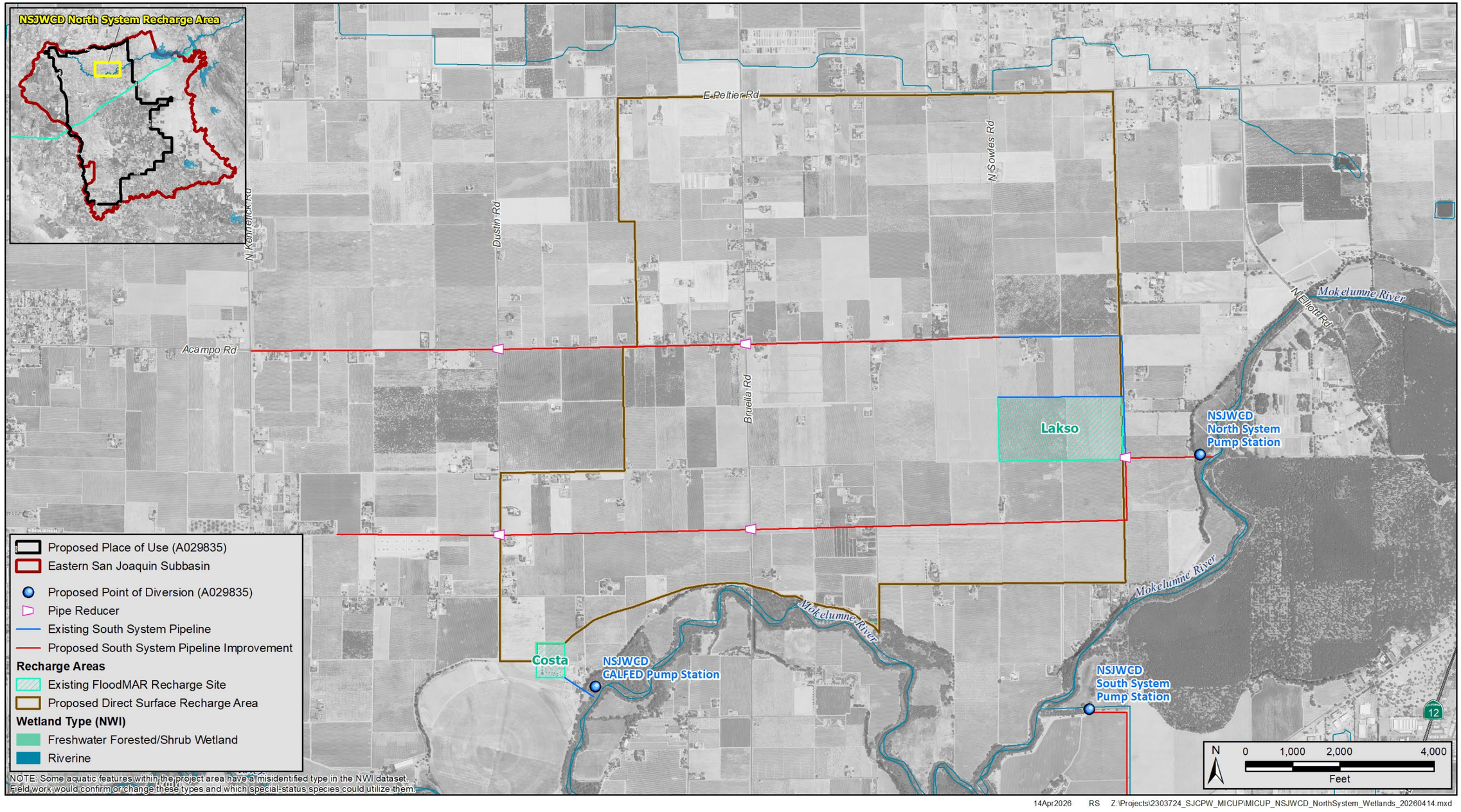


Figure 4.4-13 Aquatic Resources within NSJWCD Project Components South System Recharge Area

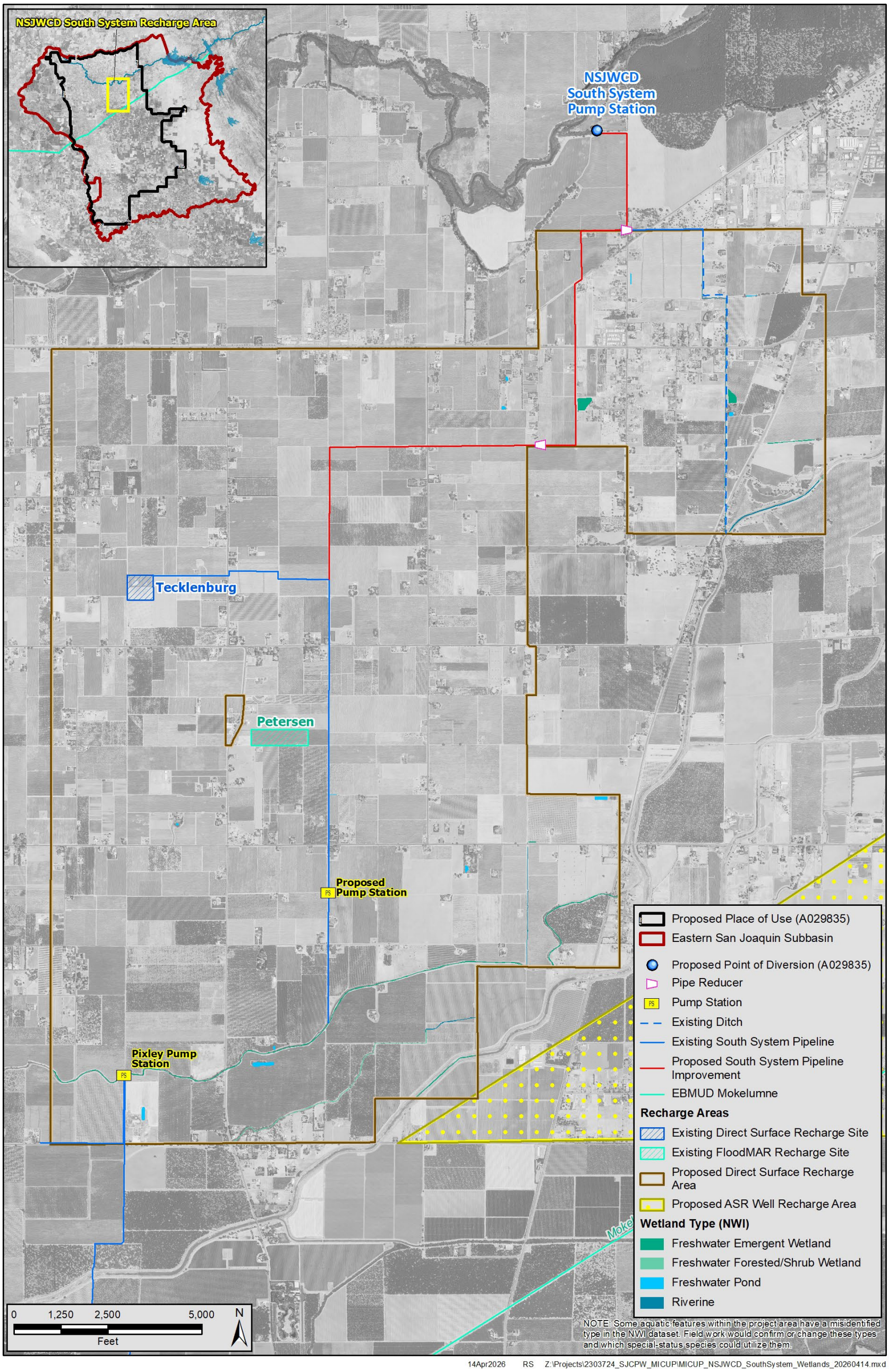


Figure 4.4-14 Aquatic Resources within NSJWCD Project Components ASR Well Recharge Area

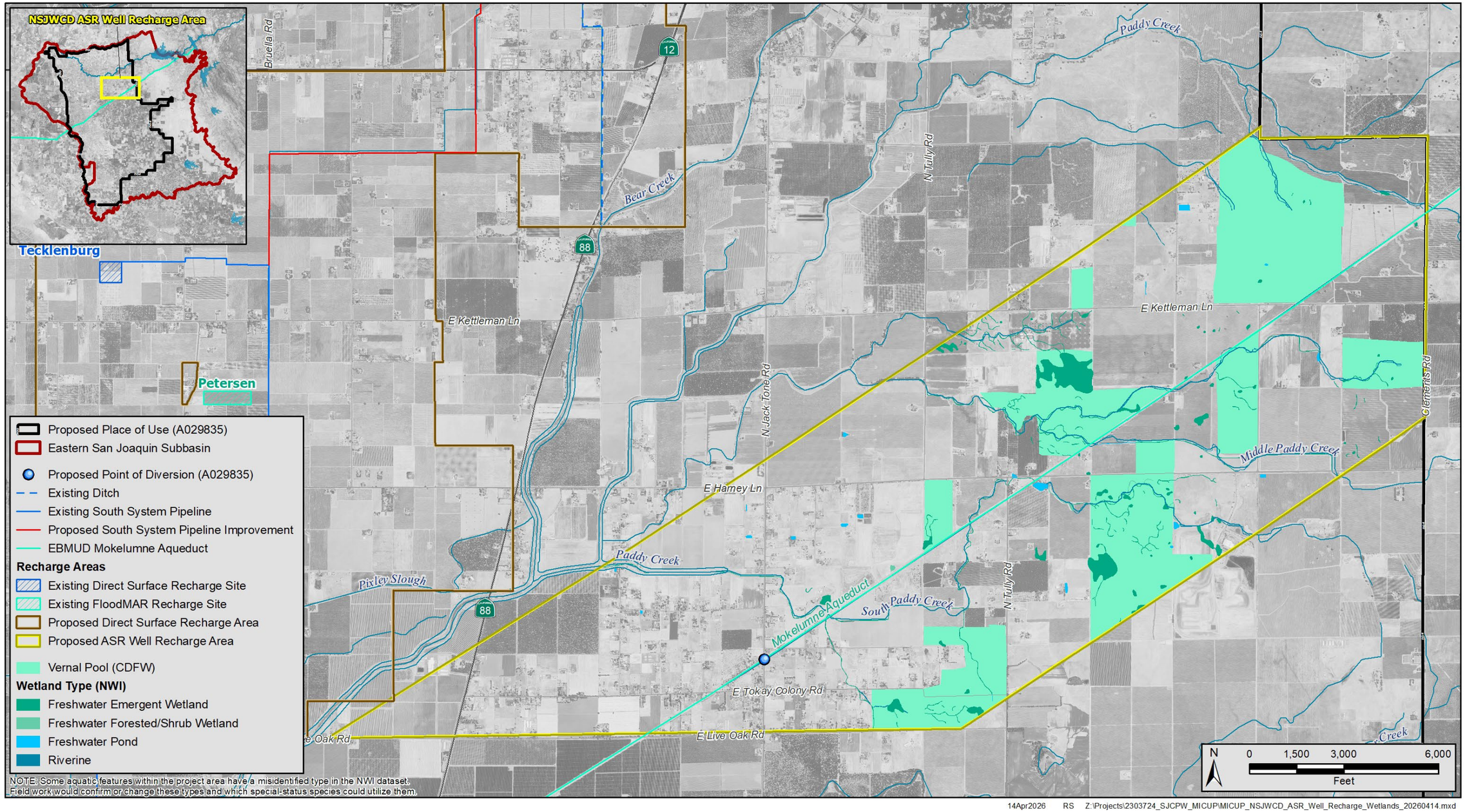


Figure 4.4-15 Aquatic Resources within SEWD Project Components

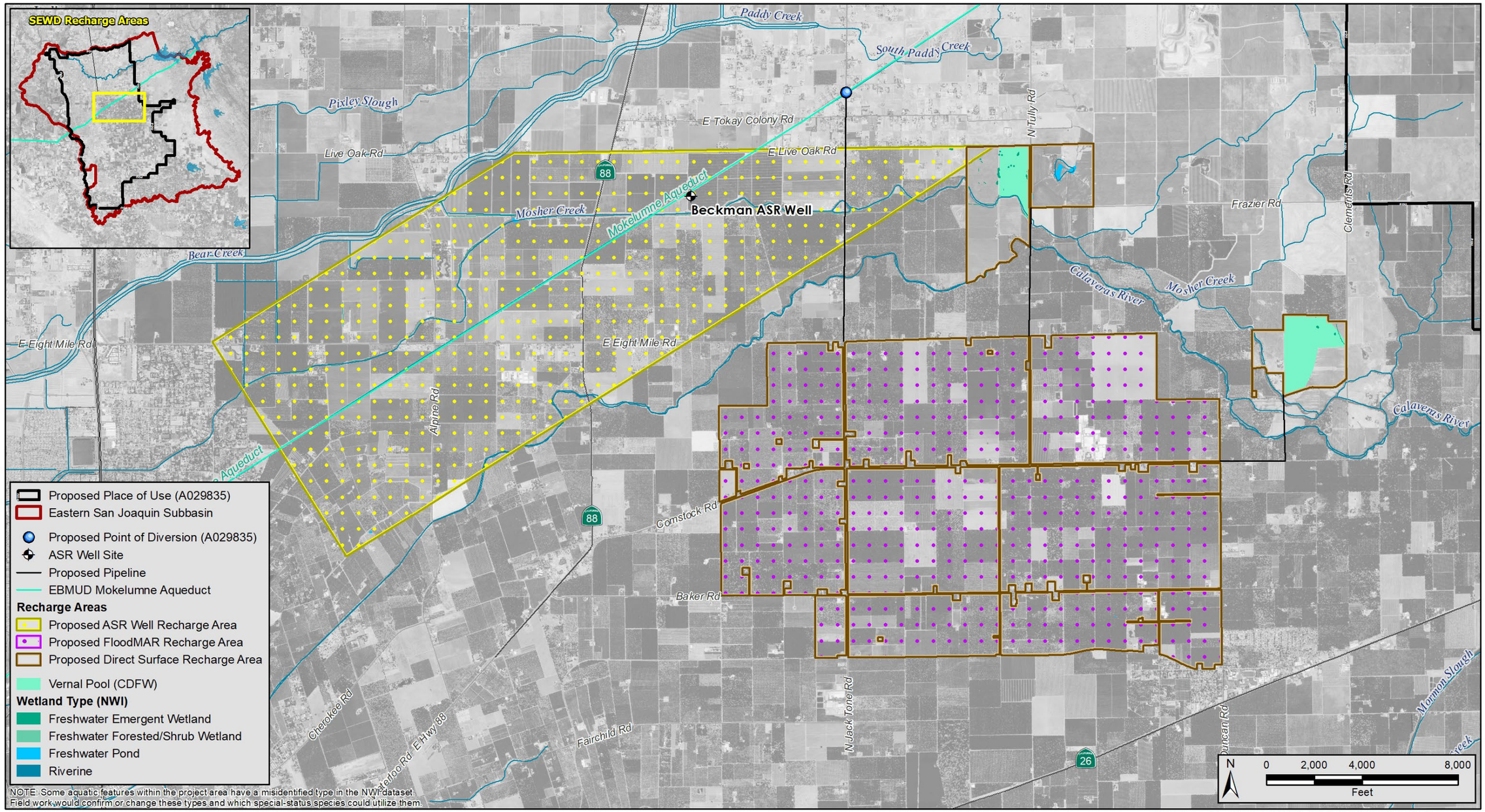
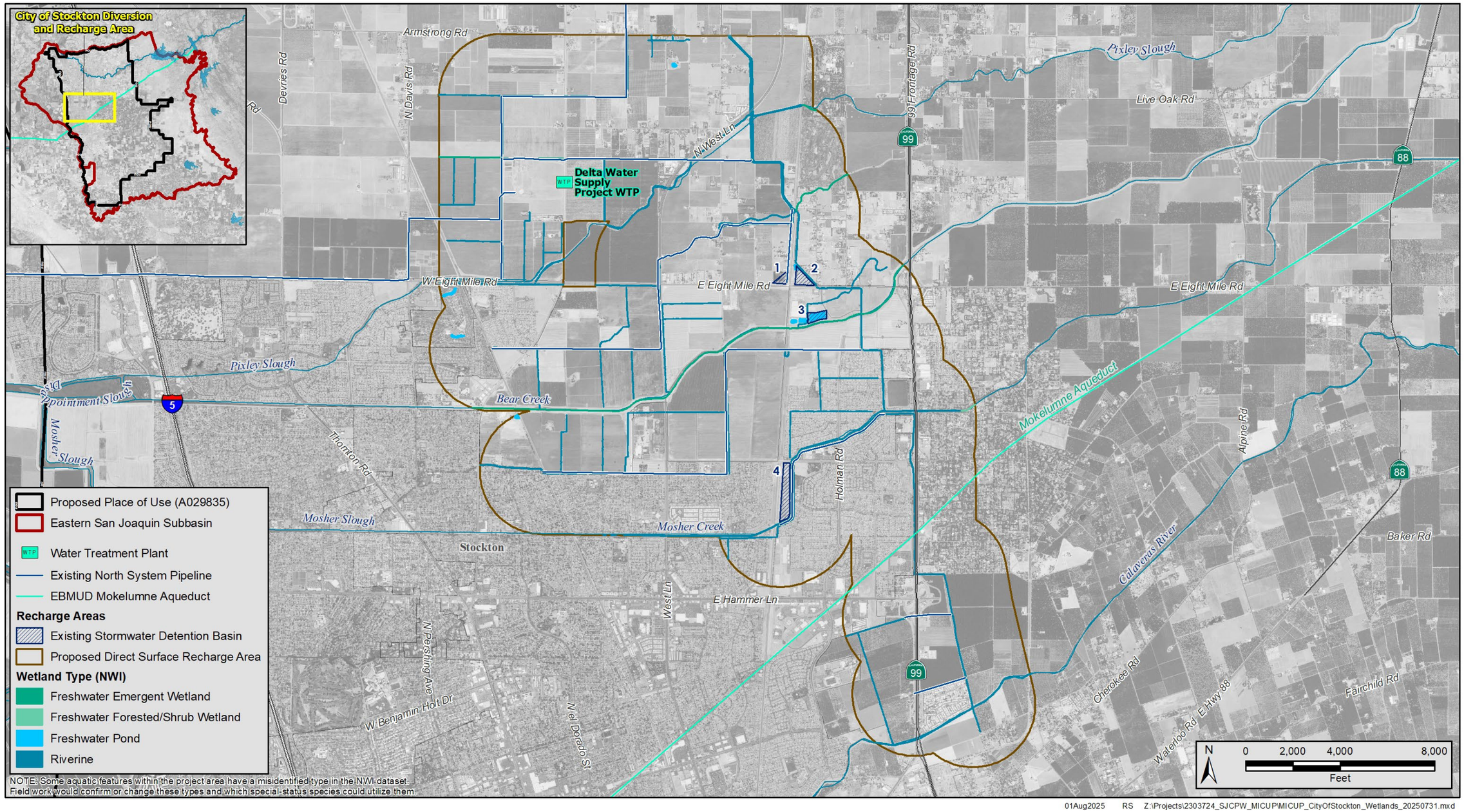


Figure 4.4-16 Aquatic Resources within City of Stockton Project Components



FRESHWATER POND

Freshwater ponds are generally present in agricultural lands as storage for watering crops or as a herd watering hole for cattle. Aquatic vegetation similar to fresh emergent wetlands and ditches may or may not be present. Depending on the hydroperiod of these ponds, if they are perennial or intermittent, they may provide suitable breeding habitat for amphibians and reptiles such as California tiger salamander (*Ambystoma californiense*), and/or northwestern pond turtle. Freshwater ponds provide a suitable resting and foraging habitat for migratory birds.

RIVERINE

Riverine systems include all wetlands and deepwater habitats contained within a channel, with two exceptions:

1. Wetlands dominated by trees, shrubs, persistent emergents, emergent mosses, or lichens, and
2. Habitats with water containing ocean-derived salts of 0.5 parts per trillion (ppt) or greater.

A channel is "an open conduit either naturally or artificially created which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water."[20] Riverine systems are bounded on the landward side by upland, by the channel bank (including natural and man-made levees), or by wetlands dominated by trees, shrubs, persistent emergent, emergent mosses, or lichens. In braided streams, the System is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

Within the project area, there are two main riverine systems – the Mokelumne and Calaveras Rivers. MICUP would divert water from the Mokelumne River, while the Calaveras River is within the vicinity of several project components. These riverine systems are described in further detail below.

Mokelumne River

The Mokelumne River Watershed (Figure 4.9-1) encompasses approximately 660 square miles, stretching from its headwaters in the Sierra Nevada mountain range and westward to the Sacramento-San Joaquin Delta (Delta). The Place of Use encompasses a portion of the eastern border of the Delta from the city of Lodi south to the city of Stockton. Most of the yield of the watershed results from snow runoff throughout the year. The lower mainstem of the Mokelumne River features 16 major impoundments, including two large reservoirs operated by East Bay Municipal Utilities District (EBMUD; Camanche and Pardee Reservoirs) and a smaller reservoir (Salt Springs) operated by Pacific Gas & Electric company. Flood flows are only present in the lowest reaches of the system in the wettest of water year types when discharge exceeds storage capacity of the reservoirs. The Mokelumne River Watershed is discussed further in Section 4.9, *Hydrology and Water Quality: Surface Water*.

The barrier to anadromous fish migration on the lower Mokelumne River occurs at a fairly low elevation of 28 meters above sea level at Camanche Dam. The reach of the river below Camanche Dam has a low gradient from the dam to its confluence with the Cosumnes River. As a consequence, the lower Mokelumne River is under tidal influence as far upstream as Woodbridge at Lodi Lake, near the Woodbridge Irrigation District (WID) Diversion Dam. Much like the San Joaquin River and its other tributaries, the lower Mokelumne River has been significantly altered from its historic

[20] Langbein and Iseri. 1960. General Introduction and Hydrologic Definitions. Manual of Hydrology: Part 1. General Survey-water Techniques.

condition by anthropogenic changes like hydraulic mining, gravel extraction, altered flow regimes, deforestation, artificial bank protection, channelization, and levee construction.[21]

Channelization is most prevalent in the lowest reaches of the Mokelumne River, downstream of Camanche Dam, with the exception of Lake Lodi. Much of this channelization can be attributed to the construction of levees to protect homes and agricultural areas on both banks of the lower Mokelumne River. EBMUD has continually devoted significant efforts to the restoration of floodplain habitat in this area and supplement spawning gravels for salmonids which is on-going. Riparian cover can be sparse in some heavily leveed areas.

Calaveras River

The Calaveras River Watershed (Figure 4.9-1) originates in the Sierra Nevada mountains and extends southwesterly for roughly 60 miles to the Stockton metropolitan area. The watershed encompasses an area of approximately 590 square miles. The lower watershed, below New Hogan Reservoir, consists of approximately 230 square miles, including 100 square miles of foothill drainage between New Hogan Dam and Bellota and 120 square miles of valley floor downstream of Bellota.[22] Elevations in the Calaveras River Watershed range from near sea level at the confluence with the San Joaquin River to 130 feet at Bellota, 500 feet at New Hogan Dam, and approximately 6,000 feet at the headwaters.

Due to the low elevation of the upper watershed, snowpack does not persist into late-spring or summer. Summers are long and hot with little or no rainfall. Seasonal rainfall is variable from year to year, ranging from less than 16 inches to over 45 inches[23] Prior to SEWD's operations, the lower river frequently dried up during the late summer. Now, water stored in New Hogan Reservoir during wet seasons is released year-round for diversion, which results in sustained year-round flows between at least New Hogan Dam and Bellota Weir in all but drought years. The Calaveras River Watershed is discussed further in Section 4.9, *Hydrology and Water Quality: Surface Water*.

VERNAL POOLS

Vernal pools are a special type of seasonal wetland, characterized by rare and endemic species that have evolved to survive the ephemeral nature of vernal pools. Vernal pools provide habitat for such specialized and rare plants as succulent owl's clover (*Castilleja campestris* var*. succulenta*), dwarf downingia (*Downingia pusilla*), and Boggs Lake hedge-hyssop (*Gratiola heterosepala*). Actual species may vary depending on the types of soil and soil chemistry.

Animals that inhabit vernal pools include Pacific chorus frog (*Hyla regilla*), western spadefoot (*Spea hammondii),* California tiger salamander, fairy shrimp (various species), and a diversity of other aquatic invertebrates.

Project Area

As follows is a discussion of aquatic resources within project component areas for each of the three MICUP partner agencies.

[21] Jeffres, C.A., A.P. Klimley, J.E. Merz, and J.J. Cech. 2006. Movement of Sacramento sucker, *Catostomus occidentalis*, and hitch, *Lavinia exilicauda,* during a spring release of water from Camanche Dam in the Mokelumne River, California. Environmental Biology of Fishes 75:365-373.
[22] US Army Engineer District. 1981. Reconnaissance Report New Hogan Fishery Investigation. U.S. Army Engineer District, Sacramento, California.
[23] *Ibid.*

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

Potential aquatic resources identified within NSJWCD project components (Figure 4.4-11 through Figure 4.4-14) include agricultural ditches, freshwater emergent wetlands, freshwater forested/shrub wetlands, freshwater pond, lake, riverine and vernal pools.

STOCKTON EAST WATER DISTRICT

Potential aquatic resources identified within SEWD project components (Figure 4.4-15) include freshwater emergent wetlands, freshwater forested/shrub wetlands, freshwater pond, riverine and vernal pools.

CITY OF STOCKTON

Potential aquatic resources identified within City of Stockton project components (Figure 4.4-16) includes agricultural ditches, freshwater emergent wetlands, Delta waterways, and the Calaveras River. There is also an agricultural ditch immediately outside of the project component but adjacent.

Sensitive Natural Communities and Designated Critical Habitats

Sensitive habitats include those that are of special concern to resource agencies or are afforded specific consideration through CEQA, Native Plant Protection Act, California Endangered Species Act (CESA), federal ESA, Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), Section 1602 of the California Fish and Game Code (CFGC), Sections 401 and 404 of the Clean Water Act (CWA), and the Porter-Cologne Water Quality Control Act (Porter-Cologne Act). Sensitive natural communities may be of special concern for a variety of reasons, including their locally or regionally declining status, or because they provide important habitat to common and special-status species.

Place of Use Sensitive Natural Communities Summary and Descriptions

CDFW evaluates natural communities across California to assign state rarity rankings through the Vegetation Classification and Mapping Program. Standardized quantitative rarity and threat rankings are applied by CDFW to California's Natural Communities. The rarity scores are based on range and distribution of a given vegetation type, and the proportion of occurrences that are of good ecological integrity. Threat scores are based on type – urban development, agriculture, energy production and mining, and invasive/problematic species; scope – typically assessed within a 20-year timeframe for vegetation; and severity. The rarity and threat scores are added to define a single rank of 1 through 5. Natural Communities with ranks of S1-S3 are considered Sensitive Natural Communities by CDFW and are to be addressed in the environmental review processes of CEQA and its equivalents.[24] State rarity rankings S1 through S3 are described by CDFW as:

- **S1 – Critically Imperiled:** critically imperiled because of extreme rarity (often 5 or fewer populations), or because of factors such as very steep declines, making the community especially vulnerable to extirpation at the state-level.
- **S2 – Imperiled:** imperiled because of rarity due to very restricted range, very few populations (often 20 or fewer), steep declines, or other factors making it very vulnerable to extirpation at the state level.

[24] CDFW. 2025. Natural Communities. Online Informational Webpage. Available at: https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities#sensitive%20natural%20communities.

- **S3 – Vulnerable:** vulnerable due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines, or other factors making it vulnerable to extirpation at the state level.

Ten sensitive natural communities occur in the project area with rankings of S1-S3: fresh emergent marsh, wet meadow, open water, riverine, lacustrine, valley foothill riparian, blue oak woodland, blue oak-foothill pine woodland, and valley oak woodland (refer to Table 4.4-3). Additionally, while not mapped by the FRAP dataset, vernal pools are considered a sensitive natural community.

ESSENTIAL FISH HABITAT

EFH is defined as "waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity" for fish species. EFH is designated under the Magnuson-Stevens Act, requiring all federal agencies to consult with National Marine Fisheries Service (NMFS) regarding actions or proposed actions permitted, funded, or undertaken that may adversely affect EFH.

All major waterways and encompassing adjacent riparian areas within the project area have been classified as EFH for Pacific salmon, and more specifically for Chinook salmon (*Oncorhynchus tshawytscha)*.

DESIGNATED CRITICAL HABITAT

Designated critical habitat is a geographic area containing features determined by the USFWS or the NMFS to be essential to the conservation and recovery of a species listed as threatened or endangered under the ESA. Designated critical habitat for the following species has been identified within the project area. Designated critical habitats for each species will be described further in the species-specific write-ups in the Special-Status Species Section.

- California Central Valley (CCV) steelhead (*Oncorhynchus mykiss*) distinct population segment (DPS)
- North American green sturgeon (*Acipenser medirostris*) southern distinct population segment (sDPS)
- Delta smelt (*Hypomesus transpacificus*)

GROUNDWATER-DEPENDENT ECOSYSTEMS

Groundwater-dependent ecosystems (GDEs) were assessed using the Natural Communities Commonly Associated with Groundwater (NCCAG) database that provides a baseline of identifying indicators for these communities.[25] A GDE is an ecological community or species that depend on groundwater emerging from aquifers or on groundwater occurring near the surface or is an interconnected surface water (ISW) that is hydraulically connected at any point by a continuous saturation zone to the underlying aquifer and the overlying surface water is not completely depleted.[26] GDEs are divided into three broad categories for California:

25 Klausmeyer K., J. Howard, T. Keeler-Wolf, K. Davis-Fadtke, R. Hull, A. Lyons. 2018. Mapping Indicators of Groundwater Dependent Ecosystems in California: Methods Report. San Francisco, California. Accessed on February 11, 2025 via: https://www.groundwaterresourcehub.org/where-we-work/california/mapping-indicators-gdes/
26 California Department of Water Resources. 2014. Sustainable Groundwater Management Act (SGMA). Accessed on February 11, 2025 via: /https://www.groundwaterresourcehub.org/content/dam/tnc/nature/en/documents/groundwater-resource-hub/iGDE_data_paper_20180423.pdf

- **Class 1:** Underground aquifer and cave systems where stygofauna (species adapted to living in underground water) reside. Due to the lack of data on this class it is excluded from the NCCAG dataset.
- **Class 2:** Ecosystems that rely on the surface expression of groundwater, including springs, perennial wetlands, and rivers whose flow is augmented by groundwater. This class is known as "Wetlands."
- **Class 3:** Ecosystems that rely on the sub-surface presence of groundwater, including phreatophytes (plants that get a significant portion of the water they need from groundwater). This class is known as "Vegetation."

Class 2 GDEs, *Wetlands*, are also identified by the NWI, which utilizes the same database. Some factors, such as irrigated agricultural fields and developed areas, were removed from the NCCAG database. Class 3, *Vegetation,* was intersected with ecoregions to account for the fact that groundwater dependence for some species is influenced by broad physical and biological components of the environment which include climate, geology, geomorphology, and soils.[*Ibid*]

AQUATIC RESOURCES

Aquatic resources provide a variety of habitat functions for plants and wildlife such as foraging, cover, migration, and movement corridors for both special-status and native species. In addition to habitat functions, these features provide physical conveyance of surface water flows capable of handling large storm water events. Large storms can produce extreme flows that cause bank cutting and sedimentation of open waters and streams. Aquatic resources can slow these flows and lessen the effects of these large storm events, protecting habitat and other resources.

All aquatic resources in the project area would be considered sensitive natural communities due to their unique hydrophytic vegetation and ability to support special-status species. High-level mapping of aquatic resources, as described in the Vegetation Communities and Land Cover Types section, was used to inform the analysis of impacts on aquatic resources in this EIR.

Project Area

As follows is a discussion of sensitive natural communities, EFH, designated critical habitat, GDEs, and aquatic resources within project component areas for each of the three MICUP partner agencies.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

- **Sensitive Natural Communities:** Known mapped sensitive natural communities within the NSJWCD's project components include blue oak woodland, blue oak-foothill pine woodland, valley oak woodland, fresh emergent wetlands, lacustrine, riverine, open water, vernal pools, and valley foothill riparian.
- **Essential Fish Habitat:** NMFS has designated EFH for all Chinook salmon species in the Mokelumne River, which overlaps within the NSJWCD project components.
- **Designated Critical Habitat:** There is no USFWS designated critical habitat that overlaps with NSJWCD project components. There is NMFS designated critical habitat for CCV steelhead within the entirety of the Mokelumne River.
- **Groundwater-Dependent Ecosystems:** The Mokelumne River is a Class 2 GDE with associated riparian vegetation as a Class 3 GDE that overlaps with NSJWCD project components. There are

several other Class 2 GDEs within the recharge areas, such as Pixley Slough, South Paddy Creek, North Paddy Creek and a few unnamed features.

- **Aquatic Resources:** Potential aquatic resources identified within the NSJWCD project component include: agricultural ditches, freshwater emergent wetlands, freshwater forested/shrub wetlands, freshwater pond, lake, riverine and vernal pools.

The Mokelumne River runs through the center of the NSJWCD proposed flood managed aquifer recharge (Flood-MAR) recharge areas. Additionally, it is located to the north and south of the proposed direct surface recharge areas. The river contains the proposed Points of Diversion for the direct surface recharge area and Flood-MAR. Pixley Slough runs through the southern portion of the proposed direct surface South System recharge area. Within the proposed ASR well recharge area the following creeks run from east to west: Paddy Creek, Middle Paddy Creek, and South Paddy Creek. The Mokelumne Aqueduct runs throughout the center of the proposed ASR well recharge area. NSJWCD would divert water from the Mokelumne Aqueduct under MICUP.

STOCKTON EAST WATER DISTRICT

- **Sensitive Natural Communities:** Known mapped sensitive natural communities within the SEWD project components include valley oak woodland, fresh emergent wetlands, lacustrine, riverine, vernal pools, and valley foothill riparian.
- **Essential Fish Habitat:** NMFS has designated EFH for all Chinook salmon species in the Calaveras River, which overlaps with portions of the SEWD project components.
- **Designated Critical Habitat:** There is no USFWS designated critical habitat that overlaps with SEWD project components. There is NMFS designated critical habitat for CCV steelhead within the entirety of the Calaveras River.
- **Groundwater-Dependent Ecosystems:** The Calaveras River and Mosher Slough (Class 2 GDEs) and associated riparian vegetation (Class 3 GDE) overlap with SEWD project components. There are several other Class 2 GDEs within the recharge areas that are unnamed features.
- **Aquatic Resources:** Potential aquatic resources identified within SEWD project components include freshwater emergent wetlands, freshwater forested/shrub wetlands, freshwater pond, riverine and vernal pools.

The Calaveras River runs along the southern edge of Mosher Creek at Tully Mosher Dam Recharge Basin and dips slightly into the proposed ASR well recharge area. Mosher Creek and the Mokelumne Aqueduct runs throughout the center of the proposed ASR well recharge area. SEWD would divert water from the Mokelumne Aqueduct under MICUP.

CITY OF STOCKTON

- **Sensitive Natural Communities:** Known mapped sensitive natural communities within the City of Stockton project component areas include blue oak woodland, blue oak-foothill pine woodland, valley oak woodland, fresh emergent wetlands, lacustrine, riverine and valley foothill riparian.
- **Essential Fish Habitat:** NMFS has designated EFH for all Chinook salmon species in the San Joaquin River, which overlaps with the City of Stockton's existing Delta water supply intake pump station component. NMFS has designated EFH for all Chinook salmon species in the Mokelumne River, which overlaps with the City of Stockton's WID diversion dam component.

NMFS has designated EFH for all Chinook salmon species in the Mokelumne and Calaveras Rivers.

- **Designated Critical Habitat:** USFWS has designated critical habitat for Delta smelt in the Delta, which only overlaps with the City of Stockton's existing Delta water supply intake pump station component. Additionally, there is NMFS designated critical habitat for sDPS green sturgeon within the tidally influenced portion of the Calaveras River at its confluence with the Delta (which is outside of the project area) and NMFS designated critical habitat for both sDPS green sturgeon and CCV steelhead in the Delta (which only overlaps with the City of Stockton's existing Delta water supply intake pump station component). There is NMFS designated critical habitat for CCV steelhead within the entirety of the Mokelumne River and Calaveras River, both of which overlap within the City of Stockton project component areas.
- **Groundwater-Dependent Ecosystems:** The Mokelumne River (a Class 2 GDE) and the associated riparian vegetation (Class 3 GDE) overlap with City of Stockton project components. There are numerous other Class 2 GDEs within the recharge areas.
- **Aquatic Resources:** Potential aquatic resources identified within the City of Stockton project component includes the Delta waterways, the Mokelumne and Calaveras Rivers, and various sloughs and ditches.

The Calaveras River runs through the southern tip of the proposed recharge areas. Pixley Slough, Bear Creek, Mosher Creek, and the Mokelumne Aqueduct run throughout the southern half of the recharge area from east to west. The City of Stockton would divert water under MICUP from an existing facility on the Mokelumne River – the WID diversion dam – to the west of the city.

Special-Status Species

Place of Use Special-Status Species Summary and Definitions

Plants and animals addressed as special-status species across the Place of Use in the following discussion include taxa (distinct taxonomic categories or groups) that fall into any of the following categories:

- taxa officially listed, candidates for listing, or proposed for listing by the federal government or the State of California as endangered, threatened, or rare;
- taxa meet the criteria for listing, even if not currently included on any list, as described in *CEQA Guidelines* California Code of Regulations Section 15380;
- wildlife identified by CDFW as species of special concern;
- species listed as Fully Protected under the CFGC;
- species afforded protection under local or regional planning documents; and
- plant taxa considered by CDFW to be "rare, threatened, or endangered in California" and assigned a California Rare Plant Rank (CRPR).

The CRPR system includes six rarity and endangerment ranks for categorizing plant species of concern. All plants with a CRPR are considered "special plants" by CDFW. The term "special plants" is a broad term used by CDFW to refer to all plant taxa inventoried in the CNDDB, regardless of their legal or protection status. Plants ranked as CRPR 1 or 2 may qualify as endangered, rare, or threatened species within the definition presented in Section 15380 of *CEQA Guidelines*. CDFW recommends that potential impacts to CRPR 1 and 2 plant species be evaluated in CEQA documents.

In general, CRPR 3 and 4 plants do not meet the definition of endangered, rare, or threatened pursuant to *CEQA Guidelines* Section 15380; however, these species may be evaluated by the lead agency on a case-by-case basis. This section analyzes CRPR 1 and 2 plants.

The term "California species of special concern" is applied by CDFW to wildlife taxa not listed under the Federal ESA or CESA, but that are nonetheless declining at a rate that could result in listing, or that historically occurred in low numbers and have known threats to their persistence.

- CRPR 1A—Plants presumed to be extinct in California
- CRPR 1B—Plants rare, threatened, or endangered in California and elsewhere
- CRPR 2A—Plants presumed extirpated in California, but are more common elsewhere
- CRPR 2B—Plants rare, threatened, or endangered in California but more common elsewhere
- CRPR 3—Plants about which more information is needed (a review list)
- CRPR 4—Plants of limited distribution (a watch list)

Species habitat use within the Place of Use is based on mapped suitable land cover type present, recent and historic occurrence records, and the biologist best professional judgement from this desktop analysis. A CNDDB "occurrence" represents any documented collection, observation, or museum specimen of a species that is submitted to the CDFW by the public. Other "occurrences" from citizen science databases include those by sight, sound, or photograph, which may also include documented collection or observation.

Project Area

As follows is a discussion of special-status species within project component areas for each of the three MICUP partner agencies followed by more detailed special-status species life histories and habitat suitability within the Partner Agency project component areas. Appendix E2 provides assessments of all plant and wildlife species that were assessed for potential occupancy within the project area. Appendix E3 provides insight into which project components and activities may have a potential to affect special-status species and their habitat. Table 4.4-3 below provides a general indication of which special-status species are present within each District.

Table 4.4-3 Potential Special-Status Species Presence by District

Scientific Name Common Name	Federal and State Status (F | S)[1]	NSJWCD	SEWD	City of Stockton
Plants				
Carex comosa bristly sedge	None | None | 2B.1	X	X	X
Castilleja campestris var. succulenta succulent owl's-clover	FT | CE | 1B.2	X	X	–
Chloropyron palmatum palmate-bracted bird's-beak	FE | CE | 1B.1	X	X	X
Cirsium crassicaule slough thistle	None | None | 1B.1	X	X	X
Delphinium recurvatum recurved larkspur	None | None | 1B.2	X	X	X
Downingia pusilla dwarf downingia	None | None | 2B.2	X	X	X

Scientific Name Common Name	Federal and State Status (F | S)[1]	NSJWCD	SEWD	City of Stockton
Eryngium racemosum Delta button-celery	None | CE | 1B.1	X	X	X
Gratiola heterosepala Boggs Lake hedge-hyssop	None | CE | 1B.2	X	X	X
Hibiscus lasiocarpos var. Occidentalis woolly rose-mallow	None | None | 1B.2	X	X	X
Lathyrus jepsonii var. jepsonii Delta tule pea	None | None | 1B.2	X	X	X
Legenere limosa legenere	None | None | 1B.1	X	X	-
Lilaeopsis masonii Mason's lilaeopsis	None | CR | 1B.1	X	X	X
Limosella australis Delta mudwort	None | None | 2B.1	X	X	X
Sagittaria sanfordii Sanford's arrowhead	None | None | 1B.2	X	X	X
Scutellaria galericulata marsh skullcap	None | None | 2B.2	X	X	X
Scutellaria lateriflora side-flowering skullcap	None | None | 2B.2	X	X	X
Trichocoronis wrightii var. wrightii Wright's trichocoronis	None | None | 2B.1	X	X	X
Trifolium hydrophilum saline clover	None | None | 1B.2	X	X	X
Tuctoria greenei Greene's tuctoria	FE | CR | 1B.1	X	X	-
Invertebrates				
Bombus crotchii Crotch bumble bee	None | CE	X	X	X
Branchinecta conservatio conservancy fairy shrimp	FE | None	X	X	-
Branchinecta lynchi vernal pool fairy shrimp	FT | None	X	X	-
Danaus plexippus (pop. 1) monarch (California overwintering population)	PT | None	X	X	X
Desmocerus californicus dimorphus valley elderberry longhorn beetle	FT | None	X	X	X
Lepidurus packardi vernal pool tadpole shrimp	FE | None	X	X	-

Scientific Name Common Name	Federal and State Status (F | S)[1]	NSJWCD	SEWD	City of Stockton
Reptiles and Amphibians				
Actinemys marmorata northwestern pond turtle	PT | SSC	X	X	X
Anniella pulchra northern California legless lizard	None | SSC	X	X	X
Ambystoma californiense pop. 1 California tiger salamander - central California DPS	FT | ST	X	X	-
Phrynosoma blainvillii coast horned lizard	None | SSC	X	X	X
Spea hammondii western spadefoot	PT | SSC	X	X	-
Thamnophis gigas giant garter snake	FT | ST	X	X	X
Birds				
Agelaius tricolor tricolored blackbird (nesting colony)	None | ST, SSC	X	X	X
Athene cunicularia burrowing owl (burrow sites and some wintering sites)	None | SCE, SSC	X	X	X
Buteo swainsoni Swainson's hawk (nesting)	None | ST	X	X	X
Circus hudsonius northern harrier (nesting)	None | SSC	X	X	X
Elanus leucurus white-tailed kite (nesting)	None | FP	X	X	X
Icteria virens yellow-breasted chat	None | SSC	X	X	X
Lanius ludovicianus loggerhead shrike	None | SSC	X	X	X
Melospiza melodia mailliardi song sparrow (Modesto population)	None | SSC	X	X	X
Riparia riparia bank swallow	None | ST	X	X	X
Setophaga petechia yellow warbler	None | SSC	X	X	X
Xanthocephalus xanthocephalus yellow-headed blackbird (nesting)	None | SSC	X	X	X
Mammals				
Antrozous pallidus pallid bat	None | SSC	X	X	X
Bassariscus astutus raptor northern California ringtail	None | SSC	X	-	X
Corynorhinus townsendii Townsend's big-eared bat	None | SSC	X	X	X
Lasiurus blossevillii western red bat	None | SSC	X	X	X

Scientific Name Common Name	Federal and State Status (F | S)[1]	NSJWCD	SEWD	City of Stockton
Fish				
Acipenser medirostris green sturgeon (southern DPS)	FT | SSC	–	–	X
Acipenser transmontanus white sturgeon	None | SC, SSC	X	–	X
Cottus gulosus riffle sculpin	None | SSC	X	X	X
Entosphenus tridentatus Pacific lamprey	None | SSC	X	X	X
Hesperoleucus symmetricus symmetricus central California roach	None | SSC	X	X	X
Hypomesus transpacificus delta smelt	FT | SE	–	–	X
Spirinchus thaleichthys Longfin smelt	CE | ST	–	–	X
Lampetra ayresii western river lamprey	None | SSC	X	X	X
Lavinia exilicauda exilicauda Sacramento hitch	None | SSC	X	X	X
Mylopharodon conocephalus hardhead	None | SSC	X	X	X
Oncorhynchus mykiss irideus (pop. 11) steelhead (central valley DPS)	FT | SSC	X	X	X
Oncorhynchus tshawytscha (pop. 11) Central Valley spring-run chinook salmon	FT | ST	X	X	X
Oncorhynchus tshawytscha (pop. 13) Central Valley fall/late fall-run Chinook salmon	None | SSC	X	X	X
Pogonichthys macrolepidotus Sacramento splittail	None | SSC	–	X	X

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

As shown in Table 4.4-3, there are nineteen (19) plant species, twenty-seven (27) terrestrial wildlife species, ten (10) fish species that have the potential to occur in suitable habitat within the project components for this District. Appendix E3 delineates which specific components each species has the potential to occur at.

STOCKTON EAST WATER DISTRICT

As shown in Table 4.4-3, there are nineteen (19) plant species, twenty-six (26) terrestrial wildlife species, ten (10) fish species that have the potential to occur in suitable habitat within the project components for this District. Appendix E3 delineates which specific components each species has the potential to occur at.

CITY OF STOCKTON

As shown in Table 4.4-3, there are sixteen (16) plant species, twenty-two (22) terrestrial wildlife species, and fourteen (14) fish species that have the potential to occur in suitable habitat within the

project components for this District. Appendix E3 delineates which specific components each species has the potential to occur at.

Plant Species Life Histories and Habitat Suitability

All plant species life histories below were adapted from the CNPS Rare Plant Inventory Database, which has the most up to date species statuses, life history, and habitat descriptions.[27]

BOGGS LAKE HEDGE-HYSSOP

Boggs Lake hedge-hyssop is an annual herb that is state endangered, has a CRPR of 1B.2, and is a San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) covered species. This species is typically found in elevations between 30 and 7,790 feet in marshes, swamps, lake margins, and vernal pools. This species is usually associated with clay soil and blooms between April and August.

The NSJWCD, SEWD, and City of Stockton project component areas may contain suitable vernal pool habitats or fresh emergent wetlands for this species. Vernal pool habitats are mapped in the northeastern most edges of the project component areas but are generally limited due to agricultural practices.

BRISTLY SEDGE

Bristly Sedge is a perennial rhizomatous herb with a CRPR of 2B.1 and is a SJMSCP covered species. This species is typically found in elevations between 0 and 2,050 feet in coastal prairies, marshes, swamps, lake margins, and valley foothill grasslands. Bristly sedge blooms between May and September.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill riparian.

DELTA BUTTON-CELERY

Delta button-celery is an annual/perennial herb that is state endangered, has a CRPR of 1B.1, and is a SJMSCP covered species. This species is typically found in elevations between 5 and 100 feet in riparian scrub. This species is often associated with vernally mesic clay depressions. Delta button-celery blooms between May and October.

The NSJWCD, SEWD, and City of Stockton project component areas have riparian habitats that are likely suitable to support this species, and project components are within the known elevation range.

DELTA MUDWORT

Delta mudwort is a perennial stoloniferous herb with a CRPR of 2B.1 and is a SJMSCP covered species. This species is typically found in elevations between 0 and 9 feet in brackish or freshwater marshes, swamps, and riparian scrub. This species is often associated with mudbanks along stream edges. Delta mudwort blooms between May and August.

[27] CNPS. 2024. Inventory of Rare and Endangered Plants (online edition, v802). California Native Plant Society, Sacramento, California. Available at: http://www.rareplants.cnps.org.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill riparian. Valley foothill riparian and aquatic habitat are more prevalent throughout the project components areas than fresh emergent wetlands.

DELTA TULE-PEA

Delta tule-pea is a perennial herb with CRPR of 1B.2 and is a SJMSCP covered species. This species is typically found in elevations between 0 and 16 feet in brackish and freshwater marshes and swamps. Delta tule-pea blooms between May and August.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill riparian. Valley foothill riparian and aquatic habitat are more prevalent throughout the project components areas than fresh emergent wetlands.

DWARF DOWNINGIA

Dwarf downingia is an annual herb with a CRPR of 2B.2. This species is typically found in elevations between 0 and 1,460 feet in mesic valley and foothill grasslands and vernal pools. Dwarf downingia blooms between March and May.

Vernal pool habitats were identified in the NSJWCD and SEWD project component areas and they likely provide suitable habitat for this species. Additionally, City of Stockton also has grasslands present that could provide suitable land cover type for this species.

GREENE'S TUCTORIA

Greene's tuctoria is an annual herb that is considered a state rare plant, has a CRPR of 1B.1, and is a SJMSCP covered species. This species is typically found in elevations between 95 and 3,510 feet in vernal pools. Greene's tuctoria blooms between May and September.

Vernal pool habitats were identified in the NSJWCD and SEWD project component areas, and they likely provide suitable habitat for this species. If vernal pools are confirmed to not be present in specific project components, this species is highly unlikely to occur.

LEGENERE

Legenere is an annual herb with a CRPR of 1B.1 and is a SJMSCP covered species. This species is typically found in elevations between 0 and 2,885 feet in vernal pools. Legenere blooms between April and June.

Vernal pool habitats were identified in the NSJWCD and SEWD project component areas and they likely provide suitable habitat for this species. If vernal pools are confirmed to not be present in specific project components, this species is highly unlikely to occur.

MARSH SKULLCAP

Marsh skullcap is a perennial rhizomatous herb with a CRPR of 2B.2. This species is typically found in elevations between 0 and 6,890 feet in lower montane coniferous forest, marshes, swamps, meadows, and mesic seeps. Marsh skullcap blooms between June and September.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill

riparian. Valley foothill riparian and aquatic habitat are more prevalent throughout the project components than fresh emergent wetlands.

MASON'S LILAEOPSIS

Masons's lilaeopsis is a perennial rhizomatous herb that is considered a state rare plant, has a CRPR of 1B.1, and is a SJMSCP covered species. This species is typically found in elevations between 0 and 30 feet in brackish or freshwater marshes, swamps, and riparian scrub. Mason's lilaeopsis blooms between April and November.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill riparian. Valley foothill riparian and aquatic habitat are more prevalent throughout the project components than fresh emergent wetlands.

PALMATE-BRACTED BIRD'S-BEAK

Palmate-bracted Bird's-beak is an annual herb that is federally endangered, state endangered and has a CRPR of 1B.1. This species is typically found in elevations between 15 and 510 feet in chenopod scrub, valley, and foothill grassland. This species is often associated with alkaline soils and blooms between May and October.

The project area is located within a valley where this species has possibly been extirpated from, however, locational data on this species is sparse and cannot be ruled out. The NSJWCD, SEWD, and City of Stockton project component areas with suitable grasslands habitats could support this species.

RECURVED LARKSPUR

Recurved larkspur is a perennial herb with a CRPR of 1B.2 and is a SJMSCP covered species. This species is typically found in elevations between 9 and 2,591 feet in chenopod scrub, cismontane woodland, and valley foothill grassland. This species is often associated with alkaline soils and blooms between March and June.

The NSJWCD, SEWD, and City of Stockton project component areas with suitable grasslands or woodlands habitats present could support this species.

SALINE CLOVER

Saline clover is an annual herb with a CRPR of 1B.2. This species is typically found in elevations between 0 and 985 feet in marshes, swamps, mesic and alkaline valley and foothill grassland, and vernal pools. Saline clover blooms between April and June.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill riparian. Additionally, within the NSJWCD and SEWD project components identified vernal pools could support suitable habitat for this species.

SANFORD'S ARROWHEAD

Sanford's arrowhead is a rhizomatous herb with a CRPR of 1B.2 and is a SJMSCP covered species. This species is typically found in elevations between 0 and 2,132 feet in shallow freshwater marshes and swamps. Sanford's arrowhead blooms between May and October.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill riparian.

SIDE-FLOWERING SKULLCAP

Side-flowering skullcap is a perennial rhizomatous herb with a CRPR of 2B.2. This species is typically found in elevations between 0 and 1,640 feet in marshes, swamps, meadows, and mesic seeps. Side-flowering skullcap blooms between July and September.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill riparian.

SLOUGH THISTLE

Slough thistle is an herb with a CRPR of 1B.1 and is a SJMSCP covered species. This species is typically found in elevations between 9 and 328 feet in chenopod scrub, marshes, swamps, meadows, and mesic seeps. Slough thistle blooms between May and August.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as riparian habitat and margins along aquatic habitats.

SUCCULENT OWL'S-CLOVER

Succulent Owl's-clover is an annual herb that is federally threatened, state endangered, has a CRPR of 1B.2, and is a SJMSCP covered species. This species is typically found in elevations between 165 and 2,460 feet in vernal pools (often acidic). Succulent Owl's-clover blooms between March and May.

Vernal pool habitats were identified in the NSJWCD and SEWD project component areas and they provide suitable habitat for this species. The closest CNDDB occurrence record is at a lower elevation than reported above, likely extending the known elevation range for this species, hence the inclusion.

WOOLLY ROSE-MALLOW

Woolly rose-mallow is a perennial rhizomatous herb with a CRPR of 1B.2. This species is typically found in elevations between 0 and 395 feet in freshwater marshes and swamps. It is also often found in riprap on the sides of levees. Woolly rose-mallow blooms between May and September.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as riparian habitat, fresh emergent wetlands, and margins along aquatic habitat.

WRIGHT'S TRICHOCORONIS

Wright's trichocoronis is an annual herb with a CRPR of 2B.1 and is a SJMSCP covered species. This species is typically found in elevations between 16 and 1,427 feet in marshes, swamps, meadows, seeps, riparian forest, and vernal pools. Wright's trichocoronis blooms between May and September.

The NSJWCD, SEWD, and City of Stockton project component areas have suitable habitat types that could support this species, such as aquatic habitat, fresh emergent wetlands, and valley foothill

riparian. Additionally, within the NSJWCD and SEWD project components identified vernal pools could support suitable habitat for this species.

Wildlife Species Life Histories and Habitat Suitability

INVERTEBRATES

Conservancy Fairy Shrimp

The Conservancy fairy shrimp is federally listed as endangered and is a SJMSCP covered species. This shrimp is a small, freshwater crustacean typically found in vernal pools. Conservancy fairy shrimp are restricted to vernal pools found in California's Central Valley from Tehama County in the north to Merced County in the south.[28] They have life histories highly adapted to the environmental conditions of these ephemeral habitats. Mostly inhabit relatively large and turbid vernal pools, called playa pools, which typically remain inundated much longer than most vernal pools. This shrimp can be found starting in November and will complete their life cycle by early April.[29]

The NSJWD and SEWD project component areas may provide suitable vernal pool habitat for Conservancy fairy shrimp. This species is dependent on vernal pools and would not occur within the project site if vernal pools are not confirmed present. Vernal pool habitat within these project components is limited to the northeastern edges.

Crotch's Bumblebee

Crotch's bumble bee is a candidate for state listing as endangered. These bees require foraging, nesting, and overwintering habitats. Primary land cover types that provide the three habitat requirements are grassland, chaparral, and scrub (*i.e.,* open habitats); oak woodland and forest likely provide suitable habitat as well. Secondarily, riparian areas, coastal and valley freshwater marshes, seasonal wetlands, and agricultural areas can provide foraging habitat, and drier sites within these habitats can provide nesting or overwintering habitat. There are a few recent records from urban areas, suggesting that urban parks or suburban/residential areas may provide habitat as well. This species lives in colonies that are annual, with all individuals except new queens dying each fall. The nesting biology is poorly known, though known nests have been found in abandoned rodent burrows.

The project area provides primary and secondary land cover types that are suitable for nesting, foraging, and overwintering. Suitable nesting habitat and burrows may be present in the annual grasslands of the project area. Suitable nectar plants are also likely to be present throughout the project area. Therefore, this species has the potential to occur throughout all of the project components and land cover types until field work can rule out suitability.

Monarch Butterfly

Monarch butterfly is a federally proposed threatened species. Adults feed on a diversity of blooming nectar resources throughout their migration routes and breeding grounds. Monarchs also require milkweed (primarily *Asclepias* spp.) for egg laying and larval development and feeding. In western North America, nectar and milkweed resources are often associated with riparian corridors.[30]

[28] USFWS.2022. Conservancy Fairy Shrimp Overview. United States Fish and Wildlife Website. Available at: https://www.fws.gov/species/conservancy-fairy-shrimp-branchinecta-conservati
[29] USFWS. 2024. Vernal Pool Fairy Shrimp (*Branchinecta lynchi*) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.
[30] USFWS. 2020. *Monarch (Danaus plexippus) Species Status Assessment Report, version 2.1*. Available: https://www.fws.gov/savethemonarch/pdfs/Monarch-SSA-report.pdf.

Migratory monarchs in the western population primarily overwinter in groves along the coast of California and Baja California.

The project area is located outside of the known overwintering range for monarch butterflies, which is located along the coastline. The project area, however, is within the Priority #1 Early Breeding Zone, therefore Monarch butterfly could use the project area as an early breeding ground where milkweed and nectar plants occur. A priority breeding zone for monarchs refers to a geographical area identified as crucial for summer breeding, often considered a high priority for conservation efforts due to the critical role it plays in sustaining the monarch population during the peak breeding season.[31] Monarchs may be present where nectar and milkweed are identified within the project area. Therefore, this species has the potential to occur throughout all of the project components and land cover types until field work can rule out suitability.

Valley Elderberry Longhorn Beetle

Valley elderberry longhorn beetle is federally listed as threatened and is a SJMSCP covered species. The range of this species extends throughout the Central Valley and associated foothills from about 3,000 feet in elevation to the east and the watershed of the Central Valley to the west. The valley elderberry longhorn beetle is dependent on its host plant, elderberry (*Sambucus ssp.*), for all stages of its life cycle. Adults feed on the elderberry leaves and mate within the elderberry canopy. Females deposit eggs on or adjacent to the host elderberry. The larvae bore into the wood of the host plant where they feed on the pith of the plant for 1 to 2 years. The larvae metamorphose between December and April; the adult then emerges from the chamber through an exit hole. Most records for adults occur from late April to mid-May,[32] although April 15 to June 15 is considered to be the "flight season" for the species. This is when the beetle is in the adult stage and present within the elderberry shrub canopy. The active beetles may be found in the immediate vicinity of the shrubs.

Elderberry shrubs have potential to occur in riparian habitats and upland habitats identified within the NSJWCD, SEWD, and City of Stockton project component areas. Elderberry shrubs are most likely to occur along established natural waterways. The elderberry shrub is the sole host plant for valley elderberry longhorn beetle, therefore suitable habitat is based on the presence or absence of these shrubs and determines the potential for this species to occur.

Vernal Pool Fairy Shrimp

The vernal pool fairy shrimp is a federally threatened species and is a SJMSCP covered species. This shrimp is a small, freshwater crustacean typically found in vernal pools. They are endemic to California and the Agate Desert of southern Oregon. Found only in ephemeral freshwater habitats, such as vernal pools and similar features, and have life histories highly adapted to the environmental conditions of these ephemeral habitats.[33] They can be found in a wide range of vernal pools, including extremely small or marginal ones that fill with water for just long enough to allow the individuals to complete their lifecycle. This shrimp can be found starting in November and will complete their life cycle by early May.

[31] Xerces Society, The. 2024. Priority Action Zones in California for Recovering Western Monarchs. Available at: https://xerces.org/publications/fact-sheets/priority-action-zones-in-california-for-recovering-western-monarchs.
[32] USFWS. 2007. Endangered and Threatened Wildlife and Plants; Initiation of 5-Year Reviews of 58 species in California and Nevada: Availability of Completed 5-Year Reviews in California and Nevada. Federal Register 72:7064-7067
[33] USFWS. 2024. Vernal Pool Fairy Shrimp (*Branchinecta lynchi*) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.

The NSJWD and SEWD project component areas may provide suitable vernal pool habitat for vernal pool fairy shrimp. This species is dependent on vernal pools and would not occur within the project site if vernal pools are not confirmed present. Vernal pool habitat within these project components is limited to the northeastern edges.

Vernal Pool Tadpole Shrimp

The vernal pool tadpole shrimp is federally listed as a threatened species and is a SJMSCP covered species. This shrimp is a small, freshwater crustacean typically found in vernal pools. Endemic to the Central Valley, as well as a few locations in the San Francisco Bay area and South Coast Range.[34] They are found only in ephemeral freshwater habitats including alkaline pools, clay flats, vernal pools, and other seasonal wetlands.[35] They have life histories highly adapted to the environmental conditions of these ephemeral habitats. Limited to pools that are sufficiently large or are otherwise able to retain water for a long enough duration to complete its lifecycle. Tadpole shrimp can be found starting in November and will complete their life cycle by early May.

The NSJWD and SEWD project component areas may provide suitable vernal pool habitat for vernal pool tadpole shrimp. This species is dependent on vernal pools and would not occur within the project site if vernal pools are not confirmed present. Vernal pool habitat within these project components is limited to the northeastern edges.

REPTILES AND AMPHIBIANS

California Tiger Salamander

The Central California DPS of the California tiger salamander is federal and state listed as threatened and is a SJMSCP covered species. California tiger salamanders are distributed throughout the Central Valley and Central Coast ranges from Colusa County south to San Luis Obispo and Kern counties, from sea level to 3,460 feet in elevation. California tiger salamanders inhabit lowland grasslands, oak savannah, and mixed woodland habitats, and require vernal pools, seasonal ponds, or semi-permanent calm waters that pond water for a minimum of 3 to 4 months for breeding and larval maturation, and adjacent upland habitat with small mammal burrows for aestivation.[36,37,38] The salamanders begin migrating to breeding sites following the onset of autumn rains, typically in November, and have been documented traveling distances up to 1.3 miles from breeding sites.[39] Young migrate in mass when temporary pools begin to dry in late spring or early summer[40] and

[34] USFWS. 2024. Vernal Pool Tadpole Shrimp (*Lepidurus packardi*) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.
[35] USFWS. 2022. Vernal Pool Tadpole Shrimp Overview. United States Fish and Wildlife Website. Available at: https://www.fws.gov/species/vernal-pool-tadpole-shrimp-lepidurus-packardi.
[36] Storer, T. I. 1925. A synopsis of the amphibia of California. University of California Publications in Zoology 27(1):1-342.
[37] Stebbins, R. C. 2003. A Field Guide to Western Reptiles and Amphibians. 3rd Edition. Houghton Mifflin Company. New York, New York. 533 pp.
[38] USFWS. 2017. Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (*Ambystoma californiense*). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California.
[39] Trenham, Peter C., and H. Bradley Shaffer. 2005. Amphibian upland habitat use and its consequences for population viability. Ecological Applications 15:1158–1168.
[40] Jennings, Mark R. and Marc P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game.

juveniles and adults aestivate through the summer and fall, typically in small mammal burrows (*i.e.,* California ground squirrel and pocket gopher burrows).[41,42,43,44]

The NSJWCD and SEWD project component areas may provide suitable vernal pool habitat for breeding, as well as suitable grassland habitat for upland and dispersal habitat. Vernal pool habitat within these project components is limited to the northeastern edges that are surrounded by suitable grassland upland habitat. Suitable non-traditional aquatic resources, such as cattle ponds, may provide suitable breeding habitat and cannot be ruled out as habitat until field eliminates likelihood of presence.

Coast Horned Lizard

Coast horned lizard is a California species of special concern and is a SJMSCP covered species. They have a broad distribution extending well inland from the coast, including into the Sierra Nevada mountains. This species generally occurs in sage scrub, dunes, alluvial scrub, annual grassland, chaparral, oak, riparian, Joshua tree woodland, coniferous forest, and saltbush scrub. Coast horned lizards needs loose, fine soils for burrowing, open areas for basking, and dense foliage for cover. They are negatively associated with Argentine ants (*Linepithema humi*).[45]

The project area provides suitable foraging and burrowing habitat where grassland, oak woodlands, and riparian habitat is present, particularly in areas with loose fine soils for burrowing. These habitat types occur intermittently throughout the entire area including all project components with a focus surrounding primary waterways.

Giant Garter Snake

Giant garter snake is federal and state listed as threatened and is a SJMSCP covered species. They inhabit marshes, sloughs, ponds, small lakes, low gradient streams, and other managed waterways and agricultural wetlands. Occupied aquatic habitats typically contain permanent or seasonal water, mud bottoms, and vegetated dirt banks. Giant garter snakes are inactive or greatly reduce their activities during late fall and winter, typically emerging from upland winter retreats in late March to early April and often remaining active through October. Three habitat components appear to be most important to giant garter snake: (1) freshwater aquatic habitat with protective emergent cover, (2) nearby upland habitat that can be used for thermoregulation, and upland refugia that provide winter hibernacula.[46]

The project area provides suitable habitat where irrigated fields, agricultural ditches/canals, and other slow-moving waterways and upland habitat are present. Agricultural ditches and canals are common throughout the project area providing suitable movement corridors and aquatic habitat for giant garter snake. Based on ecology and historic and current records[44], the giant garter snake is

[41] Shaffer, H. B., R. N. Fisher, and S. E. Stanley. 1993. Status report: the California tiger salamander (*Ambystoma californiense*). Final report to the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California under Contracts (FG 9422 and FG 1383).
[42] Barry, S. J., and H. B. Shaffer. 1994. The status of the California tiger salamander (*Ambystoma californiense*) at Lagunita: A 50-year update. Journal of Herpetology 28(2):159-164.
[43] Jennings, Mark R. and Marc P. Hayes. 1994. Amphibian and Reptile Species of Special Concern in California. Final Report to the California Department of Fish and Game.
[44] Stebbins, R. C. 2003. A Field Guide to Western Reptiles and Amphibians. 3rd Edition. Houghton Mifflin Company. New York, New York. 533 pp.
[45] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.
[46] USFWS (U.S. Fish and Wildlife Service). 2017. *Recovery Plan for the Giant Garter Snake (*Thamnophis gigas*)*. Sacramento, CA.

unlikely to be in larger bodies of water such as the Mokelumne River or Calaveras River, as it prefers low-gradient streams and managed waterways.[47]

Northern California Legless Lizard

Northern California legless lizard is a California species of special concern This species occurs from the southern edge of the San Joaquin River in northern Contra Costa County south to Ventura County, south of which there is a wide area where the species of *Anniella* is or are unknown. Occurs in scattered locations in the San Joaquin Valley, along the southern Sierra Nevada Mountains, on the desert side of the Tehachapi Mountains, and part of the San Gabriel Mountains.[48] Generally found in habitats with a relatively sparse amount of vegetation including coastal sand dunes, chaparral, pine-oak woodland, desert scrub, grassland, and riparian zones. Specifically, requires sandy to loose loamy substrates suitable for burrowing, and avoids areas with gravel or larger sized substrates and those with greater than 10 percent clay content. Also, they tend to avoid non-native grasslands, iceplant fields, and other non-native dominated herbaceous communities. Occurs in moist warm loose soils with plant cover, and moisture is essential.[49]

Suitable habitat is present in the NSJWD, SEWD, and City of Stockton project component areas where sandy soils, grassland, and riparian habitats occur. These habitat types are dispersed throughout the project component areas, with a focus along main waterways and sandy soils. The project area is within the northernmost extent of this species range, and the species is unlikely to be heavily present.

Northwestern Pond Turtle

Northwestern pond turtle is proposed for federal listing as threatened, a California species of special concern, and a SJMSCP covered species. These turtles require aquatic and terrestrial habitats that are connected to each other. As habitat generalists, northwestern pond turtles occur in a broad range of permanent and ephemeral aquatic water bodies, such as flowing rivers and streams, lakes, ponds, reservoirs, settling ponds, marshes, vernal pools, and irrigation ditches. Preferred aquatic conditions are those with abundant basking sites, underwater shelter sites (undercut banks, submerged vegetation, mud, rocks, and logs), and standing or slow-moving water. Northwestern pond turtle nesting habitat is typically characterized by sparse, short grasses and forbs and little or no canopy cover. Females excavate nests between late April and August in compact, dry soils located approximately 10 to 1,300 feet from water. Overwintering habitat generally occurs in upland locations above ordinary high-water lines and/or beyond the riparian zone.[50]

The NSJWD, SEWD, and City of Stockton project component areas provide suitable aquatic and upland habitat for foraging and nesting, especially near existing bodies of water. This species is reliant on large bodies of water and is more likely to be present around the Mokelumne River and Calaveras River. Northwestern pond turtles are known to nest in a variety of upland habitats, that could include in more urban dominated areas, as well as typical grassland habitat present throughout these project components.

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[47] *Ibid.*
[48] Nafis, G. (2000-2020) California Herps - A Guide to the Amphibians and Reptiles of California. Available at: http://www.californiaherps.com/.
[49] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.
[50] USFWS. 2023. Species Status Assessment Report for Northwestern Pong Turtle (*Actinemys marmorata)* and Southwestern Pond Turtle (*Actinemys pallida),* Version 1.1. Ventura Fish and Wildlife Office, Ventura, CA. Available at: https://iris.fws.gov/APPS/ServCat/Reference/Profile/160047.

Western Spadefoot

Western spadefoot is a California species of special concern and is a SJMSCP covered species. Generally found in grasslands, oak woodlands, coastal sage scrub, and chaparral in washes, floodplains, alluvial fans, playas, and alkali flats. Natural and artificial water bodies are used for breeding. Specifically, vernal pools used by this species have an average ponding duration of 81 days, and successful recruitment occurs in ponds that last on average 21 days longer than larval development time. Pools with invasive species, such as crayfish (*Pacifasticus* spp.), or bullfrogs (*Lithobates catesbeianus*) often, but not always, exclude this species. The species is known to disperse up to 1,200 feet from breeding ponds into upland habitats.[51]

The NSJWD and SEWD project component areas could provide suitable habitat where grasslands, oak woodlands, and bodies of water occur throughout these areas. This species will use both natural and artificial bodies of water and can be found on roadways and grasslands adjacent to aquatic habitat. Suitable aquatic habitat is likely limited to the Mokelumne River, vernal pools and freshwater ponds, as agricultural ditches and canals do not provide the suitable substrate required by this species.

BIRDS

Bank Swallow

Bank swallow is state listed as threatened. California breeding populations winter in Central and South America and breed in the northern and central regions of the state in colonies ranging in size from 3 to over 3,000 nest burrows. Most bank swallows in California nest along the Sacramento River and its tributaries, excavating burrows in vertical banks created by natural river processes, such as bank erosion and deposition resulting from lateral migration of rivers within their natural meander belt and floodplain. Nesting colonies are also found in artificial sites, including sand quarries and road cuts, but these are uncommon.[52]

The NSJWD, SEWD, and City of Stockton project component areas provide suitable foraging habitat for this species where open water occurs, however, suitable nesting habitat is dependent on soil types of the bank slopes of the Mokelumne River and Calaveras Rivers, possibly along the other waterways present in the project components.

Burrowing Owl

Burrowing owl is a Candidate for state listing as endangered, a California species of special concern, and a SJMSCP covered species. In California, the species occurs throughout the Central Valley, southwestern deserts, and northeastern basin, as well as the Carrizo Plain and other western valleys. Burrowing owl is primarily a grassland species, but it can thrive in some landscapes that are highly altered by human activity if suitable burrows for roosting and nesting and short vegetation are present. These owls typically nest and roost in burrow systems created by medium-sized

[51] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.
[52] Bank Swallow TAC (Bank Swallow Technical Advisory Committee). 2013. *Bank Swallow (*Riparia riparia*) Conservation Strategy for the Sacramento River Watershed, California*. Version 1.0. Available: http://www.sacramentoriver.org/bans/.

mammals (especially those of California ground squirrel*),* artificial sites (*e.g.,* drainpipes and culverts), or self-excavated burrows, where soil conditions are appropriate.[53]

The project area provides suitable foraging, nesting, and overwintering habitat where sparsely vegetated fields, grasslands, fallow fields, urban disturbed areas, golf courses, *etc*. exist along with rodent burrows. Burrowing owls will nest and overwinter in a variety of habitats, all of which are dispersed throughout the project area.

Loggerhead Shrike

Loggerhead shrike is a California species of special concern and a SJMSCP covered species. They inhabit lowland and foothill areas with scattered shrubs and trees. This species occurs throughout most of California, except the Sierra Nevada, high elevations of the Coast Ranges, and the northwestern part of the state. In California, loggerhead shrikes breed primarily in shrubland and open woodland with some grass cover and areas of bare ground. In the Central Valley, they nest in shrubs and small trees, primarily at the edges of riparian habitat.[54]

The NSJWD, SEWD, and City of Stocktons project component areas provide suitable foraging and nesting habitat for this species in portions of the component areas where open woodlands, grasslands, trees and shrubs occur. This species prefers to be on edges of riparian and grasslands, so is likely to be present along the Mokelumne and Calaveras Rivers but can also be present along agricultural fields or smaller creeks throughout the project components.

Northern Harrier

Northern harrier is a California species of special concern and a SJMSCP covered species. They occur primarily in lowlands throughout much of the State. The Central Valley supports most of the state's breeding birds, which nest and forage in a variety of open habitats, including marsh, wet meadows, borders of lakes, rivers, and streams, grasslands, weedy fields, and some agricultural crops. Harriers nest on the ground in dense, often tall vegetation in relatively undisturbed areas.[55] Grassland habitat on and adjacent to the project site provides suitable foraging habitat and some areas may also provide suitable nesting habitat.

The NSJWD, SEWD, City of Stockton, and City of Stockton project component areas provide suitable foraging and nesting habitat for this species where agricultural fields and grassland occur. These habitat types are widespread throughout the project components, and this species is highly likely to occur foraging. Nesting would occur in fallow fields or relatively undisturbed locations.

Song Sparrow (Modesto Population)

The Modesto population of song sparrow is a California species of special concern. Song sparrows occur widely throughout North America, but the Modesto population is endemic to California and restricted to the north-central portion of the Central Valley. The Delta and the Butte Sink are the

[53] Gervais, J. A., D. K. Rosenberg, and L. A. Comrack. 2008. Burrowing Owl (*Athene cunicularia*). In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, ed. W. D. Shuford and T. Gardali, 218–226. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

[54] Humple, D. 2008. Loggerhead Shrike (*Lanius ludovicianus*). In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, ed. W. D. Shuford and T. Gardali, 271–277. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

[55] Davis, J. N., and C. N. Niemla. 2008. Northern Harrier (*Circus cyaneus*). In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, ed. W. D. Shuford and T. Gardali, 218–226. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

currently known areas of highest abundance. Historically, these sparrows were described as having an affinity for emergent freshwater marsh dominated by tules and cattails, as well as riparian willow thickets. Those in the Butte Sink continue to nest in such habitat, and recent studies have documented nesting in riparian forest, along irrigation canals, and in young oak woodland restoration sites.[56] Although this population of song sparrow has not been recently documented in the project vicinity, the presence of song sparrows is rarely documented because of the common status of the species as a whole.

The NSJWD, SEWD, and City of Stockton project component areas provide suitable foraging and nesting habitat for this species where emergent wetlands and riparian habitats occur. Song sparrows are likely to be present along waterways, primarily the Mokelumne and Calaveras Rivers, as well as in the lesser creeks with emergent marsh.

Swainson's Hawk

Swainson's hawk is State listed as threatened. This species typically occurs in California only during the breeding season (March to September) and winter in Mexico and South America; the Central Valley population migrates only as far south as central Mexico. Swainson's hawks begin to arrive in the Central Valley in March; nesting territories are usually established by April, with incubation and rearing of young occurring through June. Swainson's hawks are found most commonly in grasslands, low shrublands, and agricultural habitats that include large trees for nesting. Nests are found in riparian woodlands, roadside trees, trees along field borders, and isolated trees. Nesting pairs frequently return to the same nest site for multiple years and decades.

The project area provides suitable foraging habitat where agricultural fields and open grasslands occur and nesting habitat where established riparian and large trees occur. Swainson's hawks are highly likely to occur all throughout the project area, but presence may be focused along the Mokelumne and Calaveras Rivers. The species does not overwinter in California.

Tricolored Blackbird

Tricolored blackbird is state listed as threatened, is a California species of special concern, and is a SJMSCP covered species. This species is a year-round resident and endemic to California and occurs throughout the Central Valley. Tricolored blackbirds nest colonially; they historically preferred freshwater marshes dominated by cattails and bulrushes. However, an increasing number of colonies have been documented in Himalayan blackberry, and thistles, with some of the largest recent colonies in silage and grain fields. Preferred foraging habitats include crops such as rice, alfalfa, irrigated pastures, and ripening or cut grain fields (*e.g.,* oats, wheat, silage), as well as annual grasslands, cattle feedlots, and dairies. Species require nearby open water.[57]

The NSJWD, SEWD, and City of Stockton project component areas provide suitable foraging and nesting habitat where dense wetland vegetation occurs near aquatic sources and croplands. These areas are limited to where open waterways occur throughout the project components, primarily along vegetated irrigation and drainage canals, and along the areas with emergent marsh habitat.

[56] Gardali, T. 2008. Song Sparrow (*Melospiza melodia*) ("Modesto" population). In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, ed. W. D. Shuford and T. Gardali, 400–404. Studies of Western Birds No. 1. Western Field ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

[57] Beedy, E. C. 2008. Tricolored Blackbird (*Agelaius tricolor*). In *California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California*, ed. W. D. Shuford and T. Gardali, 437–443. Studies of Western Birds No. 1. Western Field Ornithologists, Camarillo, CA, and California Department of Fish and Game, Sacramento, CA.

White-tailed Kite

White-tailed kite is a fully protected species under the CFGC and is a SJMSCP covered species. This species occurs in virtually all lowlands of California, west of the Sierra Nevada, and in the southeast desert; it is common in the Central Valley and along the entire California coast. White-tailed kites breed in lowland grasslands, agricultural areas, wetlands, oak woodland and savanna, and riparian areas with nearby open habitats.[58] They forage in grasslands, pasture, and some agricultural crops. Grassland habitat on and adjacent to the project site provides suitable foraging habitat.

The project area provides suitable foraging and nesting habitat for this species where grasslands, farmlands, and suitable trees occur. Suitable habitat for this species is widespread throughout the project area, and this species is highly likely to occur.

Yellow-breasted Chat

Yellow-breasted chat is a California species of special concern and is a SJMSCP covered species. Nests in early successional riparian habitats with a well-developed shrub layer and an open canopy. Restricted to narrow borders of streams, creeks, sloughs, and rivers. Often nest in dense thickets of blackberry and willow. Nests from late April to early August.[59]

The NSJWD, SEWD, and City of Stockton's project components provide suitable foraging and nesting habitat for this species where riparian thickets occur. This species is likely to occur along the Mokelumne and Calaveras Rivers but may also occur on smaller creeks where suitable thickets occur.

Yellow-headed Blackbird

Yellow-headed blackbird is a California species of special concern. It occurs in California primarily as a migrant and summer resident from April to early October. Breeds from mid-April to late July. Nests in fresh marshes with tall, emergent vegetation such as bulrushes and cattails generally in open areas and adjacent to deep water. Nests are fabricated from dry vegetation and placed in dense cover. Because of the need for deeper water, breeding marshes often are on the edges of water bodies such as lakes, reservoirs, or larger ponds.[60]

The NSJWD, SEWD, and City of Stockton project component areas provide suitable foraging and nesting habitat for this species where emergent vegetation and bodies of water occur. They are likely to be present along waterways throughout the project components.

Yellow Warbler

Yellow warbler is a California species of special concern and is a SJMSCP covered species. Usually found in riparian deciduous habitats in summer: cottonwoods, willows, alders, and other small trees and shrubs typical of low, open-canopy riparian woodland. Also breeds in montane shrubbery in open coniferous forests.[61]

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[58] Moore, J. 2000. *White-tailed Kite (Elanus leucurus). Focal Species Account for the CalPIF Grassland Bird Conservation Plan*. Available: http://www.prbo.org/calpif/htmldocs/species/grassland/wtkiacct.html.

[59] Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

[60] *Ibid*

[61] CWHR Project Staff. 2005. "Yellow Warbler," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2109&inline=1

The NSJWD, SEWD, and City of Stockton project component areas provide suitable foraging and nesting habitat for this species where riparian woodland occurs. This species would likely be found along open waterways, such as the Mokelumne and Calaveras Rivers and may occur on the lesser creeks in the project components.

Other Nesting Raptors and Migratory Bird Species

Nesting raptors and other migratory bird species are protected under the Migratory Bird Treaty Act (MBTA) and CFGC Sections 3503, 3503.5, 3800(a), and 3513. The potential for non-special-status birds to nest in a variety of habitats present in the project area is high.

MAMMALS

Northern California Ringtail

Ringtail is a fully protected species under the CFGC and is a SJMSCP covered species. Suitable habitat consists of a mixture of forest and shrubland in close association with rocky areas or riparian habitats. Usually not found more than 0.6 miles from permanent water. Hollow trees, logs, snags, cavities in talus slopes and other rocky areas, and other recesses are used for cover. Nests in rock recesses, hollow trees, logs, snags, abandoned burrows, or woodrat nests.[62]

The NSJWD and City of Stockton project component areas with suitable riparian habitat occur primarily along the Mokelumne River. Only the most northern portions of these project components are within the known range of this species. However, range and habitats of this secretive species are not well documented, therefore all suitable riparian habitat along the Mokelumne River, Calaveras River, and lesser waterways are considered suitable.

Pallid Bat

Pallid bat is a California species of special concern that occurs at low to moderate elevations throughout California. These bats occur in a wide variety of habitats, including grassland, shrubland, woodland, and forest, but they are most common in open, dry habitats with rocky areas for roosting. Pallid bats roost primarily in caves, crevices, mines, and occasionally in hollow trees and buildings.[63]

The project area is located within the yearlong range for pallid bat and provides suitable foraging and roosting habitat. Trees in riparian habitat provide roosting habitat and can be present along waterways as well as in semi-residential areas along agricultural fields. This species may also roost in buildings and man-made structures throughout the project area where there is not excessive noise or human disturbance.

Townsend's Big-eared Bat

Townsend's big-eared bat is a California species of special concern. This species ranges throughout California except for high elevation portions of the Sierra Nevada Mountains. Generally, prefers mesic habitats but known to occur in all non-alpine habitats of California. Roosting occurs in caves,

[62] CWHR Project Staff. 2005. "Ringtail," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2581&inline=1
[63] Harris, J., Alley, D., Duke, R. 1990. "Pallid Bat," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2349&inline=1

tunnels, mines, buildings, or other structures and this species may use different roosting sites for day and night.[64]

The project area is located within the yearlong range for Townsend's big-eared bat and provides suitable foraging and roosting habitat. Trees in riparian habitat provide roosting habitat and can be present along waterways as well as in semi-residential areas along agricultural fields. This species may also roost in buildings and man-made structures throughout the project area where there is not excessive noise or human disturbance.

Western Red Bat

Western red bat is a California species of special concern and is a SJMSCP covered species. These bats occur throughout the Central Valley. Western red bats typically roost in the foliage of mature trees associated with woodland borders, rivers, and agricultural areas. Roost trees are typically large cottonwoods, sycamores, walnuts, and willows. Activity levels in the Central Valley, as measured by acoustic surveys, have been shown to be highest in riparian habitat corridors more than 160 feet wide and dominated by mature trees.[65]

The project area is located within western red bat range and provide suitable foraging and roosting habitat. Trees in riparian habitat provide roosting habitat where trees and shrubs with accessible crevices occur. Roosting is common along the margins of agricultural fields, riparian areas, orchards, and occasionally urban areas. Suitable roosting habitat is scattered throughout the project area.

Fish Species Life Histories and Habitat Suitability

CENTRAL CALIFORNIA ROACH

Central California roach is a California species of special concern. Roach are generally found in small streams and are adapted to persist in intermittent streams as dense populations are frequently encountered in isolated pools. They are most common in the mid-elevation streams of the Sierra Nevada foothills but may also be found in the main channels of some rivers like the Stanislaus and Tuolumne.

Although little data is available for this species to determine a true potential to occur within the project area, it is within their historic range and this species has been observed in the Calaveras River and other nearby tributaries. Therefore, all natural waterways within the NSJWCD, SEWD, and City of Stockton project components are considered suitable habitat for this species.

CENTRAL VALLEY FALL/LATE FALL-RUN CHINOOK SALMON

Central Valley fall/late fall-run Chinook salmon are not a federally protected species under the ESA, but do have protections from the Magnuson-Stevens Act, and the project area includes EFH designated under the Pacific Coast Salmon Fishery Management Plan[66]. Additionally, they are a California species of special concern and are covered by the Calaveras River Habitat Conservation Plan (HCP). Chinook are an anadromous species, they reproduce in freshwater, but spend the majority of their life in the ocean before returning to freshwater to spawn. Once juvenile fish hatch,

[64] CWHR Project Staff. 2000. "Townsend's Big-Eared Bat," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2347&inline=1
[65] Pierson, E. D., W. E. Rainey, and C. Corben. 2006. *Distribution and Status of Western Red Bats (*Lasiurus blossevillii*) in California*. Species Conservation and Recovery Program Report 2006-04. California Department of Fish and Game, Habitat Conservation Planning Branch, Sacramento, CA.
[66] PFMC. 2024. Appendix A to the Pacific Coast Salmon Fishery Management Plan, as revised by Amendment 24. Identification and description of essential fish habitat, adverse impacts, and recommended conservation measures for salmon.

they can stay in the gravel nest to feed for 3-4 months. As the juveniles migrate towards the ocean, they begin the process called smoltification (transitioning from living in freshwater to living in saltwater). The "smolts" may stay in estuaries from a few days to several weeks to feed, adapt, and prepare to enter the ocean.

Fall/late-fall-run Chinook salmon regularly occur in the Mokelumne River on an annual basis. They are also supported by the Mokelumne River Hatchery located just downstream of Camanche Dam and Reservoir. These fish may also opportunistically utilize the Calaveras River but are not anticipated to result in a self-sustaining population due to infrequent presence and low numbers of spawning pairs annually. As such, this species has the potential to occur within NSJWCD, SEWD, and City of Stockton project component areas.

CALIFORNIA CENTRAL VALLEY STEELHEAD

CCV steelhead are a federally listed as threatened species and a California species of special concern.[67] They are covered by the Calaveras River HCP. This population includes the stock of steelhead at the Mokelumne River Hatchery. Spawning habitat includes gravel-bottomed, fast-flowing, well-oxygenated rivers and streams. Non-spawning habitat includes freshwater streams, estuarine habitats, and marine waters**.** The project area contains designated critical habitat for CCV steelhead in the Mokelumne River, Calaveras River, and the mainstem San Joaquin River.

CENTRAL VALLEY SPRING-RUN CHINOOK SALMON

Central Valley spring-run Chinook salmon is a federally and state listed as threatened species. They are covered by the Calaveras River HCP and EFH overlaps with the project area. Designated critical habitat for this species does not include the Mokelumne or Calaveras Rivers. Chinook are an anadromous species, they reproduce in freshwater, but spend the majority of their life in the Ocean before returning to freshwater to spawn. Once juvenile fish hatch, they can stay in the gravel nest to feed for 3-4 months. As the juveniles migrate towards the ocean, they begin the process called smoltification (transitioning from living in freshwater to living in saltwater). The "smolts" may stay in estuaries from a few days to several weeks to feed, adapt, and prepare to enter the ocean.

The NSJWCD, SEWD, and City of Stockton project component areas provide suitable aquatic habitat for this species.

Spring-run Chinook salmon do not have designated critical habitat within the project area.[68] In recent years, the San Joaquin River Restoration Program (SJRRP) has begun to reintroduce spring-run Chinook salmon to the San Joaquin River as an experimental population under a 10j rule.[69] The 10j rule for the population identified a study area (non-essential population [NEP] area) where the population carries different protections under the ESA, but when fish leave the study area they carry full ESA protections. The 10j rule for the SJRRP included a *de minimus* clause regarding certain types of projects that would not be at risk for take violations if take of the SJRRP fish occurs outside of the original study area. The project area falls outside of the designated NEP area for the SJRRP

[67] 70 FR 37160-37204. June 28, 2005. Final Rule: Endangered and Threatened Species: Final Listing Determinations for 16 ESUs of West Coast Salmon, and Final 4(d) Protective Regulations for Threatened Salmonid ESUs Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California. United States Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service. Federal Register, Volume 70 pages 37160-37204.
[68] 70 FR 52488. 2005. Final Rule: Endangered and Threatened Species: Designation of Critical Habitat for Seven Evolutionarily Significant Units of Pacific Salmon and Steelhead in California.
[69] Federal Register. 2016. *Endangered and Threatened Species: Designation of Experimental Populations Under the Endangered Species Act.* 81 FR 33416. Accessed via: https://www.federalregister.gov/documents/2016/05/26/2016-12379/endangered-and-threatened-species-designation-of-experimental-populations-under-the-endangered

experimental population, but also within the definition of projects excluded from take of SJRRP spring-run Chinook under the *de minimus* clause.

DELTA SMELT

Delta smelt were federally listed as a threatened species in March 1993.[70] The state of California listed the Delta smelt as threatened under the CESA in 1993 and designated the fish as endangered in 2008. They are a SJMSCP covered species and designated critical habitat is located in the Lower Mokelumne and San Joaquin River. Endemic to open waters of San Francisco Bay and Delta. Distribution includes San Pablo Bay up through Suisun Bay, upstream through the Delta to the Sacramento River below Isleton, and the San Joaquin River below Mossdale. Spawning has not been observed in the wild but is thought to take place in sloughs and shallow edge-water channels in the upper Delta and in Montezuma Slough near Suisun Bay.

The project component areas are within the known range of Delta smelt; however, they only have potential to occur in the lowest, tidally influenced reaches of the Mokelumne and Calaveras Rivers, as well as within the Delta. Recent sampling efforts for established monitoring programs for this species have not resulted in documentation of this species within the region in recent years, and it is likely that this species has been extirpated from this area**.** Therefore, as discussed below, only the City of Stockton has project components that overlap critical habitat.

Delta smelt designated critical habitat in California includes Suisun Bay, the Sacramento River Deep Water Ship Channel, portions of the Sacramento River, San Joaquin River, and the entirety of the Delta. Portions of the City of Stockton's project component overlap with delta smelt designated critical habitat within the Delta.

GREEN STURGEON (SOUTHERN DPS)

The sDPS of North American green sturgeon was listed as threatened under the ESA in 2006;[71] they are also a SJMSCP covered species. Spawning occurs primarily in the upper Sacramento River, but spawning populations have also been documented in the Feather and Yuba rivers. Green sturgeon occur in oceanic waters, bays, and estuaries during non-spawning season, entering San Francisco Bay in late winter through early spring, and spawning from April through early July. This species spawns in cool sections of rivers in deep pools containing small to medium-sized gravel, cobble, or boulder substrates.

The project area is within the range for this species, however, potential for occurrence within reaches of the Mokelumne River above its confluence with the San Joaquin River and Delta is low. The deep pools adults of this species prefer are limited and only the area furthest downstream, where it is tidally influenced near the confluence, is considered suitable habitat. Therefore, this species has the potential to occur within small portion of the City of Stockton project component.

Green sturgeon designated critical habitat in California includes portions of the Sacramento, lower Feather, and lower Yuba rivers; the Delta; and the Suisun, San Pablo, and San Francisco bays; and the mainstem San Joaquin River south to the confluence with the Stanislaus River.[72] The San Joaquin

[70] USFWS. 1993. FR Vol. 58. No 42. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Delta Smelt.
[71] National Oceanic and Atmospheric Administration (NOAA). 2006. "Endangered and Threatened Wildlife and Plants: Threatened Status for Southern Distinct Population Segment of North American Green Sturgeon, Final Rule." Federal Register 71 (67): 17757-17766.
[72] National Oceanic and Atmospheric Administration (NOAA). 2009. "Endangered and Threatened Wildlife and Plants: Final Rulemaking to Designate Critical Habitat for the Threatened Southern Distinct Population Segment of North American Green Sturgeon, Final Rule." Federal Register 74 (195): 52300-52351.

River is connected to the project area via an existing diversion station to the City of Stockton. There is designated critical habitat for sDPS green sturgeon within the tidally influenced portion of the Calaveras River at its confluence with the Delta (which is outside of the project area) and in the Delta (which only overlaps with the existing pipeline component in the City of Stockton).

HARDHEAD

Hardhead is a California species of special concern. Usually found in clear deep streams with a slow current. They are less common in brackish waters and generally prefer to remain in freshwater. Hardhead distributions generally occur in the lower rivers near the confluence or in foothill elevations, so their occurrence within the project area is likely limited to lower portions of the Mokelumne and Calaveras Rivers near the confluence of the San Joaquin River.

Although, little data is available for hardhead to determine a true potential to occur within the project area, it is located within their historic range and it has been observed in nearby San Joaquin tributaries like the Stanislaus. As such, this species has the potential to occur within the District boundaries of NSJWCD, SEWD, and City of Stockton, but not to overlap with the location of project component areas.

LONGFIN SMELT (SAN FRANCISCO BAY DELTA DPS)

Longfin smelt is federally listed as endangered[73] and State-listed as a threatened species and is also a SJMSCP-covered species. Considered pelagic and anadromous, though anadromy of this species is poorly understood. This DPS is a pelagic fish that exhibits an anadromous life history with reproduction within low-salinity to freshwater habitats beginning in late fall/early winter, extending into the spring as water temperature and low-salinity conditions allow. Longfin smelt designated critical habitat has not yet been designated. Their range does identify potential occurrence in the lower Mokelumne River near the confluence with the Cosumnes River.

The project area is within the range of longfin smelt; however, they likely only have potential to occur in the lowest, tidally influenced reaches of the Mokelumne or Calaveras Rivers. Recent sampling efforts for established monitoring programs for this species have not resulted in documentation of this species within the region in recent years**.** As such, this species has the potential to occur within the District boundaries of City of Stockton near the Delta (which only overlaps with the existing pipeline component in the City of Stockton project component area).

PACIFIC LAMPREY

Pacific lamprey is a California species of special concern. They are an anadromous species with a juvenile life stage residing in freshwater year-round. Adults typically migrate from the ocean into freshwater in winter during high flows. Juveniles of this species can be found in most watersheds in the Central Valley below large dams.

Although little data is available for Pacific lamprey to determine a true potential to occur within the project area, it is within their range and there are known populations in nearby watersheds like the Stanislaus River. As such, this species has the potential to occur within NSJWCD, SEWD, and City of Stockton project component areas in the Mokelumne and Calaveras Rivers as well as other natural waterways.

[73] U.S. Fish and Wildlife Service (USFWS). 2024. Endangered and Threatened Wildlife and Plants; Endangered Species Status for the San Francisco Bay-Delta Distinct Population Segment of the Longfin Smelt. Federal Register 89:61029.

RIFFLE SCULPIN

Riffle sculpin is a California species of special concern. It inhabits sand and gravel riffles of headwaters and creeks. They may also be found in sand-gravel runs and backwaters of small to large rivers and tend to stay on the river bottom. Riffle sculpin are distributed from the lower Columbia River in Washington to Morro Bay in California, including the Sacramento-San Joaquin River drainage (excluding Pit River).

Although little data is available for riffle sculpin to determine a true potential to occur within the project area, it is within their historic range and this species has been observed in the Calaveras River and other nearby tributaries. As such, this species has the potential to occur within NSJWCD, SEWD, and City of Stockton project component areas.

SACRAMENTO HITCH

Sacramento hitch is a California species of special concern. Often found in slow warm water, including lakes and quiet stretches of rivers, they can also occasionally be found in cool and clear, low-gradient streams in sandy runs or pools. This is a very heat tolerant fish and can withstand water temperatures greater than 30 degrees Celsius under some conditions. Additionally, it can be found in brackish water with salinities as high as nine ppt.

Knowledge regarding this species within this watershed is admittedly poor as there are no reported encounters in the CDFW's CNNDB in San Joaquin County when accessed on January 3, 2025. As such, this species presence in the Mokelumne River is unlikely, although the project area is within the historic range. As such, this species has the potential to occur within NSJWCD, SEWD, and City of Stockton project component areas in the Mokelumne and Calaveras Rivers as well as other natural waterways.

SACRAMENTO SPLITTAIL

Sacramento splittail is a California species of special concern and is a SJMSCP covered species. Typically found in estuarine environments all throughout the Delta. Sacramento splittail can be found in slower moving water, channels, floodplains, sloughs, and slow-moving rivers. The basic life history pattern for Delta/Suisun Marsh populations is for adults to migrate upstream in response to flow events from November to February to then spawn on floodplains or fringe habitats in March and April. Adults will then migrate downstream while embryos and larvae remain in flooded vegetation for three to six weeks during March and April.[74]

Spawning still occurs on a regular basis in the lower San Joaquin River areas and juveniles have been found in this region every year from 1995 to 2011.[75,76] Although little data is available for Sacramento splittail to determine a true potential to occur within the project area, it is within their historic range. They would likely only occur in the lowest, tidally influenced reaches of the Calaveras River. As such, while this species has the potential to occur within the District boundaries of SEWD and City of Stockton, they do not have the potential to occur within the project component areas.

[74] Crain, P.K., K. Whitener, P.B. Moyle. 2004. Use of a restored central California floodplain by larvae of native and alien fishes. Pages 125-140 *in* F. Feyrer, L.R. Brown, R.L. Brown, and J.J. Orsi, editors. Early life history of fishes in the San Francisco Estuary and watershed. American Fisheries Society Symposium 39, Bethesda, Maryland.
[75] Contreras, D., V. Afentoulis, K. Hieb, R. Baxter, and S. Slater. 2011. 2010 Status and Trends Report for pelagic fishes of the upper San Francisco Estuary. IEP Newsletter 24:27-38.
[76] Moyle PB, Baxter RD, Sommer T, Foin TC, Matern SA.2004. Biology and population dynamics of Sacramento splittail (*Pogonichthys macrolepidotus*) in the San Francisco Estuary: a review. San Francisco Estuary and Watershed Science [online serial]. Vol. 2, Issue 2 (May 2004), Article 3

WESTERN RIVER LAMPREY

Western river lamprey is a California species of special concern. They are an anadromous species with juvenile life stage residing in freshwater year-round. Adults typically migrate from the ocean into freshwater in winter during high flows.

Although little data is available for this species to determine a true potential to occur within the project area, it is within their historic range. As such, this species has the potential to occur within NSJWCD, SEWD, and City of Stockton project component areas in the Mokelumne and Calaveras Rivers as well as other natural waterways.

WHITE STURGEON

While not currently listed, white sturgeon were approved by the California Fish and Game Commission as a candidate species for listing under the CESA on June 19, 2024. As a candidate species, white sturgeon are granted full protections while the candidate review process takes place. A final decision is anticipated from the Commission as early as late 2025. Additionally, on October 7, 2024, white sturgeon was also approved by USFWS to be petitioned as a threatened or endangered species and the service confirmed that protection may be warranted. USFWS will review this species in a 12-month status review, anticipated late fall of 2025 or later.

Much like green sturgeon, white sturgeon primarily live in estuaries of large river systems but are anadromous fish moving from the ocean to fresh water for spawning. This species is generally found in deep, soft-bottomed areas of estuaries, where they move about in response to changes in salinity. The Mokelumne River is identified as potential habitat for white sturgeon, though there are no recent records of them being captured there.

The project area is within the range of white sturgeon, however, there is no documentation readily available of this species occurring within the Mokelumne or Calaveras Rivers recently. Both rivers likely lack the deep pools preferred by adults of this species. White sturgeon are assumed to have similar habitat needs as green sturgeon, and therefore similar occurrence potential in the Mokelumne based on established critical habitat. As such, this species has the potential to occur within NSJWCD and City of Stockton project component areas.

Fish Passage and Wildlife Movement Corridors

A fish or wildlife corridor is generally a topographical or landscape feature or movement area that connects two areas of habitat that otherwise would be entirely fragmented or isolated from one another. Habitat connectivity is described as the connectedness of habitat for a particular species, while landscape connectivity can be defined as the human perception of native vegetation cover connectedness in a landscape.[77] Permeability of fish and wildlife corridors is a measure of structure – hardness of barriers, connectedness of natural cover, and arrangement of land uses.[78] Roads, development, dams, and other structures create resistance that interrupts or redirects movement, and therefore, lowers the permeability. Maintaining the continuity of established fish and wildlife corridors is important to sustaining species with specific foraging requirements, preserving a

[77] Fischer, J. D.B. Lindenmayer. 2007. Landscape modification and habitat fragmentation: a synthesis. Global Ecology and Biogeography 16: 265-280

[78] The Nature Conservancy. 2012. Modeling Landscape Permeability. Available at: https://www.conservationgateway.org/ConservationByGeography/NorthAmerica/UnitedStates/edc/Documents/ModelingLandscapePermeability.pdf

species' distribution potential, and retaining diversity among many wildlife populations. Consequently, resource agencies consider wildlife corridors to be a sensitive resource.

Place of Use Corridors Summary and Descriptions

FISH PASSAGE AND BARRIERS

Habitat connectivity is an important characteristic required for most fish species. Poor connectivity can present in the form of partial or complete migratory barriers, stranding, entrainment, impingement, or other environmental or manmade scenarios. Connectivity (*i.e.,* fish passage) supports diversity and, therefore, ecosystem resilience. Habitat accessibility is identified as one of the largest stressors on many of Californias anadromous fish.[79]

Data of known fish barriers in the Mokelumne and Calaveras Rivers was downloaded from CalFish's California Fish Passage Assessment Database.[80] While the Mokelumne River has some documented partial barriers and known diversions that may limit some species' ability to move freely throughout the river, the true upstream, non-passable barrier lies at Camanche Dam at river kilometer (rkm) 103. One of the more notable partial barriers on the Mokelumne River is the WID Dam at rkm 64; however, fish ladders allow for salmonid passage upstream to Camanche Dam.[81]

A full assessment of fish passage barriers on the Calaveras River was conducted by the California Department of Water Resources (DWR) in 2007.[82] Below the Bellota Weir (rkm 36.8), the Calaveras River splits into two separate channels – the Old Calaveras River to the north and Mormon Slough to the south – before meeting again at the Stockton Diverting Canal (SDC). The DWR assessment found 37 instream structures have been identified as potential passage impediments to salmon and steelhead trout in the lower Calaveras River, downstream of Bellota Weir via both the Mormon Slough/SDC and Old Calaveras River channel routes. Twenty-two (22) structures are in the Mormon Slough/SDC route while 15 are located in the Old Calaveras River channel.[83]

Notably, as part of the Calaveras River HCP, Mormon Slough is utilized as the primary migratory corridor for salmonids in the Calaveras River, and SEWD has committed to improving passage conditions at the five most limiting structures they own and potentially more over the term of their Incidental Take Permit (*e.g.,* 50 years) if funding becomes available.[84] To date, improvements have been made at Budiselich Flashboard Dam (rkm 12.1; 2011), Caprini Low-Flow Crossing (rkm 20.4; 2013, Central California Traction Railroad Crossing (rkm 10.5; 2019) and Hosie Low-Flow Crossing (rkm 21.2; 2024), with construction pending for summer of 2025 for the Watkins Low-Flow Crossing at rkm 30.6, and permits pending for the Bellota Modification Project.[85] These improvements should allow for continuous migration of salmonids from the Delta, through Mormon Slough, to the true upstream limit of anadromy at New Hogan Dam (rkm 67.6).

[79] NMFS (National Marine Fisheries Service), 2022. NOAA Fisheries West Coast Region Guidance to Improve the Resilience of Fish Passage Facilities to Climate Change - 2022. NOAA Fisheries West Coast Regional Office, 1201 Northeast Lloyd, Portland, Oregon 97232
[80] CalFish. 2018. California Fish Passage Assessment Database. Google Earth KMZ. Available online: https://www.calfish.org/Portals/2/Programs/PAD/docs/California_Fish_Passage_Assessment_Database_GE.zip
[81] *Ibid*
[82] California Department of Water Resources (DWR). 2007. Calaveras River fish migration barriers assessment report.
[83] Stockton East Water District (SEWD) and NOAA Fisheries (NOAA). 2019. Draft Environmental Assessment/Initial Study of Incidental Take and Implementation of the Calaveras River Habitat Conservation Plan.
[84] SEWD and NOAA Fisheries (NOAA). 2019. Draft Environmental Assessment/Initial Study of Incidental Take and Implementation of the Calaveras River Habitat Conservation Plan.
[85] SEWD, FISHBIO, and DWR. 2024. Hosie Low-Flow Crossing Fish Passage Improvement Project. Presentation to the California Fish Passage Forum Science and Data Meeting, June 5, 2024.

TERRESTRIAL WILDLIFE

Movement corridors refer to established migration routes commonly used by resident and wildlife species for passage from one geographic location to another. Corridors are present in a variety of habitats and link otherwise fragmented locations of undisturbed areas. Maintaining the continuity of established corridors is important to sustain access to breeding and foraging areas, preserve species distributions, and retain genetic diversity. The Nature Conservancy's Resilient Land Mapping Tool[86] Local Connectedness dataset, and the CDFW Terrestrial Connectivity, Areas of Conservation Emphasis (ACE) dataset were used to define the baseline condition and permeability of the project area in terms of terrestrial wildlife movement.

The Nature Conservancy local connectedness dataset "measures how impaired the structural connections are between natural ecosystems within a local landscape.[87] Roads, development, noise, exposed areas, dams, and other structures all directly alter processes and create resistance to species movement by increasing the risk (or perceived risk) of harm." The ranking of local connectedness ranges from:

1. Developed
2. Least Connected
3. Less Connected
4. Slightly Less Connected
5. Average/Median Connected
6. Slightly More Connected
7. More Connected
8. Most Connected.

CDFW's California Essential Habitat Connectivity Linkages model provides a statewide map of ACE that details the entire state in 2.5 square mile hexagons that each get ranked into relative importance for wildlife movements.[88] CDFW's California Essential Habitat Connectivity Linkages model provides a statewide map of ACE that details the entire state in 2.5 square mile hexagons that each get ranked into relative importance for wildlife movements.[89] The ranking system is as follows:

1. Limited Connectivity Opportunity
2. Large Natural Habitat Area
3. Connections with Implementation Flexibility
4. Conservation Planning Linkages
5. Irreplaceable and Essential Corridors.

Additionally, CDFW has a Statewide map identifying 850 relatively large natural landscape blocks, ranging from 2,000 to 3.7 million acres, connected by 192 Essential Connectivity Areas.[90] The

[86] The Nature Conservancy. 2024. Resilient Land Mapping Tool version 2.0. Available at: https://www.maps.tnc.org/resilientland/#/explore
[87] *Ibid*
[88] CDFW. 2024. California Wildlife Habitat Relationships System. Online Database. Available at: https://wildlife.ca.gov/Data/CWHR/Wildlife-Habitats.
[89] *Ibid*
[90] The Nature Conservancy. 2024. Resilient Land Mapping Tool version 2.0. Available at: https://www.maps.tnc.org/resilientland/#/explore

purpose of this mapping is to maintain ecological integrity at the broadest scale to allow wildlife movement. Areas are ranked in five categories from less permeable to more permeable.

A review of these sources reveals that the project area has:

- Developed to less connectedness throughout most of the project area, with the eastern edge connecting to an average/median connected area that is the outer span of a most connected area.
- 'Limited Connectivity Opportunity' for habitat connectivity linkages.
- No major natural landscape blocks within the project area.

Most of the Place of Use consists of actively used agricultural plots and urban development and dwellings that typically does not allow for unobstructed movement of terrestrial wildlife throughout. Due to the high level of development and human disturbance in the project area, there are barriers to wildlife movement. However, there are some species that are accustomed to human disturbance, and these areas still provide movement and suitable habitat for them. Riparian areas associated with the Mokelumne River, Calaveras River, and associated riparian corridors within the project area do provide cover and facilitate both terrestrial and aquatic wildlife movement. In addition to riparian habitats, other aquatic habitats, such as irrigation canals and ditches can also provide movement for semi-aquatic species.

MIGRATORY BIRDS

Important bird areas (IBAs) identifies and aims to conserve areas that provide vital habitat for birds and other biodiversity. The IBA program is a global initiative of BirdLife International, implemented by Audubon and local partners. The Audubon Society's California Important Bird Areas Interactive Site Map[91] defines priority migratory bird use locations as important globally, continentally, or by state.

There are no IBAs within the Place of Use. The closest IBA is located at Salt Spring Valley east of Stockton and the base of the foothills but is separated from the rest of the central-valley by a low, northwestern-southeastern-trending range covered with oak woodlands (Gopher Ridge).

Project Area

As follows is a discussion of corridors within project component areas for each of the three MICUP partner agencies.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

NSJWCD project components overlap with the Mokelumne River, Bear Creek, and Pixley Slough, all of which may provide a riparian and/or aquatic corridor for aquatic, terrestrial, and semi-aquatic species. Irrigation canals and ditches within agricultural areas within the recharge area may also provide smaller corridors for certain aquatic and semi-aquatic species. The Mokelumne River may be considered a significant wildlife corridor.

[91] Audubon Society. 2013. *California Important Bird Areas Interactive Site Map.* Accessed on January 13, 2025 via: https://ca.audubon.org/conservation/california-iba-interactive-site-map

STOCKTON EAST WATER DISTRICT

SEWD project components overlap with the Calaveras River and Mosher Slough, both of which may provide riparian corridors and/or aquatic corridors for aquatic, terrestrial, and semi-aquatic species. Irrigation canals and ditches in agricultural areas within the project component may also provide smaller corridors for certain wildlife species. Calaveras River may be considered a significant wildlife corridor.

CITY OF STOCKTON

The City of Stockton project component areas overlap with the Calaveras River, Bear Creek, Pixley Slough, and Mosher Creek, all of which may provide riparian corridors and/or aquatic corridors for aquatic, terrestrial, and semi-aquatic species. Irrigation canals and ditches in agricultural areas within the recharge area may also provide smaller corridors for certain aquatic and semi-aquatic species. Mokelumne River and Calaveras River may be considered a significant corridor. There is an agricultural ditch running the length of the western border of the City of Stockton's project component. This ditch could provide a submarginal corridor for certain aquatic and semi-aquatic species, however, it is only adjacent to the project component area and not within it.

4.4.3 Regulatory Framework

Federal Regulations

Federal Endangered Species Act

Pursuant to the federal ESA, the USFWS and NMFS have authority over projects that may affect the continued existence of a federally listed (threatened or endangered) species. Section 9 of the ESA prohibits the take of federally listed fish or wildlife species (16 USC Section 1538[a][1][B]). "Take" is defined under ESA, in part, as killing, injuring, harming, or harassing (16 USC Section 1539[19]). Under Federal regulations, take is defined further to include habitat modification or degradation where it results or is reasonably expected to result in death or injury to wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

The take prohibition of ESA Section 9 applies only to listed species of fish and wildlife. Section 9(a)(2)(B) describes Federal protection for endangered plants. In general, ESA does not protect listed plants located on nonfederal land (*i.e.,* areas not under Federal jurisdiction), unless such species are already protected by State law.

Section 7 of ESA outlines procedures for Federal interagency cooperation to conserve federally listed species and designated critical habitat. Section 7(a)(2) requires Federal agencies to consult with USFWS and NMFS to ensure that the Federal agencies are not undertaking, funding, permitting, or authorizing actions likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat. Critical habitat identifies specific areas that have the physical and biological features that are essential to the conservation of a listed species, and that may require special management considerations or protection.

For projects where Federal action is not involved and take of a listed species may occur, the project proponent may seek to obtain an incidental take permit under Section 10(a) of ESA. Section 10 allows USFWS and/or NMFS to permit the incidental take of listed species if such take is accompanied by a habitat conservation plan that includes components to minimize and mitigate impacts associated with the take.

Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires Federal agencies to consult with NMFS on activities that may adversely affect EFH. Under the Magnuson-Stevens Act, the consultation process is intended to promote the conservation of EFH as necessary to support sustainable fisheries and the managed species' contribution to a healthy ecosystem.

For the purposes of the Magnuson-Stevens Act, EFH means "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity," and includes the associated physical, chemical, and biological properties that are used by fish (50 CFR 600.10). Adverse effect means any impact that reduces quality or quantity of EFH, and may include direct or indirect physical, chemical, or biological alteration of the waters or substrate and loss of (or injury to) benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality or quantity of EFH. Adverse effects may result from actions occurring within EFH or outside of it and may include direct, indirect, site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810). Section 305(b) of the Magnuson-Stevens Act also requires NMFS to recommend measures that can be taken by the action agency to conserve EFH. Such recommendations may include measures to avoid, minimize, mitigate, or otherwise offset the adverse effects of the action on EFH (50 CFR 600.905(b))].

The MSA has identified four different fisheries management plans with associated EFH:

- Pacific Coast salmon
- Pacific Coast groundfish
- Coastal pelagic species
- Highly migratory species

Clean Water Act

Section 404 of the CWA requires a permit before engaging in any activity that involves any discharge of dredged or fill material into "waters of the United States," including wetlands. Fill includes material placed in waters of the United States where the material has the effect of replacing any portion of a water of the United States with dry land or changing the bottom elevation of any portion of a water of the United States. Examples of fill material include, but are not limited to rock, sand, soil, clay, plastics, construction debris, wood chips, overburden from mining or other excavation activities, and material used to create any structure or infrastructure in waters of the United States.

Under Section 404 of the CWA, the U.S. Army Corps of Engineers (USACE) regulates, and issues permits for activities that involve the discharge of dredged or fill materials into waters of the United States. Fill that results in no more than minimal individual and cumulative adverse effects on the aquatic environment generally can be authorized under the USACE nationwide permit program, provided that the project satisfies the terms and conditions of the particular permit. Fills that do not qualify for a nationwide permit or regional general permit require a letter of permission or an individual permit.

Under Section 401 of the CWA, an applicant for a Section 404 permit must obtain a certificate from the appropriate State agency stating that the intended dredging or filling activity is consistent with the State's water quality standards and criteria. In California, the State Water Resources Control Board delegates the authority to grant water quality certification to the nine Regional Water Quality

Control Boards (RWQCBs); the Central Valley RWQCB, (Region 5) has jurisdiction over the project area.

Migratory Bird Treaty Act

The Federal MBTA (16 USC, Sec. 703, Supp. I, 1989) prohibits killing, possessing, or trading migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. This act encompasses whole birds, parts of birds, bird nests, and eggs and applies to all persons and agencies in the U.S., including Federal agencies. The MBTA is administered by the USFWS, but there is no process for obtaining project-related take authorization under the MBTA.

State Regulations

California Endangered Species Act and California Native Plant Protection Act

Pursuant to the CESA, a permit from the CDFW is required for projects that would "take" a species that is State listed as threatened or endangered (CFGC 2050 *et seq*.). Under CESA, take is defined as an activity that would directly or indirectly kill or injure an individual of a species. The take of State-listed species incidental to otherwise lawful activities requires a permit, pursuant to Section 2081(b) of CESA. The State has the authority to issue an incidental take permit under CFGC 2081, or to coordinate with USFWS during the Section 10(a) process to make the Federal permit consistent with CESA.

The California Native Plant Protection Act (CFGC Section 19000 *et seq*.) allows landowners to take listed plant species from, among other places, a canal, lateral ditch, building site, road, or other right-of-way, provided that the owner first notifies CDFW and gives the agency at least 10 days to come and retrieve (and presumably replant) the plants before they are plowed under or otherwise destroyed.

California Fish and Game Code Section 1602

Sections 1600–1603 of the CFGC states that it is unlawful for any person or agency to substantially divert or obstruct the natural flow or substantially change the bed, channel, or bank of any river, stream, or lake designated by CDFW, or to use any material from the streambeds, without first notifying CDFW of such activity. If an existing fish or wildlife resource may be substantially adversely affected by the activity, CDFW may propose reasonable measures to protect those resources. If these measures are agreeable to the party, they may enter into a streambed alteration agreement with CDFW identifying the approved activities and associated mitigation measures.

California Fish and Game Code Section 3503 – 3503.5 – Protection of Bird Nests and Raptors

Section 3503 of the CFGC states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Section 3503.5 specifically states that it is unlawful to take, possess, or destroy any raptors (*i.e.,* hawks, owls, eagles, and falcons), including their nests or eggs. Typical violations of these codes include destruction of active nests resulting from removal of vegetation in which the nests are located. Violation of Section 3503.5 could also include failure of active raptor nests resulting from disturbance of nesting pairs by nearby project construction.

Natural Community Conservation Planning Act

The Natural Communities Conservation Planning Act was established by the California Legislature, is directed by the CDFW, and is implemented by the State, as well as public and private partnerships to protect habitat in California. The Natural Communities Conservation Planning Act takes a regional approach to preserving habitat. An Natural Community Conservation (NCCP) identifies and provides for the regional protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. Once an NCCP has been approved, CDFW may provide take authorization for all covered species, including fully protected species, Section 2835 of the California Fish and Game Code.

California Environmental Quality Act - Sensitive Natural Communities

CDFW maintains a List of Natural Communities that are native to California. CDFW identifies and ranks subsets of these natural communities as sensitive natural communities that are considered to be highly imperiled. CDFW publishes and frequently updates a list of Sensitive Natural Communities.[92] Many riparian plant communities are included as sensitive natural communities, because of habitat loss and their value to a diverse community of plant and wildlife species. Some native grassland communities are in decline and are considered sensitive natural communities.

Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Act, waters of the State fall under jurisdiction of the RWQCB. Under the Act, the RWQCBs must prepare and periodically update water quality control basin plans. Each basin plan sets forth water quality standards for surface water and groundwater, as well as actions to control non-point and point sources of pollution to achieve and maintain these standards. Waters of the state include any surface water or groundwater, including saline waters, within the State's boundaries. The RWQCB has the discretion to take jurisdiction over areas not Federally regulated under Section 401 of the CWA, provided they meet the definition of waters of the State. Projects that affect waters of the State must meet waste discharge requirements of the relevant RWQCB.

California Code of Regulations (Wetlands and Waters Definition)

The State Water Board indicates that no single accepted definition of wetlands exists at the State level, and that RWQCBs may have different requirements and levels of analysis with regard to the issuance of water quality certifications. Generally, an area is a wetland if, under normal circumstances:

1. the area has continuous or recurrent saturation of the upper substrate caused by groundwater, or shallow surface water, or both;
2. the duration of such saturation is sufficient to cause anaerobic conditions in the upper substrate; and
3. the area's vegetation is dominated by hydrophytes, or the area lacks vegetation.

Under California State law, waters of the State means "any surface water or groundwater, including saline waters, within the boundaries of the state." As such, water quality laws apply to both surface water and groundwater. After the U.S. Supreme Court decision in *Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers* (53 USC 159), the Office of Chief Counsel of the State

[92] CDFW. 2023. California Sensitive Natural Communities. Available at: https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities#sensitive%20natural%20communities.

Water Board released a legal memorandum confirming the State's jurisdiction over isolated wetlands. The memorandum stated that under the California Porter-Cologne Water Quality Control Act, discharges to wetlands and other waters of the State are subject to State regulation, and this includes isolated wetlands. In general, the State Water Board regulates discharges to isolated waters in much the same way as it does for waters of the United States, using Porter-Cologne rather than CWA authority.

Sustainable Groundwater Management Act

In 2014, the State adopted the Sustainable Groundwater Management Act (SGMA) to help manage its groundwater. According to the act, local Groundwater Sustainability Agencies (GSAs) must be formed for all high- and medium-priority basins in the state. These GSAs must develop and implement Groundwater Sustainability Plan (GSP)s for managing and using groundwater without causing undesirable results, including significant groundwater-level declines, groundwater-storage reductions, seawater intrusion, water-quality degradation, land subsidence, and surface-water depletions.[93] These are also referred to as sustainability indicators. DWR and SWRCB are the two lead State agencies that implement the SGMA.

SGMA requires that all designated medium and high-priority groundwater basins be managed in a sustainable manner within 20 years of GSP adoption, and the Eastern San Joaquin Subbasin (ESJSB) is designated as a high-priority groundwater basin. SGMA also requires that GSAs demonstrate sustainability through the avoidance of undesirable results. The presence of significant and unreasonable effects for any of the indicators, if left uncorrected, could result in State intervention in the management of groundwater in the ESJSB. In compliance with SGMA, GSPs should be evaluated regarding their progress towards meeting the approved sustainability goals at least every five years.[94] The project area is covered by the Eastern San Joaquin Groundwater Authority and ESJSB GSP.

Regional and Local Regulations

City of Stockton General Plan

The General Plan for the City of Stockton provides the following goals and policies to protect, maintain, and restore natural resources in Chapter 5 Land Use of the Plan:[95]

- **Policy LU-5.2:** Protect natural resource areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other cultural/historic resources from encroachment or destruction by incompatible development.
  - **Action LU-5.2A.** Continue to coordinate with the San Joaquin Council of Governments (SJCOG) and comply with the terms of the Multispecies Habitat Conservation and Open Space Plan to protect critical habitat areas that support endangered, threatened, and special-status species.
  - **Action LU-5.2B.** For projects on or within 100 feet of sites that have the potential to contain special-status species or critical or sensitive habitats, including wetlands, require preparation of a baseline assessment by a qualified biologist following appropriate

[93] California Department of Water Resources. 2024. Sustainable Groundwater Management Act. Available: https://water.ca.gov/programs/groundwater-management/sgma-groundwater-management. Accessed January 23, 2025.
[94] *Ibid*
[95] City of Stockon. 2018. Envision Stockton 2040 General Plan. Prepared by Placeworks for the City of Stockton. Accessed via: https://www.stocktonca.gov/business/planning___engineering/general_plan.php

protocols, such as wetland delineation protocol defined by the U.S. Army Corps of Engineers. If such sensitive species or habitats are found to be present, development shall avoid impacting the resource, and if avoidance is not feasible, impacts shall be minimized through project design or compensation identified in consultation with a qualified biologist.

- **Action LU-5.2C.** Require new development to implement best practices to protect biological resources, including incidental take minimization measures and other federal and State requirements and recommendations that are consistent with the SJMSCP.

San Joaquin County General Plan

The San Joaquin County General Plan Natural and Cultural Resources Element provides goals and objectives for natural resources and species in order to protect and preserve important habitat for plant and wildlife species, protect open space critical for percolation of rainfall for natural recharge of the underlying groundwater basin, and to ensure the development and maintenance of open space and recreation areas:[96]

- **Goal NCR-2.1: Protect Significant Biological and Ecological Resources -** The County shall protect significant biological and ecological resources including: wetlands; riparian areas; vernal pools; significant oak woodlands and heritage trees; and rare, threatened, and endangered species and their habitats.
- **Goal NCR-2.2: Collaboration for Species Protection -** The County shall collaborate with the CDFW during the review of new development proposals to identify methods to protect listed species.
- **Goal NCR-2.3: San Joaquin County Multi-Species Habitat Conservation and Open Space Plan-** The County shall continue to implement the SJMSCP to mitigate biological impacts resulting from open space land conversion.
- **Goal NCR-2.4: Preservation of Significant Oak Groves -** The County shall require new development in the vicinity of significant oak groves to be designed and sited to maximize the long-term preservation of the trees and the integrity of their natural setting.
- **Goal NCR-2.5: No Net Loss of Wetlands -** The County shall not allow development to result in a net loss of riparian or wetland habitat.
- **Goal NCR-2.6: Criteria for Development Impacts to Wetlands -** The County shall not approve new development projects that have the potential to fill wetlands, unless:
  - no suitable alternative site exists for the land use, and the use is considered necessary to the public;
  - there is no degradation of the habitat or numbers of any rare, threatened, or endangered plant or animal species as a result of the project; and
  - habitat of greater quantity and superior or comparable quality will be created or restored to compensate for the loss.
- **Goal NCR-2.7: Protect Waterfowl Habitat -** The County shall strive to preserve, protect, and enhance feeding areas and winter habitat for migratory waterfowl.
- **Goal NCR-2.8: Natural Open Space Buffer -** The County shall require a natural open space buffer to be maintained along any natural waterway to provide nesting and foraging habitat and to protect waterway quality.

[96] San Joaquin County. 2016. San Joaquin County General Plan. Policy Document.

- **Goal NCR-2.9: Protect Fisheries -** The County shall encourage and support efforts to protect fisheries, including:
  - Reducing the level of pesticides and fertilizers and other harmful substances in agricultural and urban runoff;
  - Designing and timing waterway projects to protect fish populations; and
  - Operating water projects to provide adequate flows for spawning of anadromous fish.
- **Goal NCR-2.10: Support Fishery Restoration Plans -** The County shall work with the CDFW and other agencies or organizations to support development and implementation of feasible restoration plans for anadromous fisheries.
- **Goal NCR-2.11: Ecological Information Programs -** The County shall support programs that encourage and teach respect for the environment.
- **Goal NCR-2.12: Encourage Native Landscaping -** The County shall encourage the use of native plants for landscaping to provide suitable habitat for native wildlife.
- **Goal NCR-2.13: Project Referral to Environmental Organizations -** The County shall encourage private resource and conservation organizations to review and comment on projects that could affect the County's biological resources

City of Stockton Municipal Code

The City of Stockton Municipal Code has requirements regarding removal of City trees as well as removal of heritage trees within the City of Stockton limits. Anyone who wishes to remove trees or stumps in the City's right-of-way or easements must contact the Community Development Department for permit information and requirements (Chapter 16.162 Street Tree Permit). Application must include the following information: the number, species, circumference, condition of the existing tree(s), a statement for the reason for the request, and a map. After receipt of the application, the Community Development Department will contact the applicant about the tree assessment, approval or denial of a permit, and any mitigation requirements per the code such as replacement.[97] Activities that would not require a permit under this municipal code include trimming, pruning, or maintaining a street tree. Maintenance of trees includes deep root watering; root pruning; installing root barriers; clearance and structural trimming; fertilizing; pest control; removal of mistletoe, dead branches, leaves, and other debris; and the removal of branches to ensure visibility of traffic signs or the movement of pedestrians on sidewalks or vehicles on streets. Maintenance does not include the removal or effective removal of a street tree.

Heritage trees which are also protected under the City's Municipal Code (Chapter 16.130), are defined as any valley oak, coast live oak (*Q. agricolia*), and interior live oak trees which are located on public or private property, and which have a trunk diameter of sixteen inches or more, measured at twenty-four inches above actual grade[98]. The removal process is very similar to street trees and would require the same information.

San Joaquin County Ordinance – Development Title

This Development Title (Title 9) is intended to serve as the basis for all land use regulations and development standards adopted by San Joaquin County. Its purpose is to protect and promote the public health, safety, and general welfare; and implement the San Joaquin County 2035 General

[97] City of Stockton. 2024. City Ordinance: Heritage Tree Permit. Chapter 16.130.
[98] *Ibid.*

Plan. The title lists requirements in regard to tree impacts (Chapter 9-1505), riparian (Chapter 9-1510), wetlands (Chapter 9-1515), and waterway habitats (Chapter 9-1520).[99] Definitions of the following are utilized within this title:[100]

- **Drip Line.** An area delineated by projection of the periphery of the crown area of a tree down to the ground surface.
- **Heritage Oak Tree.** A native oak tree that has a single trunk diameter of 32 inches or greater measured at four and one-half feet above the average ground elevation of the tree.
- **Historical Tree.** Any tree or group of trees given special recognition by the Planning Commission because of the size, age, location, or history.
- **Native Oak Trees.** A valley oak or interior live oak, California live oak, or blue oak.
- **Rare and Endangered Species.** A plant or animal species designated as rare, endangered, or threatened by the California Fish and Game Commission or the USFWS.
- **Review Authority**. The decision-making body or official responsible for approving, approving with conditions or denying an application for a subdivision or map approval or a development project or interpreting, implementing, and enforcing this Title. The Review Authority includes:
  - Board of Supervisors;
  - Planning Commission;
  - Director of the Community Development Department;
  - Zoning Administrator; and
  - Community Development Department.
- **Riparian Corridor.** A strip or generally contiguous area of riparian habitat.
- **Riparian Habitat.** The banks and other terrestrial environs of freshwater bodies, watercourses, estuaries, and surface waters where mesic vegetation grows.
- **Riparian Woodland.** A riparian habitat characterized by trees 20 feet or taller that compose the dominant vegetation element of the plant community.
- **Vegetation removal.** The cutting, breaking, burning, or uprooting of vegetation, the application of herbicide to vegetation, the covering over of vegetation with earth, or the compacting of the soil under and around vegetation. Vegetation removal does not include removal of invasive plant species.
- **Vernal Pool.** A shallow depression in poorly drained soil that fills with water during rain, gradually shrinks in the spring, usually dries out in the summer, and often supports a unique population of organisms.

TREES

Under general exemptions for tree impacts (Section 9-1505.8), exemptions include trees that are dead or diseased, emergency removals, removals for public utilities, and ”removals required for the repair or maintenance of existing roads, flood control facilities, and/or other public facilities. Where flood channels consist of all or portions of natural waterways, the portion to be exempted shall be

[99] San Joaquin County. 2025. Code of Ordinances. Online content updated January 9, 2025. Available at: https://library.municode.com/ca/san_joaquin_county/codes/code_of_ordinances.
[100] San Joaquin County. 2024. *9-900.20 - Definitions.* Accessed on January 14, 2025 via: https://library.municode.com/ca/san_joaquin_county/codes/development_title?nodeId=SERIES_900GETE_CH9-900KETEDE_9-900.020DE

limited to the watercourses and such portions of the adjacent land area between the levees required to discharge the 100-year flood."

The removal of a native oak tree, heritage oak tree, or a historical tree requires an approved Improvement Plan application (Chapter 9-884) that will be reviewed by the Review Authority or Staff Review. Replacements will be specified based upon approval but may include: 5 trees, acorns or combination for heritage oaks or 3 of the same for each native oak (Section 9-1505.4). Additionally, the replacement stock must be planted and maintained in such a manner as to ensure survival at the end of three years from planting.

Native oak trees, heritage oak trees, or historical trees that are identified during planning as being preserved onsite are subject to the development constraints (Section 9-1505.5). Constraints include restrictions within the dripline of said trees such as: no grade changes of removal or addition of soils, prevention of soil compaction protections, mitigation of elevation changes, fencing protections, trenching impacts, retaining walls, and paving. Development constraints in this section do not apply to agricultural practices.

RIPARIAN HABITAT

Any actions that are located within a riparian corridor are subject to Chapter 9-1510. Opinions from the Review Authority on if riparian habitat has the potential to be destroyed, eliminated, or degraded shall not be permitted. A permit may be issued if both the following conditions are true, (1) the potential loss is in the public interest, and (2) the potential destruction, elimination, or degradation of the riparian habitat would be mitigated through a Riparian Habitat Mitigation Plan that shall be part of the conditions of approval.

Riparian Habitat Mitigation Plans (Section 9-1510.3) shall include a plan to protect existing riparian habitat or a plan to re-place, preserve, or develop new habitat, or a combination thereof. The Plan shall be prepared by a qualified biologist and shall be subject to the following provisions:

- **On-Site Riparian Habitat.** The Plan shall show the location and extent of existing riparian habitat on the site of the proposed project and shall indicate the riparian habitat that may be destroyed, eliminated, or degraded as a result of the project as well as the riparian habitat that is to be retained and protected, with methods for ensuring protection.
- **Mitigation Sites.** The Plan shall indicate sites that are to be developed or preserved to serve as mitigation for loss of riparian habitat as a result of the proposed project. To the extent practicable, mitigation sites shall be in San Joaquin County and shall assist in the maintenance of riparian corridors.
- **Contribution to Existing Off-Site Habitat Site. In** lieu of establishing and maintaining riparian habitat on-site of the proposed development, the applicant may contribute to the acquisition and maintenance of an existing off-site riparian habitat area or contribute to the establishment and maintenance of a new riparian habitat area. The amount of the contribution shall be based on the cost of establishing and maintaining replacement habitat for a five (5) year period on site.
- **Replacement Vegetation.** Vegetation planted to mitigate the loss of riparian habitat shall generally be native vegetation. The size of the area of replacement vegetation shall be at least two (2) times the size of the area that is to be destroyed, eliminated, or degraded.
- **Maintenance.** Provisions shall be made for maintaining replacement vegetation for five (5) years.

- **Conservation Easement**. Assurance of habitat preservation shall be by conservation easement or other acceptable methods.

Additionally, a Natural Bank Buffer (Section 9-1510.5) that runs parallel to any natural bank of a waterway, a natural open space for riparian habitat and waterway protection shall be maintained to provide nesting and foraging habitat and the protection of waterway quality. The minimum width of said open space shall be one hundred (100) feet, measured from the mean high-water level of the natural bank or fifty (50) feet back from the existing riparian habitat, whichever is greater. Water-dependent uses may be permitted in this buffer.

WETLAND AND WATERWAYS HABITAT

Wetlands and waterway habitats are covered within the Ordinance (Chapter 9-1515 and Chapter 9-1520), however, they are "reserved" and are not available to the general public. Therefore, they are not discussed further in this document.

San Joaquin County Habitat Conservation Plan

The key purpose of the San Joaquin County Multi-Species Habitat Conservation and Open Space Plan (SJMSCP),[101] is to provide a strategy for balancing the need to conserve Open Space and the need to convert Open Space to non-Open Space uses while (1) protecting the region's agricultural economy; (2) preserving landowner property rights; (3) providing for the long-term management of plant, fish and wildlife species, especially those that are currently listed, or may be listed in the future, under the ESA or the CESA; (4) providing and maintaining multiple-use Open Spaces which contribute to the quality of life of the residents of San Joaquin County; and (5) accommodating a growing population while minimizing costs to Project Proponents and society at large.

The SJMSCP, in accordance with ESA Section 10(a)(1)(B) and CESA Section 2081(b) Incidental Take Permits, provides compensation for the conversion of Open Space to non-Open Space uses which affect the plant, fish and wildlife species covered by the Plan. The SJMSCP compensates for conversions of Open Space for the following activities: urban development, mining, expansion of existing urban boundaries, non-agricultural activities occurring outside of urban boundaries, levee maintenance undertaken by the San Joaquin Area Flood Control Agency, transportation projects, school expansions, non-federal flood control projects, new parks and trails, maintenance of existing facilities for non-federal irrigation district projects, utility installation, maintenance activities, managing Preserves, and similar public agency projects.[102]

Participation in the SJMSCP is voluntary for local jurisdictions and independent project proponents and allows a participant to conduct permitted activities that result in or may result in "Incidental Take" of listed species covered by the SJMSCP. Participation in the SJMSCP may facilitate or expedite the approval of development projects since participants would avoid having to obtain required permits separately or authorizations directly from the regulating agencies. The Joint Powers Authority (JPA) has obtained permits and authorizations for the conversion of a predetermined amount of open space habitat to development. These permits and authorization would cover a participant in the SJMSCP.[103]

[101] San Joaquin Council of Governments. 2000. San Joaquin County Multi-species Habitat Conservation and Open Space Plan (SJMSCP).
[102] *Ibid.*
[103] Environmental Science Associates. 2009. Draft Eastern San Joaquin Basin – Integrated Conjunctive Use Program Programmatic Environmental Impact Report. Prepared for Northeastern San Joaquin County Groundwater Banking Authority.

Agricultural activities are not covered under the SJMSCP. In addition, areas not within the plan limits for participating cities are not covered under the SJMSCP. Proponents of projects within these areas may request to participate in the SJMSCP; however, coverage for these areas and their land uses is subject to a case-by-case review by the JPA's Technical Advisory Committee to ensure that the biological impacts of a proposed project falls within the parameters established by the SJMSCP. Approval of such requests is contingent upon the JPA finding that sufficient Incidental Take acres remain and that mitigation pursuant to the SJMSCP is appropriate for the impacts on the species covered by the SJMSCP. Certain land uses, such as water diversions and water conveyances are also not covered under the SJMSCP. Coverage for each individual component would be determined on a project-by-project basis.[104]

Calaveras River Habitat Conservation Plan

The Calaveras River HCP ensures a commitment to conservation activities for fish as well as permitting security for water operations on the Calaveras River for a period of 50 years. An HCP establishes a partnership between private entities and federal agencies to conserve ecosystems important for species listed under the ESA – in this case, CCV steelhead. The Calaveras River HCP describes the anticipated effects of water operations and provides best management practices (BMPs) to minimize or mitigate their impacts. The plan's biological goals are to maintain a viable rainbow trout and steelhead population below New Hogan Dam on the Calaveras River, while also ensuring adequate habitat for Chinook salmon that may opportunistically use the river. Key conservation actions outlined in the HCP include improving barriers to fish passage, screening diversions to reduce fish entrainment, maintaining flow in important fish habitat and maintaining water quality for the fish population.[105] Activities covered under this HCP include: New Hogan Reservoir impoundment and non-flood control operations, SEWD Old Calaveras River Headworks facility operations, SEWD Bellota Diversion facility operations, artificial instream structures and SEWD small instream dam operations, privately owned diversion facilities operated within SEWD's service area, SEWD channel maintenance, and the fisheries monitoring program.

The new HCP lays the groundwork for an adaptive management plan that would support future studies of the fish community below the dam. Beyond research and monitoring, the HCP includes several management activities related to flow, fish passage, and water quality to further support fish conservation over the term of a 50-year permit for water operations. The HCP also establishes the SEWD as a watershed coordinator, which acts to inform stakeholders about the current state of the river and provides a forum for stakeholder and citizen input in Calaveras River management.[106]

Lower Mokelumne River Joint Settlement Agreement

The Lower Mokelumne River Joint Settlement Agreement (JSA) was entered into between EBMUD, USFWS, and the California Department of Fish and Game (now CDFW) in February 1996[107] for the Lower Mokelumne River Project (Federal Energy Regulatory Commission Project No.2916). In part, the objectives of this agreement are to protect and enhance the anadromous fishery in the lower Mokelumne River and to protect and improve the Mokelumne River ecosystem. As such, all parties agreed that to achieve these objectives, EBMUD would operate the Lower Mokelumne River Project

[104] San Joaquin Council of Governments. 2000. San Joaquin County Multi-species Habitat Conservation and Open Space Plan (SJMSCP).
[105] FishBIO. 2021. Calaveras River Habitat Conservation Plan Stakeholder Workshop PowerPoint. Available at: https://www.sewd.net/habitat-conservation-plan#:~:text=This%20plan%20ensures%20a%20commitment,a%20period%20of%2050%20years.
[106] *Ibid.*
[107] USFWS, CDFG, EBMUD. 1996. Lower Mokelumne River (FERC Project No. 2916-004) Joint Settlement Agreement. 21 p.

in accordance with minimum flow requirements described within the JSA along with other non-flow methods.

Most relevant to the MICUP assessment, as part of the JSA, EBMUD agreed to a minimum flow schedule and commitment that considers key life history milestones for Endangered ESA-listed salmonids within the lower Mokelumne River. EBMUD specifically committed to minimum releases from Camanche Dam and minimum flow below the WDD.[108] Notably, it is generally assumed providing suitable environmental conditions for salmonids, should also provide similar quality habitat for other known special-status fish species in the lower Mokelumne River.

Mokelumne River Hatchery Plan

As Camanche Dam constitutes the upper limit of anadromy within the Mokelumne River, the Mokelumne River Fish Hatchery (MOK) was constructed in 1964 as mitigation for the reduction of habitat lost by the impoundment of Camanche Reservoir. In accordance with the JSA, EBMUD provided additional funding to expand and upgrade the hatchery, while CDFW continues its operation.[109] On an annual basis, MOK provides fall-run Chinook salmon for mitigation of the impoundment as well as ocean salmon enhancement. MOK has an annual production goal of 6.4 million fall-run smolts divided between the mitigation and ocean enhancement elements.[110] When additional stock is available, MOK also provides fall-run smolts for regional special studies.

As a response to the listing of CCV steelhead as threatened in 2006, the MOK also conducts artificial propagation of CCV steelhead to enhance steelhead fisheries within the Mokelumne River. The annual MOK steelhead production goal for Camanche mitigation is 250,000 steelhead yearlings. They also provide steelhead yearlings for researchers when excess stock is available.[111]

Release locations for fall-run Chinook are coordinated by the MOK Coordination Team, but fish are generally released at locations within the Delta and San Francisco Bay for the ocean fisheries enhancement.[112] CCV steelhead are generally released directly to the Mokelumne River to reduce straying of returning adults. CCV steelhead releases are timed to coincide with higher flows of the Sacramento and San Joaquin Rivers to encourage outmigration, but generally occur in between the months of February and April to coincide with the annual closing of the Delta Cross Channel Gates.[113]

Mokelumne River Fisheries Monitoring

EBMUD operates an extensive fisheries monitoring program on the Mokelumne River that encapsulates the entirety of the salmonid lifecycle. Since 1990, EMBUD has conducted video monitoring of the fish ladder at the WID Dam to enumerate adult fall-run Chinook salmon as they migrate upstream to spawn. Additional escapement monitoring methods include redd surveys to count salmon nests, their distribution through the river, and their habitat use and preference, carcass surveys that allow for Coded Wire Tag recovery, determination of pre-spawn mortality, and

[108] *Ibid*
[109] *Ibid*
[110] CalFish. 2018. Mokelumne River Hatchery. Website. Available online: https://www.calfish.org/ProgramsData/ConservationandManagement/CentralValleyMonitoring/SacramentoValleyTributaryMonitoring/MokelumneRiverFishHatchery.aspx.
[111] CalFish. 2019. 2018/2019 Mokelumne River Hatchery California Central Valley Steelhead Trout Spawning and Release Protocol. PDF. 17p. Available online: https://www.calfish.org/Portals/2/Programs/CentralValley/Mokelumne/18-19_MOKSpawningProtocol_Steelhead.pdf;
[112] CalFish. 2019. 2018/2019 Mokelumne River Hatchery Chinook Salmon Spawning and Release Protocol. PDF. 26p. Available online: https://www.calfish.org/Portals/2/Programs/CentralValley/Mokelumne/18-19_MOKSpawningProtocol_Chinook.pdf
[113] *Ibid*

the collection of additional biological samples.[114] EBMUD also operates Rotary Screw Traps (RSTs) at multiple locations to monitor juvenile outmigration. An 8-foot RST is operated at Vino Farms (river kilometer [rkm] 87), two side-by-side 8-foot and 5-foot RSTs are operated at Golf (rkm 62), and there is also a screened smolt trap at rkm 62.[115]

4.4.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 *CEQA Guidelines* Appendix G significance criteria questions related to Biological Resources.

Would (MICUP (the proposed project):

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?
3. Have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?
5. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan?

Approach to Analysis

The analysis of impacts on biological resources focuses on evaluating the proposed project's potential to adversely affect special-status species and their habitats, and other habitats and migratory/ movement corridors considered sensitive by federal, State, or local agencies. Impact conclusions consider the habitat quality, impact extent, impact duration, and impact intensity (*e.g.,* level of harm, injury/loss, or degradation suffered by the resource). The impact analysis is based on the results of desktop research in relation to the baseline habitat conditions, known and potential species occurrence, and species natural history traits that influence how they may be impacted by proposed project activities. No field surveys have been conducted to confirm assumed mapped land covers, existing habitat conditions, or potential species presence within the project area.

Impacts on biological resources were evaluated to qualitatively describe how proposed project activities could adversely affect biological resources, and where applicable, to quantify the extent of

[114] East Bay Municipal Utility District (EBMUD). 2024. Fisheries and Wildlife. Presentation. 29 slides. Available online: https://www.ebmud.com/download_file/force/37656/3409?FW_Overview.pdf.
[115] *Ibid*

regulated habitat that would be impacted. Potential impact mechanisms that were evaluated include habitat removal, injury or mortality of special-status wildlife and plants, indirect habitat degradation, and wildlife disturbance (*i.e.,* from noise, vibration, lighting, glare, and other visual disturbance).

Special-status Plant, Wildlife, and Fish Species

Information on species occurrences, potential to occur, and habitat suitability was based on desktop review of a multitude of online databases, mapping systems and literature. Online record searches for species occurrence data included the following databases: CDFW CNDDB, CNPS *Online Inventory of Rare, Threatened and Endangered Plants of California,* USFWS's IPaC, eBird, iNaturalist, Western Monarch Milkweed Mapper, and Bumble Bee Watch. For habitat suitability, habitat mapping, and vegetation mapping, the following databases and sources were reviewed: CDFW BIOS mapper, NOAA *Critical Habitat Mapper*, NOAA EFH *Mapper*, USFWS NWI, USFWS *Critical Habitat Mapper,* Google Earth, and the California Department of Forestry and Fire Protection CALFIRE FRAP.

Sensitive Natural Communities

The CDFW list of Sensitive Natural Communities[116] was reviewed and compared to mapped habitat types using the previously mentioned databases and data sets. Sensitive natural communities also include water land cover types (including wetlands), vernal pools, oak woodlands, and riparian habitat, which were included in mapping and assessing sensitive natural communities.

Wildlife Movement Corridors

Available data on movement corridors and linkages was accessed via the CDFW in BIOS 6.[117] Data reviewed included the Essential Connectivity Areas layer, the Natural Landscape Blocks layer, the Interstate Connections layer, the Terrestrial Connectivity layer, and the Missing Linkages in California layer. In addition, the California Fish Passage Assessment Database and Fish Passage Priorities layers were reviewed to identify known barriers to fish movement. The ACE online map was also reviewed that shows areas ranked into relative importance for wildlife movement.[118] The Nature Conservancy local connectedness dataset that ranks species habitat connectedness was also reviewed.[119] This data was reviewed, in combination with online habitat layers, to assess the potential for areas within the project area to be important movement corridors and/or critical linkages for both aquatic and terrestrial species.

Protected Trees

Due to the large project area, diverse project components, and lack of determined location for project features, it is assumed that there is potential for native trees, particularly oak trees and/or heritage trees, to be present in portions of the proposed project components within the individual districts. It is expected that some level of tree trimming and/or tree removal will occur in the duration of proposed project implementation and that they may be considered protected trees.

[116] CDFW. 2023. California Sensitive Natural Communities. Available at: https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities#sensitive%20natural%20communities.
[117] CDFW. 2024. California Wildlife Habitat Relationships System. Online Database. Available at: https://wildlife.ca.gov/Data/CWHR/Wildlife-Habitats.
[118] *Ibid*
[119] The Nature Conservancy. 2024. Resilient Land Mapping Tool. Online Database. Version 2.0. Available at: https://www.maps.tnc.org/resilientland/#/.

Therefore, the approach is to assume that there could be impacts to protected trees in some capacity and to analyze those potential impacts.

Fish

Operational impacts on fish in the lower Mokelumne River were evaluated by comparing monthly changes in model flows from MICUP to minimum flow requirements. Operational impacts on fish in the Delta were evaluated by estimating Delta water quality from MICUP and compliance with D-1641 fish and wildlife water quality standards and X2 standards. The remainder of this section discusses the methodology and results used to evaluate fish impacts.

LOWER MOKELUMNE RIVER FLOW MODELING

Flows were estimated for the Baseline Condition and MICUP using the Mokelumne-Calaveras Rivers Simulation Model and the Water Availability Analysis Tool. The flow modeling methods and results are summarized in the "Lower Mokelumne River Flow Modeling" subsection in Section 4.9, *Hydrology and Water Quality: Surface Water* and discussed in detail in Appendix I-3.

In the Baseline Condition, consistent with EBMUD's regulatory obligations and operations, MOCASIM allocates water releases to satisfy minimum JSA flow requirements at the two designated compliance points: 1) below Camanche Dam and 2) below WDD. In addition to JSA flow requirements below WDD, to provide a conservative approach, the modeling ensured Camanche releases were large enough to satisfy additional instream flows below WDD as set forth in the Healthy River and Landscape (HRL) program.

While seepage reductions from MICUP would increase flows in the lower Mokelumne River, as discussed in detail in Section 4.10, *Hydrology and Water Quality – Groundwater,* and summarized in the flow modeling methodology in Section 4.9, *Hydrology and Water Quality: Surface Water*, it was not possible to adjust flows for increases from reduced stream seepage at WDD because flow increases from seepage reductions were estimated on a reach basis. Therefore, model estimated flow levels at WDD for MICUP are lower than would be expected in actual operations.

Appendix I-3 includes tables showing the JSA water year type for each year of the modeling period and minimum flow requirements at Camanche and WDD, and a comparison of Baseline Condition and MICUP flows to the flow requirements for each month of the modeling period. Minimum JSA flow requirements were determined for the periods from October to March and April to September of each year in MOCASIM for the Baseline Condition scenario based on hydrologic conditions for the representative year in the model. The JSA year type was not modified for the MICUP Flow scenario. The results in Appendix I-3 show that minimum flow requirements are satisfied under MICUP operations in all months of the 53-year modeling period. Monthly flows and minimum flow requirements are shown for selected years on Figures 4.9-5 to 4.9-8. Refer to Section 4.9, *Hydrology and Water Quality: Surface Water,* for the figures and additional information on the years selected.

DELTA WATER QUALITY MODELING

Delta water quality was estimated using Delta Simulation Model 2 with inputs provided by the CalSim 3 model. The Delta water quality modeling methods and results are summarized in the "Delta Water Quality Modeling" subsection in Section 4.9, *Hydrology and Water Quality: Surface Water* and discussed in detail in Appendix I-2.

This analysis includes an evaluation of D-1641 water quality objectives for fish and wildlife at San Joaquin River at Jersey Point (D15) and San Joquin River at Prisoners Point (D29). In addition, modeling and evaluation of X2 was conducted for the proposed project. X2 is designed specifically to protect the aquatic life of the Delta. X2 is a physical attribute of the Delta used as a habitat indicator for the location of the low salinity zone and fluctuates based on freshwater outflows and tides. Specifically, X2 is the location in kilometers from the Golden Gate Bridge where water salinity is 2 parts per thousand of isohaline salt. The low salinity zone is where freshwater transitions into brackish water. Historically, the low salinity zone was associated with high primary productivity, zooplankton population, and abundance of native species.[120]

X2 standards for January through October are summarized in Table 4.4-4. X2 is the most downstream location (lowest value) of either the maximum daily average or the 14-day running average of the 2.64 mmhos/cm isohaline. Daily and Fourteen-day average X2 values were calculated for the Baseline Condition and MICUP scenarios based on Delta inflow. The minimums of the two values were used to determine if standards violations occurred.

Table 4.4-4 X2 Standards[121]

Period	Number of Days	Wet	Above Normal	Below Normal X2 Position (km)	Dry	Critical
01Jan – 31Jan	31	81	81	81	81	81
01Feb – 31May	120-121	75	75	75	75	75
01Jun – 31Aug	92	81	81	81	81	81
01Sep – 31 Oct	61	80	80	–	–	–

Appendix I-2 includes results of X2 modeling for Baseline Conditions and MICUP. Under MICUP operations compared to Baseline operations, there were an additional 28 days (0.2 percent) of X2 standards violations over the 53-year modeling period (over 7,000 days), which occurred in 14 different years. There were no standard violations in 99.6 percent of days during the modeling period. The violations occurred primarily in September (15 days) and August (11 days) but also June (2 days) and primarily in wet years (19 days), but also above normal (7 days) and below normal (2 days) water years. The June violations would not occur under actual operations because the MICUP permit would be subject to Term 91, and MICUP direct diversions would not be allowed when the Delta is in balanced conditions.

EIR Scoping Comments Consideration

Various comments were submitted during the EIR scoping process. Comments related to biological resources include: direct and cumulative impacts from both construction and operation of the proposed project to threatened, endangered, and sensitive species and habitats within the project site and in the surrounding areas; environmental resources that are rare or unique to the region; groundwater-dependent ecosystems; potential impacts due to a reduction of flows in and downstream of the Mokelumne River to special-status species and existing habitats; the need for a water availability analysis that does not presume all unappropriated flows to be excess flows

[120] Delta Stewardship Council. Delta Plan Performance Measures, Salinity. Available at: https://viewperformance.deltacouncil.ca.gov/pm/salinity

[121] State Water Resources Control Board. 2000. *Revised Water Right Decision 1641*. In the Matter of: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project. December 29, 1999. Revised in Accordance with Order WR 2000-02. March 15, 2000.

because high flows are beneficial to fish species; consider using existing works for diversion of water to protect fish; and impacts to riparian corridors and the cascading effects of removed habitat and connectivity, reduced groundwater, and ongoing climate change on the special-status species and other animals and plants that rely on these habitats.

Specific Thresholds of Significance

For purposes of this analysis, the following thresholds are used to evaluate the significance of Biological Resources impacts resulting from implementation of MICUP.

- Result in direct take or habitat removal or alteration for candidate, sensitive, or special-status species.
- Adversely affect any riparian habitat or other sensitive natural community identified in San Joaquin County, City of Stockton, or by the CDFW or USFWS.
- Remove, fill, or damage a federally protected wetland.
- Interrupt fish movement in an aquatic channel or impede terrestrial movement via a land corridor.
- Remove, damage, or replace trees designated as protected by the local policies and ordinances
- Conflict with the provisions of an applicable habitat conservation plan.
- Conflict with fish and wildlife water quality standards and X2 standards D-1641.
- Result in non-compliance with JSA minimum flow requirements.

Impact Evaluation

Special-status Plant, Wildlife, and Fish Species

Significance Criterion a:	Would the proposed project have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?

Impact BIO-1 MICUP COULD HAVE A SUBSTANTIAL ADVERSE EFFECT, EITHER DIRECTLY OR THROUGH HABITAT MODIFICATIONS, ON SPECIES IDENTIFIED AS A CANDIDATE, SENSITIVE, OR SPECIAL-STATUS SPECIES. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED.

Overview

The general analysis below first discusses overall impacts to special-status species from proposed project construction and operation. Then, the evaluation of the proposed project impacts to special-status species is grouped and analyzed based on taxa if impacts are similar, or if impacts are not similar, specific species evaluations within taxa were conducted. The impact analysis is relevant to each of the three MICUP partner agencies for habitats where these species have the potential to occur (refer to Table 4.4-3). Refer to Table 4.4-4 for a summary of potential impacts to special-status species by Partner Agency.

Construction

There is potential for both temporary and permanent impacts related to proposed project construction activities to a variety of special-status plant, wildlife, and fish species. Loss of individuals of special-status species or degradation of habitat supporting these species would be considered a significant impact. The following mitigation measures have been identified to address this significant impact. Mitigation Measure BIO-1 would first assess the habitat types present and whether they have the potential to support the presence of special-status plant or wildlife species. While there are species-specific mitigation measures outlined below for the species that have the potential to occur in the project area, Mitigation Measure BIO-2 would aid in avoiding and minimizing impacts to special-status species and sensitive biological resources with the potential to occur within the project area. Therefore, overall construction impacts related to special-status species would be less than significant with mitigation. See specific impact analyses and conclusions by taxa grouping below.

Operation

Operation and maintenance (O&M) activities would have no impact on special-status plants, a less than significant direct impact on wildlife and their habitats could occur but could have a potentially significant impact on fish and their habitat. O&M primarily includes activities such as monitoring and adjusting pumps, flow of water, and wells, and general maintenance on existing features. Recharge basins would also require regular sediment removal, vegetation management, debris clearing, and periodic inspections to maintain their efficiency and recharge rate and prevent blockages. O&M activities also include flooding of the proposed recharge areas using both dedicated surface-based recharge and existing agricultural lands for Flood-MAR. Additionally, flooding would primarily occur in vineyards, orchards, and other actively used agricultural lands that do not provide suitable habitat for special-status plant and wildlife species with potential to occur in the project area. Initial flooding is anticipated to occur from December 1 to June 30, with re-diversions from stored water occurring from July 1 to October 31. Some level of dewatering and in-water work may also occur for some operational activities. Therefore, overall operational impacts related to special-status species would be less than significant with mitigation. See specific impact analyses and conclusions by taxa grouping below.

Special-Status Plants

Specific land cover types may provide suitable habitat for special-status plant species within the project area. There is an overarching likelihood of special-status plants to occur within certain natural sensitive community classifications, such as vernal pools, valley foothill riparian, and along the margins of aquatic resources, such as riverine, lacustrine, and open water. Additionally, only a few special-status plant species were identified as having suitable habitat within annual grasslands, oak woodlands, or agricultural ditches. No special-status plants were identified as having suitable habitat within urban land covers.

Construction

The proposed project could result in direct adverse effects to special-status plant species from construction activities, including ground disturbance and vegetation removal, occurring in suitable habitats. Direct construction impacts to special-status plant species would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-2, Mitigation Measure BIO-3 and Mitigation Measure BIO-4 have been identified to address these impacts to special-status plant species. Implementing Mitigation Measures BIO-1, BIO-2, BIO-3, and BIO-4 would reduce this impact, because habitat assessment surveys would be conducted, and then if needed, focused rare plant surveys would be conducted if suitable habitat is present, Worker Environmental Awareness Program (WEAP) training would be conducted, the timing of vegetation removal and trimming would be limited to the extent possible, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, appropriate permits and authorizations will be acquired, spill protection would be implemented, and disturbed riparian and oak woodland habitat would be revegetated. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status plant species, and construction impacts would be less than significant with mitigation**.**

Operation

Operational use and maintenance activities would have no impact to special-status plants because the areas would already be disturbed, and FloodMAR-related flooding would only occur in vineyards or agricultural lands that generally do not provide suitable habitat for special-status plants. Any agricultural ditches providing habitat for special-status plants would have been identified, avoided, transplanted, or mitigated for under the construction phase of this project. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status plant species, and there would be no operational impact.

Special-Status Invertebrates

The project area provides suitable foraging, nesting, and breeding habitat for special-status invertebrates. Crotch's bumblebee and monarch butterfly are highly mobile species and would be able to evacuate disturbance areas most of the time. There is extensive similar habitat in the vicinity, and potential disturbance of foraging individuals would likely be minor. Nonetheless, the proposed project could result in direct or indirect adverse effects on these special-status invertebrates' habitat and individuals if they are breeding or nesting in the project area.

The project area also provides suitable habitat for several vernal pool shrimp species. The known vernal pool habitat is minimal within the project area, and these vernal pool shrimp species are dependent on this habitat alone. Nonetheless, the proposed project could result in direct or indirect adverse effects to special-status vernal pool shrimp species habitat and to individuals if proposed project activities occur within or adjacent to vernal pools and these species are present.

Lastly, the project area has potential to provide suitable habitat for valley elderberry longhorn beetle where elderberry shrubs are present. Shrubs are likely to be consolidated along riparian habitat, specifically the Mokelumne and Calaveras Rivers, but may also be present in other upland habitat types. The proposed project could result in direct or indirect adverse effects to valley elderberry longhorn beetle and its habitat if removal or trimming of elderberry shrubs is necessary during proposed project implementation. Elderberry shrubs may also be affected by nearby dust, ground disturbance, and pesticide use.

Construction

Foraging individual butterflies and bumble bees are unlikely to be disturbed and displaced from habitat within the project area by ground-disturbing activities and during vegetation removal,

because these species are mobile and would vacate the area. However, ground-disturbing activities and vegetation removal do have the potential to remove nectar sources and milkweed species, where found, and, thus, indirectly affect Crotch's bumblebee and monarch butterfly due to habitat removal. Vegetation removal could also directly impact monarch butterfly, if larvae are on milkweed plants that are disturbed during vegetation removal occurring during the breeding season. However, if no milkweed is present, then breeding monarch would not occur. In addition, ground disturbance could also directly impact Crotch's bumblebee if ground nests are disturbed during the nesting season. Direct and indirect impacts of construction on monarch butterfly habitat and Crotch's bumblebee are considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measures BIO-5 and BIO-6 have been identified to address these impacts to the Crotch's bumblebee and monarch butterfly species. [122]

Individual vernal pool shrimp species are unlikely to be disturbed and displaced from habitat if there are no construction activities occurring within vernal pools, because these species are contained to vernal pool locations and are, thus, less likely to be impacted. However, if construction work would occur within or adjacent to vernal pool habitat (during the dry or wet season), the habitat and the individual special-status shrimp species could be directly or indirectly impacted by ground disturbing activities occurring within or adjacent vernal pools during construction. Project construction could have direct or indirect impact to special-status shrimp species during construction activities, and this would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-7 has been identified to address these impacts to the vernal pool shrimp species.

Individual valley elderberry longhorn beetles are unlikely to be disturbed by general construction activities unless removal, trimming, or transplantation of elderberry shrubs is required. If trimming, transplanting, or removal of elderberry shrubs occurs, there could be direct impacts to individual beetles due to construction. This species is highly dependent on contiguous habitat for occupation, and, thus, if a significant number of shrubs are removed that prevent this species from moving in-between patches, it would be highly detrimental. In addition, elderberry beetle habitat could be indirectly impacted by an excess of dust, or adjacent ground disturbance caused by construction activities. Project construction could have indirect and direct adverse effects to elderberry longhorn beetle species and habitat, and this would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measures BIO-8 and BIO-9 have been identified to address these impacts to the elderberry longhorn beetle species.

Altogether, implementing Mitigation Measures BIO-1, BIO-2, BIO-5, BIO-6, BIO-7, BIO-8, and BIO-9 would reduce construction impacts to the aforementioned special-status invertebrate species, because habitat assessments would be conducted, and then if needed, pre-construction surveys would be conducted, species-specific surveys would be conducted, WEAP training would be conducted, biological construction monitoring during ground disturbance and vegetation removal would occur, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, appropriate permits and authorizations will be acquired, spill

[122] The monarch butterfly is a federally proposed species that does not receive statutory protection under the ESA; however, the USFWS is anticipated to make a determination on listing in 2025. Therefore, any measures to protect this species would be considered guidance and proactive until the determination.

protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, buffers around active nests and or breeding sites will be enforced, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status invertebrate species, and construction impacts would be less than significant with mitigation**.**

Operation

Operational use and maintenance activities would have no impact to special-status invertebrates because the areas would already be disturbed, and FloodMAR-related flooding would only occur in vineyards or agricultural lands that do not provide suitable habitat for special-status invertebrates. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status invertebrate species, and there would be no operational impact.

Special-Status Reptiles and Amphibians

The project area provides suitable foraging, nesting, and breeding habitat for special-status reptiles. Suitable habitat for northwestern pond turtle includes larger bodies of water and adjacent upland grassland habitat, primarily focused along the Mokelumne and Calaveras Rivers. Suitable habitat for giant garter snake includes slow-moving smaller bodies of water, such as irrigation canals and agricultural ditches, as well as irrigated fields and suitable grassland upland habitat that are present throughout the project area. Coast horned lizard and California legless lizard could be present where suitable grassland and riparian habitat exists, specifically where sandy soils suitable for burrowing occur. The proposed project could result in direct or indirect adverse effects on these special-status reptile habitats and individuals if they are within suitable habitat during proposed project implementation.

The project area also provides suitable aquatic and upland habitat for amphibian species, including western spadefoot and California tiger salamander. Suitable aquatic habitat for California tiger salamander and western spadefoot includes vernal pools, stock ponds, and other semi-permanent waterbodies, primarily mapped in the eastern edges of the project area. Suitable upland habitat for these species includes grasslands and oak woodlands present adjacent to aquatic habitat. While suitable aquatic habitat is limited within the project area, the proposed project could result in direct or indirect adverse effects to special-status amphibian species habitat and to individuals, particularly in upland habitat that may be impacted.

Construction

Northwestern pond turtle, giant garter snake, coast horned lizard, California tiger salamander, and California legless lizard all utilize underground burrows during some portion of the year, and, thus, individuals are likely to be directly and indirectly disturbed and displaced by construction-related ground disturbing activities and vegetation removal occurring in suitable upland habitat in the project area. Depending on the timing of ground disturbance, some reptile species may be avoided, if it is a timeframe in which the species is not typically underground and when it is more likely to actively move out of harm's way. Additionally, if any work is to occur within suitable aquatic habitat for northwestern pond turtle, giant garter snake, western spadefoot, or California tiger salamander, potential direct and indirect impacts may occur, if the species are foraging and/or breeding within the aquatic habitat. In addition, if occupied burrows are present in or near the construction areas,

proposed project-related disturbance (*i.e.,* noise and visual disturbance) could result in burrow abandonment and/or reduced effort to breed. The proposed project could directly and indirectly impact special-status reptile and amphibian species and their habitat due to construction activities. Construction impacts on giant garter snake, northwestern pond turtle, coast horned lizard, California legless lizard, California tiger salamander, and western spadefoot are considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measures BIO-10 through BIO-15 have been identified to address these impacts to the giant garter snake, northwestern pond turtle, coast horned lizard, California legless lizard, California tiger salamander, and western spadefoot species. Implementing Mitigation Measures BIO-1, BIO-2, and BIO-10, BIO-11, BIO-12, BIO-13, BIO-14, and BIO-15 would reduce this impact, because habitat assessments would be conducted, and then if needed, species-specific surveys would be conducted, pre-construction surveys would be conducted, WEAP training would be conducted, biological construction monitoring during ground disturbance, vegetation removal, and in-water work would occur, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, sitting equipment and open pipes would be checked for wildlife daily, open holes would be checked for wildlife daily to prevent entrapment, refuse would be removed, fence materials to avoid entanglement of snakes and wildlife will be used, appropriate permits and authorizations will be acquired, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, buffers around active nests or burrows will be enforced, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status reptile and amphibian species, and construction impacts would be less than significant with mitigation**.**

Operation

Most of the project areas where O&M activities would occur are already disturbed, and Flood-MAR related flooding would only occur in vineyards or agricultural that generally do not provide suitable habitat for special-status reptiles and amphibians. Since giant garter snakes are known to occur within agricultural ditches, if suitable habitat is identified during the construction phase and additional maintenance needs to occur there is a potential for direct or indirect impacts to this species. Additionally, there is potential for in-water work and dewatering of aquatic habitat for maintenance of pump stations and screens that could pose an adverse direct or indirect affect to special-status reptiles and amphibians. As such, project operation could have a substantial adverse effect, either directly or through habitat modifications, on special-status reptile and amphibian species. Operational impacts on giant garter snake, northwestern pond turtle, coast horned lizard, California legless lizard, California tiger salamander, and western spadefoot are considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, the species-specific Mitigation Measures BIO-10, BIO-11, BIO-12, BIO-13, BIO-14, and BIO-15 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, and BIO-10, BIO-11, BIO-12, BIO-13, BIO-14, and BIO-15 would reduce this impact, because habitat assessments would be conducted, and then if needed, species-specific surveys would be conducted, pre-construction surveys would be conducted, WEAP training would be conducted, biological construction monitoring during ground disturbance, vegetation removal, and in-water work would occur, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-

work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, sitting equipment and open pipes would be checked for wildlife daily, open holes would be checked for wildlife daily to prevent entrapment, refuse would be removed, fence materials to avoid entanglement of snakes and wildlife will be used, appropriate permits and authorizations will be acquired, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, buffers around active nests or burrows will be enforced, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status reptile and amphibian species, and operational impacts would be less than significant with mitigation**.**

Special-Status and Nesting Birds

The project area contains suitable nesting, foraging, and overwintering habitat for a large variety of special-status bird species that may occur in a variety of habitats. Suitable nesting habitat for raptors typically includes riparian habitat and isolated areas with large trees. This habitat type primarily occurs along the Mokelumne and Calaveras Rivers but also occurs occasionally throughout developed areas in the project area. Foraging habitat for raptors typically consists of open grassland, agricultural fields, and occasionally bodies of water. These foraging habitats occur frequently throughout the project area.

Songbirds, passerines, and other non-raptor bird species use a variety of habitats for nesting and foraging which include riparian, grasslands, oak woodlands, agricultural, and emergent marsh. Burrowing owls are also known to occur in highly developed and urban areas, in addition to grassland habitat.

Construction

Tricolored blackbird, burrowing owl, Swainson's hawk, northern harrier, white-tailed kite, yellow-breasted chat, loggerhead shrike, song sparrow, bank swallow, yellow warbler, yellow-headed blackbird, and common bird species all may utilize suitable habitat in the project area for nesting, overwintering, or foraging during some portion of the year, and, thus, individuals are likely to be directly and indirectly impacted by ground disturbing activities and vegetation removal occurring in suitable nesting habitat during construction activities. Direct and indirect impacts to these bird species would be considered a potentially significant impact. Note that if construction activities occur outside of the typical nesting bird season (February 15 to September 1), direct impacts to nesting birds would be avoided.

Foraging and/or overwintering habitat is present for other special-status birds with potential to occur within the project area, including: lesser sandhill crane (*Antigone canadensis canadensis*), greater sandhill crane (*Antigone canadensis tabida*), golden eagle (*Aquila chrysaetos*), short-eared owl (*Asio flammeus*), black tern (*Chlidonias niger*), yellow-billed cuckoo (*Coccyzus americanus occidentalis*), common loon (*Gavia immer*), American white pelican (*Pelecanus erythrorhynchos*), and purple martin (*Progne subis*). Since these birds have no potential to nest within the area, and they are able to actively move out of the way of construction activities, they would not be directly impacted by construction activities. Similarly, foraging and overwintering habitat for a variety of bird species, special-status and non-special-status, is present within the project area and vicinity. Construction activities would not impact foraging or overwintering for these species.

Construction activities occurring during the nesting bird season could destroy active nests or occupied burrowing owl burrows and injure or kill associated individuals, if present during

construction. In addition, if active nests or occupied burrows are present in or near the construction areas, proposed project-related disturbance (*i.e.,* noise and visual disturbance) could result in nest abandonment, reduced care of eggs or young, or premature fledging. Failure of active nests of special-status birds could have a substantial adverse effect on the local population, depending on the species and the number of individuals affected. Regardless, the proposed project could directly and indirectly impact species and their habitat due to construction activities. This would be a potentially significant impact. Destruction of active bird nests also would violate the MBTA and CFGC Sections 3503 and 3503.5.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measures BIO-16, Mitigation Measure BIO-17, Mitigation Measure BIO-18, and Mitigation Measure BIO-19 have been identified to address these impacts to nesting birds and burrowing owl. Implementing Mitigation Measures BIO-1, BIO-2, BIO-10, and BIO-16, BIO-17, BIO-18, and BIO-19 would reduce this impact, because pre-construction surveys would be conducted, and then if needed, species-specific surveys would be conducted, WEAP training would be conducted, biological construction monitoring would occur as needed, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, refuse would be removed, appropriate permits and authorizations will be acquired, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, buffers around active nests or burrows will be enforced, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status bird species, and construction impacts would be less than significant with mitigation**.**

Operation

Operational use and maintenance activities would have minimal impact to bird species, because the project areas would already be previously disturbed by construction activities. FloodMAR-related flooding would only occur in vineyards or agricultural lands that generally do not provide suitable nesting habitat for most bird species. Both vineyards and agricultural fields are active, and birds opting to nest within these areas are likely habituated to farming activities and would not be impacted by passive flooding. However, localized flooding for Flood-MAR could affect habitat for ground-nesting bird species, such as burrowing owl. If burrowing owl burrows are discovered adjacent or within Flood-MAR areas, the use of that area will be reassessed. River diversions occurring along the Mokelumne River would have minimal impact on foraging and overwintering birds, as there will always be similar foraging and overwintering habitat that is non-affected and of similar quality nearby. Additionally, recharge basins would provide temporary aquatic foraging habitat for migratory birds when filled with water.

FloodMAR occurring during the nesting bird season could destroy occupied burrowing owl burrows and injure or kill associated individuals, if present during flooding. Failure of active nests of special-status birds could have a substantial adverse effect on the local population, depending on the species and the number of individuals affected. Regardless, project operation could directly impact species due to operational activities. This would be a potentially significant impact. Destruction of active bird nests also would violate the MBTA and CFGC Sections 3503 and 3503.5..

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-18, Mitigation Measure BIO-19, and Mitigation Measure SW-3 have been identified to address these impacts to special status birds. Implementing Mitigation Measures BIO-1, BIO-2, BIO-

18, BIO-19, and SW-3 would reduce this impact, because pre-construction surveys would be conducted, and then if needed, species-specific surveys would be conducted, timing of vegetation removal and trimming would be limited to the extent possible, WEAP training would be conducted, biological construction monitoring would occur as needed, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas and/or nests, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, refuse would be removed, appropriate permits and authorizations will be acquired, buffers around active nests or burrows will be enforced, compensatory mitigation for permanent habitat loss will be acquired, as needed, and parameters to prevent surface water runoff would be implemented. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status bird species, and operational impacts would be less than significant with mitigation**.**

Special-Status Mammals

The project area provides suitable habitat for special-status mammals, including pallid bat, northern California ringtail, Townsend's big-eared bat, and western red bat. Suitable roosting habitat is present where established trees (in natural communities and agricultural communities) and human-made structures with open crevices or cavities occur in the project area. This habitat is typically prevalent along riparian areas but can also be present in isolated areas around agricultural fields and semi-urban areas. Suitable habitat for ringtail is also present in riparian habitat but likely focused along the Mokelumne River, which is within range for this species.

Construction

Special-status bat species and northern California ringtail may utilize suitable habitat in the project area for roosting, nesting, and for foraging during portions of the year, and thus, individuals have the potential to be directly and indirectly disturbed by ground disturbing construction activities, vegetation removal, night time construction activities and lighting occurring in suitable habitat. Tree removal or trimming could be particularly impactful for these species, especially if it is to occur during sensitive timings for bats (*i.e.,* maternity or overwintering) or during ringtail breeding. The proposed project could directly and indirectly impact species and their habitat due to construction activities. This would be considered a potentially significant impact**.** Note that if tree removal and tree trimming occurs between August 16 and December 1 or between February 28 and May 1, direct impacts to individual bats could likely be avoided, and if tree removal and trimming occurs between June 1 and February 1, impacts to individual ringtails could likely be avoided. However, tree removal or trimming could still impact habitat quality for both ringtail and bat species. Although, plentiful similar habitat would remain in the greater surrounding area.

In addition, if occupied roosts or dens are present in or near construction areas, proposed project-related disturbance (i.e., noise and visual disturbance) could result in roost and den abandonment or reduced care for young. For example, the construction of an ASR well would require use of a drill rig that would be operated constantly for 24-hour periods for a limited period of time. If in close proximity to active roosts or dens, abandonment or reduced care for young could occur due to this activity. Failure of active roosts of special-status bats or active dens for ringtails could have a substantial adverse effect on the local population, depending on the species and the number of individuals affected. The proposed project could indirectly impact species due to construction activities. This would be considered a potentially significant impact**.**

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measures BIO-20, BIO-21, and BIO-22 have been identified to address these impacts to the ringtail and bats species. Implementing Mitigation Measures BIO-1, BIO-2, BIO-20, BIO-21, and BIO-22 would reduce this impact, because pre-construction surveys would be conducted, and then if needed, species-specific surveys would be conducted, WEAP training would be conducted, timing of vegetation removal and trimming would be limited to the extent possible, biological construction monitoring during ground disturbance and vegetation removal would occur, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds would be limited, vehicles will be stored in staging areas, refuse would be removed, appropriate permits and authorizations will be acquired, buffers around active cavities or roosts will be enforced, compensatory mitigation for permanent habitat loss will be acquired, as needed, and disturbed riparian and oak woodland habitat would be revegetated. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status mammal species, and construction impacts would be less than significant with mitigation**.**

Operation

O&M activities would have no impact to special-status mammal species. While bat species may have the potential to roost within vineyards and agricultural lands, these land covers are active with farming practices and passive flooding is unlikely to have impacts on these species. Additionally, there will be no tree removal or trimming occurring during O&M activities. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on any special-status mammal species, and there would be no impact from O&M activities.

Special-Status Fish

Fourteen (14) special-status species of fish have the potential to be located within the Mokelumne River and other waterways within the project component areas, such as the Calaveras River and other creeks. It should be noted that no field work has been conducted and determinations of habitat types and locations are based on a desktop review.

In-water construction activities, dewatering, and O&M activities, such as pump maintenance, may affect special-status fish species. Fish could be injured or killed during in-water work activities, stranded during dewatering, and fish could be entrained by unscreened pumps and diversions. Proposed project activities could also result in the incidental introduction of fine sediments to the waterways that could temporarily reduce habitat quality.

Construction

CENTRAL CALIFORNIA ROACH

As Central California roach are primarily a benthic feeding species, in-water construction would have no impact to this species or their habitat. Further, this species generally occurs at foothill elevations or higher and smaller streams, unlike the broader reaches of the lower Mokelumne River and lower Calaveras, and are not likely to occur within the project area. Therefore, project construction would have no impact on populations of Central California roach.

CHINOOK SALMON (CENTRAL VALLEY SPRING-RUN AND CENTRAL VALLEY FALL/LATE FALL RUN) AND CALIFORNIA CENTRAL VALLEY STEELHEAD

As some naturally spawning populations of Central Valley spring-run Chinook are occurring across the San Joaquin watershed, as well as CCV steelhead, it is possible that adult and juvenile fish can be found within the project area. As salmonids and steelhead may be present during times of in-water construction in the Mokelumne and Calaveras Rivers, they may be exposed to effects of the proposed project. Any adult CCV steelhead and salmonids that could occur in the in the Mokelumne and Calaveras Rivers during in-water construction would be large enough to be active swimmers and would likely avoid any area impacted by construction activities.

In-water construction, if it occurs during times when Chinook salmon or CCV steelhead are expected to be present, could have an adverse effect on the species. While these three species are strong swimmers that can leave the temporarily disturbed zone if they happen to enter the project area, juveniles, if present, are more susceptible to being killed or injured by in-water construction activities. The dewatering of an area of suitable habitat for construction activities could also expose this species to adverse effects through potential stranding. In-water construction such as dewatering may have short term effects on their habitat, including decreased water quality. This would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-23, Mitigation Measures GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts.

DELTA SMELT

The potential for Delta smelt to be affected by in-water construction activities is low to none. Sommer *et al.*[123] notes that Delta smelt typically inhabit the freshwater portion of the estuary for most of the year until they migrate into more estuarine areas to spawn during late winter and early spring, thereby further reducing their likelihood to occupy the freshwater portions of the project area. As Delta smelt are highly unlikely to be within the project area and seem to be extirpated from the project area where construction would be occurring, construction would have no impact on populations of Delta smelt.

GREEN STURGEON

The proposed project is unlikely to impact sDPS green sturgeon. As previously stated, little to no spawning occurs in the San Joaquin basin for this species. The proposed project location is well outside the primary Sacramento River migratory corridor used by both juveniles and adults. It should also be noted that both adults and juveniles are active and mobile swimmers that would largely be able to leave any area disturbed by proposed project activities.[124] If adults were present, they would likely occupy the deepest portion of the river channel as they would be seeking cooler temperatures. In the highly unlikely event that this species is present during in-water construction activities, they would likely occur in the deepest portion of the channel, away from riverbanks and associated infrastructure. Further, given the distance of the project area from any known recent spawning activity and the absence of suitable habitat within the project area, construction would have no impact on populations of sDPS green sturgeon.

[123] Sommer, T., Mejia, F., Nobriga, M., Feyrer, F., and Grimaldo, L. 2011. The spawning migration of Delta smelt in the upper San Francisco Estuary. San Francisco Estuary and Watershed Science 9 (2). Available at: http://escholarship.org/uc/item/86m0g5sz.
[125] Impacts to designated critical habitat and EFH are addressed under Impact 2 of this section.

LONGFIN SMELT

There is a potential occurrence of longfin smelt in the lower Mokelumne River near the confluence with the Cosumnes River. While longfin smelt may occasionally be present in the San Joaquin River, they are generally not found upstream of Medford Island. As in-water construction activities are only proposed higher in the Mokelumne River watershed, the likelihood of longfin smelt occurring in the project area is extremely low. Therefore, the project construction would have no impact on populations of longfin smelt.

HARDHEAD, PACIFIC LAMPREY, RIFFLE SCULPIN, SACRAMENTO HITCH, AND WESTERN LAMPREY

Hardhead, pacific lamprey, western lamprey, riffle sculpin, Sacramento hitch, and western lamprey all have the potential to be found in the Mokelumne and Calaveras Rivers year-round. If any of these four species are present during times of in-water construction, they may be exposed to effects of the proposed project. If present, hardhead, lamprey, sculpin, or hitch could be killed or injured by in-water construction activities. The dewatering of an area of suitable habitat for construction activities could also expose these species to adverse effects through potential stranding. In-water construction such as dewatering may have short term effects on their habitat, including decreased water quality. This would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-23, Mitigation Measures GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts.

SACRAMENTO SPLITTAIL

Sacramento splittail could be present in the Calaveras River and in-water construction could have a significant impact on Sacramento Splittail if conducted during the time when this species is spawning and embryos/larval fish are present in the project area. If present, splittail could be killed or injured by in-water construction activities. In-water construction such as dewatering may have short term effects on their habitat, including decreased water quality, and would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-23, Mitigation Measures GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts.

WHITE STURGEON

White sturgeon are potentially absent or rare on the Mokelumne River where in-water construction activities would occur. While the Mokelumne River is identified as potential habitat for white sturgeon, there are no recent records of them being captured or encountered. This species is also absent or rare on the Calaveras River where in-water construction will occur. As such, effects from the proposed project on white sturgeon are not expected to occur. Therefore, construction would have no impact on populations of white sturgeon.

OVERALL CONSTRUCTION-RELATED IMPACTS TO FISH

Fourteen (14) species of special-status fish were determined to have the potential to occur within the project area. Construction-related project activities would have no impact on five of these species (Central California roach, Delta smelt, sDPS green sturgeon, longfin smelt, and white sturgeon). However, construction-related project activities would have a potentially significant

impact on nine of these fish species (Central Valley fall/late fall-run Chinook, Central Valley spring-run Chinook, CCV steelhead, hardhead, Pacific lamprey, riffle sculpin, Sacramento hitch, Sacramento splittail, and western river lamprey).

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-23, Mitigation Measure GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2 would reduce this impact, because habitat assessments would be conducted, and then if needed, pre-construction surveys would be conducted, WEAP training would be conducted, stop-work for special-status species presence will occur, fish specific work windows will be adhered to, turbidity will be monitored, a fish rescue and relocation plan will be implemented, NMFS-approved screens will be used, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, erosion control plans would be created, and general BMPs for in-water work would be conducted. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on special-status fish species, and construction impacts would be less than significant with mitigation**.**

Operation

POTENTIAL IMPACTS FROM DIVERSION OF MOKELUMNE RIVER WATER UNDER MICUP

This analysis considers impacts to special-status fish in the lower Mokelumne and the Delta from MICUP including direct diversions between December 1st and June 30th under A029835 and diversion from storage in Camanche Reservoir between July 1st and October 31st.

To evaluate potential operational fish impacts, modeling was conducted to estimate lower Mokelumne River flow for Baseline Conditions and with MICUP (refer to discussion in the *Lower Mokelumne River Flow Modeling* section above), and modeling of Delta water quality was conducted for Baseline Conditions and with MICUP using estimated changes in lower Mokelumne River outflow to the Delta from the flow analysis (refer to discussion in the *Delta Water Quality Modeling* section above).

Changes in Lower Mokelumne River Flows

Potential impacts to special-status fish in the lower Mokelumne River could occur from reductions in flow from MICUP. MICUP would reduce the amount of water released from Camanche Dam into the lower Mokelumne River due to diversion of water into the Mokelumne Aqueduct at Pardee Reservoir and further reduce flows between Camanche Dam and WDD from direct diversions at MICUP PODs along the lower Mokelumne River. Potential impacts to special-status fish from diversions under MICUP could occur to Chinook salmon and CCV steelhead. As discussed in the Regulatory Setting section above, EBMUD has agreed to a minimum flow schedule and commitment that considers key life history milestones for Endangered ESA-listed salmonids within the lower Mokelumne River. Therefore, potential impacts from MICUP on special-status fish in the lower Mokelumne River are evaluated by determining if MICUP would maintain JSA and HRL minimum flow requirements. This evaluation is based on modeling conducted to estimate lower Mokelumne River flow for Baseline Conditions and with MICUP.

As discussed in operations section of Impact SW-1, the flow modeling estimates MICUP would divert water in 31 of the 53-year modeling period. In the wetter 31 years when MICUP used water, minimum flow requirements are maintained below Camanche Dam and below WDD in all months of the 53-year modeling period. Furthermore, in the drier months and 22 years when no water is used

by MICUP, when flows are naturally lower, MICUP would increase flow levels (compared to Baseline Conditions) due to reduced stream seepage resulting from MICUP operations that raise groundwater levels. This beneficial effect would increase flows for fish in the lower Mokelumne River and increase the outflow of freshwater to the Delta.

Changes in Delta Salinity

Potential impacts to special-status fish in the Delta could occur because of changes in salinity resulting from reduction of freshwater flows (Delta inflow) from the lower Mokelumne River due to MICUP. Potential impacts to special-status fish in the Delta could occur to delta smelt and longfin smelt. Flow modeling conducted for the project also estimated outflow from the lower Mokelumne River to the Delta for Baseline Conditions and with MICUP. The results of this flow analysis were then used to estimate salinity in the Delta at D-1641 compliance locations with water quality objectives for fish and wildlife and X2.

The D-1641 stations for fish and wildlife beneficial uses are San Joaquin River at Jersey Point (D15) and San Joaquin River at Prisoners Point (D29). MICUP flow reductions resulted in very small increase (0.5 percent) in days (33) of salinity non-compliance for Sacramento River at Jersey Point in wet, above normal, and below normal years. Seventeen of these days are in August . In addition, MICUP flow reduction resulted in a very small increase (0.2 percent) in days (28) of X2 non-compliance in wet, above normal, and below normal years. As discussed in operations section of Impact SW-1, Delta water quality modeling only partially captures the effects of increased flows from seepage reductions; and during longer periods when water isn't used under MICUP (but after groundwater recharge has begun), particularly prolonged drier periods when salinity tends to be higher in the Delta, increases in freshwater flows to the Delta due to MICUP would have a beneficial impact on salinity (and therefore, fish) to some extent by helping to dilute concentrations and increase the freshwater barrier on the east side of the Delta.

Conclusions

Flow modeling confirms that minimum flow requirements for fish in the lower Mokelumne River would be maintained at all times under MICUP operations. In reality, MICUP project components would be developed over time and MICUP would not immediately use the full capacity of water (as was modeled). Since modeling assumes the full capacity of MICUP is immediately available, actual flow reductions and increases due to seepage reductions are expected to be less in earlier years of MICUP and ramp up over time as additional capacity (from PODs and project components) is developed.

Delta water quality modeling demonstrates that MICUP would not result in additional days of salinity standards violations most of the time, with minimal additional days of non-compliance including a total of 16 days of salinity fish and wildlife standard non-compliance and 2 days of X2 standard non-compliance between December 1st and July 31st throughout the 53-year modeling period, attributed to direct diversion of water under A029835. This analysis assumes MICUP always diverts water and reduces flow when water is available; however, water diverted under A029835 would be subject to Term 91 which limits diversions when the CVP and SWP are releasing previously stored water to meet water quality and flow requirements in the Delta and the Delta is termed to be in balanced conditions. As such, the modeling overestimates use of water for MICUP under A029835, and actual flow reductions and changes in Delta water quality would be less than indicated to some extent. With Term 91, MICUP direct diversions would not occur in balanced Delta conditions and cause non-compliance with salinity standards.

The reduction in flow in the lower Mokelumne River channel would maintain minimum flow requirements. Increases in days of salinity fish and wildlife standards and X2 standard non-compliance from diversion of water under A029835 would be extremely small and likely avoided or at least further reduced with implementation of Term 91 to protect water quality in the Delta. Furthermore, MICUP would increase flows in the lower Mokelumne River and outflow to the Delta from the Mokelumne, Calaveras, and San Joaquin Rivers during critical dry periods resulting in beneficial effects to water quality to some extent. Therefore, operation of MICUP would result in less-than-significant impacts to special-status fish.

POTENTIAL IMPACTS FROM MICUP OPERATION AND MAINTENANCE ACTIVITIES AT PUMP STATIONS/PUMPS

This analysis addresses potential impacts to special-status fish from O&M activities at pump stations/pumps on the Mokelumne River. Fourteen (14) species of special-status fish were determined to have the potential to occur within the Mokelumne River in the MICUP project area. O&M activities would have no impact on Delta smelt, longfin smelt, sDPS green sturgeon, and white sturgeon. The City of Stockton's existing pump station that would be used as a MICUP point of diversion provides the only habitat for these species in the MICUP project area. However, MICUP would not result in any new maintenance activities or in-water work at this location.

O&M activities could affect the 10 other special-status fish species that have the potential to occur in the MICUP project area and their habitat.[125] O&M activities include monitoring and adjusting pumps, flow of water and wells, and general maintenance on existing features. Some level of dewatering and in-water work may also occur for some O&M activities at existing pump location. Fish could be injured or killed during in-water work activities, fish could be stranded during dewatering, and fish could be entrained by unscreened pumps and diversions during dewatering. O&M activities on the riverbank could also result in the incidental introduction of fine sediments to the waterways, which could temporarily reduce habitat quality. Additionally, expanded pump stations would have new screens installed, which could cause a stranding risk or other adverse impacts to certain special-status fish species depending on the grate size of the new screens. Therefore, O&M-related impacts to special-status fish and their habitat from activities at pumps stations/pump under MICUP would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-23, Mitigation Measure GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2 would reduce this impact because habitat assessments would be conducted, pre-construction surveys would be conducted, WEAP training would be conducted, stop-work for special-status species presence will occur, fish specific work windows will be adhered to, turbidity will be monitored, a fish rescue and relocation plan will be implemented, NMFS-approved screens will be used, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, erosion control plans would be created, and general BMPs for in-water work would be conducted. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on any special-status fish species, and construction impacts would be less than significant with mitigation**.**

[125] Impacts to designated critical habitat and EFH are addressed under Impact 2 of this section.

Table 4.4-5 Species Potential Impacts by Partner Agency

	NSJWCD		SEWD		City of Stockton	
Taxa	**Construction**	**O&M**	**Construction**	**O&M**	**Construction**	**O&M**
Plants	LTSMI	NI	LTSMI	NI	LTSMI	NI
Invertebrates	LTSMI	NI	LTSMI	NI	LTSMI	NI
Amphibians & Reptiles	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI
Birds	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI
Mammals	LTSMI	NI	LTSMI	NI	LTSMI	NI
Fish (waterways within project components)	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI
Habitat Modification	LTSMI	NI	LTSMI	NI	LTSMI	NI

Mitigation Measures

The following mitigation measures are required prior to and during construction activities associated with project components for all three MICUP Partner Agencies. Mitigation Measure GEO-1 is described in Section 4.6, Geology and Soils, and Mitigation Measures SW-2 and SW-3 as described in Section 4.9, Hydrology and Water Quality: Surface Water.

BIO-1 Review and Survey Project Area-Specific Biological Resources Prior to Construction and Avoid and Minimize Effects During Construction

For all MICUP components, prior to construction, the implementing agency shall assess the project area to determine if habitat types that may be suitable for sensitive biological resources are present in these areas. If suitable habitat types are anticipated to be present within the project area, the implementing agency will require a qualified biologist to conduct a field biological survey prior to proposed project activities. Field biological surveys will include a visual inspection for biological resources to (1) identify and document sensitive resources, such as riparian or other sensitive habitats, sensitive natural community, wetlands and waters, or wildlife nursery site or habitat (including bird nests); and (2) assess the suitability of habitat for special-status plant and animal species. Habitat assessments will be completed at a time of year that is appropriate for identifying habitat. Based on the results of the biological assessment, the implementing agency, in consultation with a qualified biologist, will determine which one of the following best characterizes the circumstances:

A. Suitable Habitat Is Present but Adverse Effects Can Be Clearly Avoided.

If, based on the survey, the qualified biologist determines that suitable habitat for sensitive biological resources is present but adverse effects on the suitable habitat can clearly be avoided through one of the following methods, the avoidance mechanism will be implemented prior to initiating construction and will remain in effect throughout the element implementation:

- by physically avoiding the suitable habitat, or
- by conducting proposed project activities outside of the season when a sensitive resource could be present within the suitable habitat or outside the season of sensitivity (e.g., outside of special-status bird nesting season, or outside of maternity and rearing season at wildlife nursery sites).

- Physical avoidance will include flagging, fencing, stakes, or clear, existing landscape demarcations (e.g., edge of a roadway) to delineate the boundary of the avoidance area around the suitable habitat.

B. Suitable Habitat Is Present and Adverse Effects Cannot Be Clearly Avoided.

Further review and surveys will be conducted to determine presence/absence of sensitive biological resources that may be affected (see resource-specific mitigation measures).

BIO-2 Best Management Practices for the Protection of Special-Status Species Prior to and During Construction

For all MICUP components, based on site-specific biological conditions as determined from the survey conducted in Mitigation Measure BIO-1, the following activities shall be implemented.

A. Obtain and comply with all necessary permits and authorizations prior to construction. The implementing agency and/or its contractor(s) shall acquire any necessary permits and authorizations prior to the start of any construction activities. Permits and authorizations may include any and all of the following:

- Obtaining a permit for the filling of wetlands and other waters of the United States (Section 404 of CWA) as well as CWA Section 401 certification if impacts on waters of the United States cannot be avoided. Any permit and certification will be obtained before any ground-disturbing activity begins within 50 feet of, or fill or dredged material is discharged into, any wetland or other water of the United States. All requirements of any permits obtained will be fulfilled in the time frames required by the permits.
- Consultation with USFWS and/or NMFS under Section 7 of the ESA to identify appropriate measures to avoid, minimize, and compensate for impacts to federally listed species, and, if necessary, obtain incidental take authorization.
- Securing a CDFW Section 1602 Streambed Alteration Agreement for all construction work to be performed in the vicinity of riparian habitat, and more specifically anywhere where trees would be removed in riparian habitat.
- Consulting with CDFW under Section 2081 / CESA to identify appropriate measures to avoid, minimize, and compensate for impacts to State-listed species, as well as candidate species, and, if necessary, obtain incidental take authorization.
- Participation in the SJMSCP, for several covered plant and wildlife species, waters of the United States and State, and riparian habitat.

B. Conduct a Worker Environmental Awareness Program (WEAP) Training for All Staff That Will be On-site During Project Activities. A qualified biologist shall provide WEAP training to cover species identification, habitat, life history, and conservation measures for all special-status species with potential to occur within the project area. Training may consist of showing a video prepared by a qualified biologist, or an in-person presentation by a qualified biologist. In addition to the video or in-person presentation, training may be supplemented with the distribution of approved brochures and other materials that describe protected resources and methods for avoiding effects. The contractor shall be responsible for ensuring that all new personnel have received the WEAP training and are documented for reporting purposes. For multi-year projects, the WEAP shall be updated on a yearly basis to ensure proposed project applicability and any lessons learned. All personnel are required to re-take the WEAP yearly.

C. Pre-construction Species Survey. A designated and qualified biologist shall conduct a general pre-construction survey for all special-status species with potential to occur if suitable habitat is present within the project area. This survey will focus on the presence/absence of special-status species within areas where impacts will occur. This survey should occur no sooner than 24 hours before the start of construction and will include a 200-foot buffer to include suitable surrounding habitat. Surveys shall be repeated after any lapse in ground disturbing activity of two weeks or longer. Preconstruction surveys for special-status species will follow this guideline, unless otherwise specified in the species-specific measures below.

D. Stop Work if Special-status Species are Observed in Project Area. If any life stage of special-status species (plant or wildlife) are found in the project area, construction activities shall cease within 100 feet of the resource and USFWS, CDFW, and/or NMFS shall be notified within 48 hours, depending on species federal or state status. Construction activities will not be allowed within 100 feet of the species. If species is an animal, the biologist shall monitor the animal to make sure it is not harmed and that it leaves the site on its own unless handling is approved in consultation with USFWS and CDFW and such handling is done by a USFWS- and CDFW-approved biologist with appropriate handling permits to move the animal out of the work area to a USFWS- and/or CDFW-approved relocation site. If an animal can be relocated, it will be moved to the nearest available suitable habitat and placed down in the direction it was initially moving towards when picked up. Work may reconvene after a qualified biologist confirms that the species is no longer within 100-feet of active construction and is no longer in harm's way.

E. Inspect Under Vehicles, Heavy Equipment, and Open Pipes. Construction staff will inspect under and around all vehicles, heavy equipment, and open pipes for the presence of wildlife and other special-status species before the start of each workday. Wildlife found will be allowed to leave the project site on its own before work is to proceed.

F. Prevent Wildlife Entrapment. To prevent wildlife entrapment, all excavated, steep-walled holes or trenches more than 2 feet deep must be covered with plywood or similar material at the end of each workday. If trenches cannot be covered, one or more escape ramps of no more than a 45-degree slope must be constructed of earthen fill or created with wooden planks.

G. Remove Refuse. To eliminate sources that could attract wildlife, which may include predators, all trash, including food-related trash items such as wrappers, cans, bottles and food scraps, will be disposed of in closed containers and removed at the end of each workday.

H. Vehicle Speed. Project-related vehicles shall observe a 10-mile-per-hour speed limit within project areas and along haul/access routes, except on county roads and State and federal highways.

I. Site Best Management Practices. Appropriate site-specific best management practices (*e.g.,* fencing and other erosion controls) shall be implemented to avoid accidental encroachment of vehicles and personnel to sensitive resources and to minimize and control runoff and erosion.

J. Spill Protection. Every reasonable precaution shall be implemented to protect soils and waters from pollution with fuels, oils, and other harmful materials. In the event of a spill, the spill shall be addressed immediately with appropriate equipment to contain and absorb the spilled material. Spill kits must be on-site the project area for the entirety of the proposed project construction implementation.

K. Staging Areas. Any and all heavy equipment, vehicles, and supplies shall be stored at the designated staging areas at the end of each daily work period. Vehicles and equipment shall be properly maintained to prevent contamination of soil or water from external grease and oil or from leaking hydraulic fluid, fuel, oil, and grease. Vehicles and equipment shall be checked daily for leaks. If leaks are found, the equipment shall be removed from the site and shall not be used until the leaks are repaired. Equipment shall be refueled and serviced at designated refueling and staging sites located where a spill shall not drain directly toward any aquatic habitat. Appropriate containment materials shall be installed to collect any discharge, and adequate materials for spill cleanup shall be maintained onsite.

L. Erect and Maintain High-visibility Fencing during Ground Disturbing Activities as Feasible. Before beginning ground disturbance activities, high-visibility fencing shall be erected to protect areas of sensitive biological resources (aquatic, riparian, sensitive habitat, etc.) that are located adjacent to proposed project activities that can be avoided. The fencing shall restrict encroachment of personnel and equipment into these areas. The fencing may be removed only when the ground disturbing activities within a given area is completed and shall be maintained by the contractor.

- If fencing is left up during a multi-year project, the bottom of the fencing should be rolled up, as to not impede movement or entangle wildlife during the off-season.

M. Avoid Using Materials that may Entangle Snakes and Wildlife. Products with plastic monofilament or cross-joints in the netting that are bound/stitches (such as straw wattles, fiber rolls, or erosion control blankets), which could trap giant garter snake or other wildlife will not be used.

N. Revegetate All Disturbed Natural Surfaces. After completion of ground disturbing activities, all disturbed soil surfaces shall be revegetated within the same implementation season that disturbance occurs. These areas shall be recontoured, if appropriate, and revegetated with appropriate native plant species to promote restoration of the area to pre-project conditions or better. The Project would incorporate nature-based solutions with the use of bioengineered natural and manmade materials to stabilize disturbed areas within the Project footprint including the use of biodegradable weed-free certified natural-fiber erosion control materials and native seed mix to revegetate the site.

O. Compensate for Permanent Loss of State or Federally listed Special-status Species Habitat. For all unavoidable adverse impacts to state or federally listed special-status species habitat, the implementing agency will coordinate with the CDFW, USFWS and/or NMFS to determine the appropriate type and amount of compensatory mitigation required, as necessary. Appropriate compensatory mitigation can include purchasing credits at an agency approved conservation bank, providing on-site mitigation, or establishing and/or protecting habitat for the species. Replacement habitat shall be commensurate with the type and amount of habitat lost.

BIO-3 Special-status Plants Surveys Prior to Construction and Avoid and Minimize Effects During Construction

For project components for NSJWCD, SEWD, and City of Stockton, if it is determined during implementation of Mitigation Measure BIO-1 that (1) suitable habitat for special-status plant species is present, (2) suitable habitat is present, but surveys were conducted during a time-frame when the special-status species could not be identified, and/ or (3) special-status species were identified and

can be avoided, the agency implementing the proposed project component in consultation with a qualified biologist, shall implement the following:

A. Special-status Plant Surveys. A qualified botanist shall be retained to perform focused surveys for special-status plants. These surveys shall serve to document the presence/absence of these species in and adjacent to (within 100 feet, where appropriate) proposed impact areas, including new construction access routes.

- These surveys shall be conducted in accordance with CDFW Protocols for Surveying and Evaluating Effects on Special-Status Native Plant Populations and Sensitive Natural Communities[14] or other current protocols.
- These guidelines require that special-status plant surveys be conducted at the proper time of year when target species are both evident and identifiable. Surveys shall be scheduled to coincide with known blooming periods, and/or during appropriate developmental periods that are necessary to identify the plant species of concern.
- If three (3) years has elapsed between the completion of the special-status plant surveys and the start of ground disturbance, these surveys shall be repeated.

B. Special-status Plants Are Present but Adverse Effects Can Be Avoided. If special-status species are determined to be present within 100 feet of areas of ground disturbance, the implementing agency will avoid and protect these species through one of the following:

- The implementing agency will avoid and protect these species by establishing a no-disturbance buffer around the area occupied and marking the buffer boundary with high-visibility flagging, orange construction fencing and/or silt fencing, stakes, and signage. The appropriate based on-site conditions will determine buffer boundary type. It is possible to use clear, existing landscape demarcations (e.g., edge of a roadway), only if the designated biologist determines that there is no chance of any project activities occurring in that area.
- The appropriate buffer size will be determined based on plant phenology at the time of treatment (e.g., whether the plants are in a dormant, vegetative, or flowering state), the individual species' vulnerability to the activity being implemented, and environmental conditions and terrain.

The only exception to avoidance of special-status plants will be in cases where it is determined by a qualified biologist, in consultation with CDFW and USFWS, as appropriate depending on species status and location that the listed plants would benefit from proposed project activities in the occupied habitat area even though some of the listed plants may be lost during proposed project activities.

C. Suitable Habitat is Present but Special-status Plants Are Not Present.

- No further mitigation measures needed for special-status plants.

BIO-4 Prepare Special-Status Plants Mitigation Plan Prior to Construction and Minimize Effects and/or Compensate for Unavoidable Loss Prior to, During, and After Construction

For project components for NSJWCD, SEWD, and City of Stockton, if it is determined during implementation of Mitigation Measure BIO-3B that special-status plant species are present and adverse effects cannot be avoided, the agency implementing the proposed project component, in

consultation with a qualified biologist, shall determine and implement one of the following best characterizes the circumstances and plan:

A. **Minimize Effects Through the Development of a Mitigation Plan for Salvage and Transplant of Special-status Plants prior to, during, and after construction.** The development of a mitigation plan to minimize effects to special-status plants that are within the ground disturbing area would be developed by a qualified botanist.

   - The program shall describe and identify means and methods to propagate affected special-status plants via vegetative or reproductive means (e.g., harvesting of seed or seed bank through topsoil collection, salvaging and transplanting or collecting of cuttings), as appropriate for the species, and transplant at suitable receiving sites as close to the existing population as possible.
   - Propagation and transplantation would occur prior to construction.
   - The receiving location would be evaluated and chosen based on similarity to conditions at the transplant source location, to the extent feasible. Site conditions to consider when choosing a receiving site would include aspect, substrate, hydrology, associated species, and canopy cover.
   - The transplanted plants would be monitored for at least one (1) year following construction.
   - The plan will also include success criteria and adaptive management measures or plans if performance criteria are not met.

B. **Compensation for Unavoidable Loss of Special-status Plant Species prior to, during, and after construction.** Alternative to salvage and transplant, mitigation could be satisfied through off-site preservation and/or restoration or via payment to an in-lieu fee program, if available.

   - The implementing agency will prepare a Compensatory Mitigation Plan that identifies the residual significant impacts that require compensatory mitigation and describes the compensatory mitigation strategy being implemented and how significant, unavoidable losses of special-status plants will be compensated.
   - If the preservation option is chosen, preservation areas may include undisturbed and/or disturbed areas of the site that will be preserved and/or restored, respectively, and managed in perpetuity, offsite mitigation lands, or a combination thereof. The preserved habitat shall be of equal or greater habitat value to the areas affected in terms of soil features, extent of disturbance, vegetation structure, and contain extant and/or propagated populations of the same or greater size as the area affected.
   - The actual level of mitigation may vary depending on the sensitivity of the species, its prevalence in the area, the location of the occurrence, and the current state of knowledge about overall population trends and threats to its survival; however, at a minimum, the species and habitat will be replaced at a minimum 1:1 ratio (individuals or acreage of occupied habitat).
   - Mitigation ratio beyond 1:1 may be required by either USFWS or CDFW prior to any construction activities that would affect plant species.

BIO-5 Conduct Crotch's Bumble Bee Survey Prior to Construction and Minimize Effects During Construction

For all MICUP components, if it is determined during implementation of Mitigation Measure BIO-1 that suitable habitat is present or the species is confirmed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall require that the measures described below are implemented to minimize for effects of the proposed project on Crotch's bumblebee.

A. **Conduct Pre-activity Survey for Crotch's Bumble Bee before Vegetation Removal.** If ground-disturbing activities are scheduled to begin between February 1 and October 31, preconstruction surveys shall be conducted by a CDFW-approved biologist following *CDFW's Survey Considerations for CESA Candidate Bumble Bee Species,*[126] or the most up-to-date CDFW survey protocol. If possible, three Crotch bumble bee foraging and/or nest surveys shall be conducted at two-to-four-week intervals during the colony active period (April-August).

   - If Crotch bumble bees are detected, any remaining surveys will focus on nest locations.
   - If no nests are found but the species is observed during preconstruction surveys, work crews should be informed of the possibility of Crotch bumble bees or their nests being present onsite.
   - If a Crotch bumble bee is encountered during construction, work shall stop until the individual leaves of its own volition.
   - If an active Crotch bumble bee nest is detected, an appropriate no disturbance buffer zone (including foraging resources and flight corridors essential for supporting the colony) shall be established around the nest to reduce the risk of disturbance or incidental take, and the designated biologist shall coordinate with CDFW to determine if an Incidental Take Permit (ITP) under Section 2081 of the California ESA will be required. Currently there are limited research resources on nest avoidance buffer sizes that would need to be implemented if a nest was identified. A minimum avoidance distance for this project shall be 100 feet unless the qualified biologist determines that construction activities and surrounding land cover types provide protection to this species and reduced nest buffer is appropriate. Buffer distances could be adjusted by CDFW in the ITP.
   - Nest avoidance buffers may be removed at the completion of the flight season (October 31) and/or once the qualified biologist deems the nesting colony is no longer active.

BIO-6 Conduct Monarch Butterfly Prior to Construction and Minimize Effects During Construction

If monarch butterfly is no longer a proposed species and is not formally listed under the ESA at the time ground-disturbing activities occur, then no additional protection measures are required.

If monarch butterfly is formally listed under the ESA at the time of ground-disturbing activities, for all MICUP components, if it is determined during implementation of Mitigation Measure BIO-1 that suitable habitat is present or the species is confirmed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are implemented to minimize for effects of the proposed project on monarch butterfly.

[126] CDFW.2023. Survey Considerations for CESA Candidate Bumble Bee Species. Available at: https://wildlife.ca.gov/Conservation/Survey-Protocols.

A. **Conduct Pre-activity Survey for Milkweed and Monarch before Vegetation Removal.** If work occurs during the monarch butterfly breeding season (March 1 to October 1), prior to the start of work, a qualified biologist shall conduct a pre-construction survey within all potential habitats where vegetation will be removed to search for individual monarch butterflies (mating or breeding) and identify all milkweed species present. If the results of the survey do not identify any milkweed plants or signs of mating/breeding, no further mitigation shall be required. If milkweed, breeding, or mating butterflies are observed in the project area, buffers may be used to avoid sensitive habitat (*i.e.,* milkweed).

- If monarch or milkweed are identified during the preconstruction survey, a qualified biologist will be onsite during all vegetation removal and initial ground disturbance to survey the work area for monarch butterfly before commencement of activities.
- If larvae are discovered on milkweed species, the milkweed plant will be avoided and buffered, at the discretion of the monitoring biologist, until monarch is no longer present on the milkweed.

BIO-7 Enforce Federally Listed Vernal Pool Invertebrates Buffer and Minimize Effects and/or Compensate for Unavoidable Impacts Prior to and During Construction

For project components for NSJWCD or SEWD, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable habitat, or presence is confirmed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall require that the measures described below are implemented to minimize for effects of the proposed project on conservancy fairy shrimp, vernal pool fairy shrimp, and vernal pool tadpole shrimp.

A. **Protection Buffer Delineations to Avoid Impacts to Vernal Pool Invertebrates.** If suitable vernal pool habitat is identified from field surveys in Mitigation Measure BIO-1 to be within 100 feet of ground disturbing construction activities, including maintenance areas, construction staging areas, and access routes, a qualified biologist shall take into consideration environmental factors such as site grade, construction activities, and more to determine an appropriate buffer distance to protect vernal pool invertebrates.

- CDFW or USFWS may be consulted on buffer distances. A minimum buffer distance of 50-feet will be established, enforced, and maintained during construction.

B. **Compensate for Unavoidable Loss of Vernal Pool Invertebrates.** If impacts cannot be avoided, the implementing agency will coordinate with USFWS to develop and implement an appropriate mitigation strategy to compensate for unavoidable habitat loss.

- Mitigation will likely include purchase of vernal pool habitat at a USFWS-approved mitigation bank. Appropriate mitigation ratios will be developed during consultation with USFWS but are anticipated to be based on 3 acres of habitat preservation and 1 acre of habitat creation for each acre of habitat loss.

BIO-8 Conduct Valley Elderberry Longhorn Beetle Survey Prior to Construction and Minimize Effects During Construction

For project components for NSJWCD, SEWD, and City of Stockton, if it is determined during implementation of Mitigation Measure BIO-1 that suitable habitat is present within 165-feet of a project component, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the following measures are implemented as described below.

A. **Conduct a Focused Survey for Presence of Elderberry Shrubs**. Prior to construction, a qualified biologist shall conduct a survey to map and flag all elderberry shrubs within the area of direct impacts, as well as adjacent areas within 165 feet (50 meters).

   - Access or haul routes in or adjacent to suitable habitat shall be included in this survey but may have a survey buffer reduction of 20 feet (6 meters), if the qualified biologist determines that there is no chance that shrubs outside this boundary will be impacted by project vehicles.

B. **Provide Protective Fencing around Elderberry Shrubs Prior to Construction and Monitor Shrubs to Ensure that Project Activities do not Result in Adverse Effects on Valley Elderberry Longhorn Beetle**. Elderberry shrubs that were identified within the project area, shall be protected in place with orange construction barrier fencing. The size of the buffer will depend on distance from the shrub to proposed project disturbance, as well as the type and intensity of disturbance.

   - A minimum buffer distance is 20 feet (6 meters) from the dripline of the shrub shall be installed under the supervision of the qualified biologist prior to the start of construction activities.
   - Shrubs identified along the haul or access routes shall receive a fencing buffer if the qualified biologist determines that there is a possibility of impacts to the shrubs from vehicles pulling off onto the shoulders of the road.
   - All temporary fences will be furnished, constructed, and maintained during construction by the contractor, and finally removed post-construction where there are no planned activities that could affect the shrubs.
   - Monitoring shall be conducted to confirm that proposed project activity is not resulting in detectable adverse impacts on elderberry shrubs. Buffer area fences around elderberry shrubs shall be inspected weekly by a qualified biological monitor during ground-disturbing activities and monthly after ground-disturbing activities until proposed project construction is complete or until the fences are removed, as approved by the biological monitor and the resident engineer.
   - The biological monitor shall be responsible for ensuring that the contractor maintains the buffer area fences around elderberry shrubs throughout construction.

BIO-9 Conduct Valley Elderberry Longhorn Beetle Survey Prior to and Minimize Effects and/or Compensate for Unavoidable Loss During Construction

If the focused surveys described above in Mitigation Measure BIO-8 have been completed and elderberry shrubs cannot be avoided, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are

implemented to avoid and minimize effects of the proposed project on valley elderberry longhorn beetle, such that there is no direct loss of individuals of this species.

A. Conduct Shrub Suitability and Exit Hole and Beetle Presence Survey. Surveys to identify suitable elderberry shrubs to be transplanted shall be conducted by a qualified biologist prior to transplantation.

- Surveys will be conducted in accordance with the Framework for Assessing Impact to the Valley Elderberry Longhorn Beetle.[127]
- The biologist will survey the area surrounding the shrub to be transplanted to ensure that there are not additional elderberry shrubs that need to be removed.
- Surveys will estimate the canopy area of each shrub as well as associated riparian habitat and examine individual shrubs for presence of beetle exit holes.
- Transplanting locations shall be surveyed and determined to be suitable to support the longevity of the shrubs.

B. Development of Elderberry Transplanting Plan. Prior to construction activities that will have effects on valley elderberry longhorn beetle's host plant, a transplanting plan shall be developed.

- The plan will include an assessment of elderberry shrubs that are suitable for transplanting or shrubs that are not suitable and would require mitigation.
- The plan will include the results of the exit hole and beetle presence per shrub inventoried.
- The plan will include the assessments of the transplanting locations surveyed.
- A planting plan shall be specific about site selection, factors that will influence success, native associate planting, monitoring, success criteria and methods for intervention if success criteria are not met.
- The planting plan must be consistent with Assessing Impact to the Valley Elderberry Longhorn Beetle.[128]
- The elderberry planting plan may be combined with the special-status plant mitigation plan, described in Mitigation Measure BIO-4, if both are required.

C. Transplanting Elderberry Shrubs. Elderberry shrubs that are determined to have suitable health and vitality for a successful transplant shall follow the most current version of the ANSI A300 (Part 6) guidelines[129] for transplanting.

- Shrubs shall be transplanted when they are dormant (November through the first two weeks of February) and after they have lost their leaves. Transplanting during the non-growing season will reduce shock to the shrub and increase transplantation success. Transplant locations and density of transplants

[127] USFWS. 2017. *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus).* U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.
[128] USFWS. 2017. *Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus).* U.S. Fish and Wildlife Service; Sacramento, California. 28 pp.
[129] TCIA. 2025. *Part 6 – Planting and Transplanting.* Accessed on January 21, 2025 via: https://treecareindustryassociation.org/business-support/ansi-a300-standards/part-6-planting-and-transplanting/

BIO-10 Conduct Surveys for Special-Status Reptiles and Amphibians, and Respective Habitats, Prior to Construction and Avoid and Minimize Effects During Construction

For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable habitat, or presence is confirmed, for special-status reptiles and/or amphibians, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are implemented to avoid and minimize effects.

A. Conduct Preconstruction Survey to Mark and Map Burrows within the Project Boundary. A qualified biologist will identify all small mammal burrows or cracks (for western spadefoot) within suitable habitat for all special-status reptiles and amphibians with potential to occur in the project area. Cracks or burrows will be GPS mapped and marked in the field with stakes or pin flags.

- Cracks, burrows, and/or nests will be fenced off and avoided during the duration of project activities or until a qualified biologist can determine that it is no longer active.
- Depending on the species discovered, USFWS and/or CDFW will be consulted to determine the next best appropriate steps and to confirm appropriate buffer size.
- A minimum buffer of 100-feet shall be used in the interim.

B. Install, Inspect, and Maintain Wildlife Exclusion Fencing. Where site conditions allow, installation of fencing along the project area boundaries as a way to divert moving reptiles and amphibians away from active construction zones.

- Installation of fencing locations shall be conducted under the supervision of the qualified biologist.
- The project area, including the fencing, will be inspected by a qualified biologist daily or weekly depending on project activities, time of year, and disturbed or undisturbed land cover within the boundary of where project activities are occurring.
- Fencing materials, height, and installation method shall be appropriate for the species being excluded. The use of the Animex *The Wildlife Fencing Guide – Amphibians, Reptiles, & Small Mammals*[130] shall be utilized for specifications.

C. Retain a Qualified Biologist to Be Present during All Initial Ground Disturbance and In-water Work and Regularly Inspect the Project Area for the Presence of Special-status Reptiles and Amphibians. The qualified biologist shall be present during the entirety of initial ground disturbing activities in suitable habitat for special-status reptiles and amphibians. Following the initial ground disturbance, the biological monitor will be onsite daily and available for the duration of construction while activities have the potential to impact special-status reptiles and amphibians.

- Monitoring will also include any activities involving in-water work in suitable habitat.

[130] Animex. 2021. The Wildlife Fencing Guide: Amphibians, Reptiles & Small Mammals. Version 1.1. Accessed on January 21, 2025 via: https://animexfencing.com/installation-guides

D. Dewatering Suitable Habitat. If dewatering of suitable aquatic habitat for any special-status reptile or amphibian species is to occur, monitoring will be required for the duration of the dewatering event.

- Species will be actively relocated (with prior CDFW and/or USFWS approval) to nearby suitable habitat or above or below the diversion, once water levels are low enough to safely do so.
- If the dewatering cannot remove all water, potential prey (i.e., fish and tadpoles) will be removed so that special-status reptile and amphibian species and other wildlife are not attracted to the project area.

E. Unintentional Nests or Burrows Uncovered. If an active nest or burrow is unintentionally uncovered during project activities, work shall stop in the vicinity of the nest and/or burrow and appropriate next steps, depending on the circumstances, shall be determined by a qualified biologist. These may include fencing and buffering the nest or burrow and/or rescue, rehabilitation, and relocation of affected species.

BIO-11 Conduct Giant Garter Snake Survey Prior to Construction and Minimize Effects During Construction

For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for giant garter snake or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

A. Conduct a Pre-activity Survey for Giant Garter Snake. Prior to construction, a qualified biologist shall conduct a survey to delineate suitable aquatic habitat and suitable uplands habitat within 200 feet that are anticipated to be impacted by project activities.

- Access or haul routes in or adjacent to suitable habitat shall be included in this survey but may have a survey buffer reduction of 20 feet (6 meters). If the qualified biologist determines that there is a chance that vehicles could impact suitable uplands habitat (e.g., suitable burrowing locations), measures listed below shall apply.

B. Clearance Surveys 24 Hours Prior to Ground Disturbing Activities. Suitable upland habitat for giant garter snake within the project footprint shall be surveyed by a qualified biologist within 24 hours before on-site project activities begin. Additional surveys shall be conducted within 24 hours before initial ground disturbance begins. Surveys shall be repeated after any lapse in ground disturbing activity of 2 weeks or longer.

C. Conduct Initial Earth-movement Activities within Suitable Upland Habitat between May 1 and October 1. When possible, the implementing agency shall complete ground-disturbing activities within suitable upland habitat for the giant garter snake between May 1 and October 1.

- Initial earth-moving is expected to correspond with the snake's active season (as feasible in combination with minimizing disturbance of nesting birds).
- Work in giant garter snake upland habitat may also occur between October 2 and November 1 or between April 1 and April 30, provided maximum daily air temperatures have exceeded approximately 75ºF for at least 3 consecutive days immediately preceding work and ambient air temperatures exceed approximately 75ºF during work. During these periods,

giant garter snakes are more likely to be active in aquatic habitats and less likely to be found in upland habitats

D. Conduct Initial In-water Activities within Suitable Aquatic Habitat for Giant Garter Snake between October 1 and May 1. When possible, the implementing agency shall complete in-water activities within suitable aquatic habitat for giant garter snake between October 1 and May 1. Initial in-water activity is expected to correspond with the giant garter snake's inactive season. During these periods, this species would be in upland habitat and highly unlikely to be present in aquatic habitat.

E. Variances in Work Windows. If the above Mitigation Measures do not cover the work windows, habitat or conditions that the agency implementing the proposed project is requesting, coordination with the qualified biologist first to determine if there are suitable work arounds or additional mitigation measures that can be implemented. If there are no other mitigation measures that can be implemented to protect giant garter snake, then USFWS and CDFW shall be consulted to determine acceptable methods for minimizing effects on giant garter snake shall occur prior to construction activities.

BIO-12 Conduct Northwestern Pond Turtle Survey Prior to Construction and Minimize Effects During Construction

For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for northwestern pond turtle or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

A. Conduct a Pre-activity Survey for Northwestern Pond Turtle. Prior to construction, a qualified biologist shall conduct a survey to delineate suitable aquatic habitat and suitable uplands habitat within 500 feet that are anticipated to be impacted by project activities.

- Access or haul routes in or adjacent to suitable habitat shall be included in this survey but may have a survey buffer reduction of 20 feet (6 meters). If the qualified biologist determines that there is a chance that vehicles could impact suitable uplands habitat (e.g., suitable nesting locations), measures listed below shall apply.

B. Conduct Initial In-water Activities within Suitable Aquatic Habitat for Northwestern Pond Turtle between March 1 and October 31. When possible, the implementing agency shall complete in-water activities within suitable aquatic habitat for northwestern pond turtle between March 1 and October 31. Initial in-water activity is expected to correspond with the turtle's active season. During these periods, northwestern pond turtles are more likely to be active and able to move out of harm's way.

C. Conduct Initial Ground Disturbing Activities within Suitable Upland Habitat for Northwestern Pond Turtle in April. When possible, the implementing agency shall conduct initial ground disturbance within suitable uplands habitat within 500 feet of suitable aquatic habitat in April. April is the only month in which both adult turtles, hatchlings, and nests are not within suitable uplands habitat.

D. If Initial Ground Disturbance Activities Cannot Occur within April, a Full-time Biological Monitoring Shall be Present During Initial Activities. If initial ground disturbance within 500 feet of suitable uplands habitat cannot be fully disturbed in the month of April, then a full-time biological monitor shall be present to monitor initial ground disturbance.

E. Daily In-water Work Timing and Disturbance. Prior to in-water activities, water disturbance shall occur to allow turtles to move out of the area on their own accord. Water disturbance may include the use of an excavator bucket gently disrupting the surface of the water, it shall not include activities that could cause direct harm to aquatic species. Disturbance shall occur around 8 a.m. when turtles are about to begin basking. Wait at least 10 minutes after disturbance before beginning in-water activities to allow turtle movement out of area. If in-water activities stop for more than 45 min, in-water disturbance shall occur again to enable turtles to move out of harm's way.

F. Direct Impact Avoidance. Measures shall be implemented to minimize potential for heavy equipment to destroy northwestern pond turtle nests and to encounter hatchling turtles. Feasible measures may vary depending on site-specific circumstances and could include, but not be limited to:

- Minimizing heavy equipment operation in upland habitat within 500 feet of aquatic habitat in February and March, when hatchling turtles emerge from nests and travel to aquatic habitat.
- Placing artificial ground cover that prevents female turtles from excavating nests in most likely nesting areas where ground disturbing activities shall occur before the following hatchling turtle emergence period.
- Fencing most likely nesting areas to exclude access by female turtles and/or enclose hatchlings after emergence. If active nests and hatchlings may be present, the fenced area shall be inspected daily by a qualified biologist and hatchling turtles shall be captured and relocated to suitable habitat at a pre-determined location.

BIO-13 Conduct California Tiger Salamander Prior to Construction and Minimize Effects During Construction

For project components for NSJWCD and SEWD, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for California Tiger Salamander or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

A. **Conduct All Earth-movement Activities within Suitable Upland Habitat During Dry and Daytime Conditions.** When possible, the implementing agency shall complete ground-disturbing activities within suitable upland habitat for the California tiger salamander during dry and daylight conditions.

- Initial earth-moving is expected to correspond with the salamanders active season (as feasible in combination with minimizing disturbance of nesting birds).
- All ground-disturbing work will occur during daylight hours in coordination with USFWS and depending on the level of rainfall and site conditions.

B. **Forecasted Rain Events.** The implementing agency will monitor the National Weather Service (NWS) 72-hour forecast for the work area. If a 70 percent or greater chance of rainfall is predicted within 72 hours of any project activity, all activities in areas within 1.3 miles of potential or known tiger salamander breeding sites will cease until no further rain is forecast.

   - If work must continue when rain is forecast, a qualified biologist will survey the project site before construction begins each day rain is forecast. If rain exceeds 0.25 inch during a 24-hour period, work will cease until no further rain is forecast.
   - This restriction is not applicable for areas located greater than 1.3 miles from potential or known breeding sites once they have been encircled with exclusion fencing.
   - However, even after exclusion fencing is installed, this condition would still apply to construction related traffic moving though areas within 1.3 miles of potential or known breeding sites but outside of the salamander exclusion fencing (e.g., on roads).

C. **Survey After Significant Precipitation Event.** For work conducted during the migration season (November 1 to May 31), a qualified biologist will survey the active work areas (including access roads) in mornings following measurable precipitation events.

   - Construction may commence once the biologist has confirmed that no California tiger salamanders are in the work area.

D. **Minimize Night Lighting.** If nighttime work occurs within 1.3 miles of potential or known California tiger salamander breeding sites the use of directional lighting pointing downward to avoid illuminating adjacent riparian and oak woodland habitat shall be implemented.

BIO-14 Conduct Western Spadefoot Survey Prior to Construction and Minimize Effects during Construction

For project components for NSJWCD and SEWD, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable aquatic and uplands habitat for western spadefoot or their presence is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below, in conjunction with BIO-10, are implemented to avoid and minimize effects.

A. Survey After Significant Precipitation Event. For work conducted during the western spadefoot breeding season (October 1 to May 31), a qualified biologist will survey the active work areas (including access roads) in mornings following measurable precipitation events. Construction may commence once the biologist has confirmed that no spadefoots are in the work area.

BIO-15 Consult with CDFW and/or USFWS Regarding Unavoidable Reptile and Amphibian Burrow/Nests Disturbance Prior to Construction and Avoid and Minimize Effects During Construction

For all MICUP components, if complete avoidance of active special-status reptile and amphibian (giant garter snake, northwestern pond turtle, California tiger salamander, or spadefoot toad) burrows or underground nests is not feasible, the agency implementing the proposed project component shall consult with CDFW and/or USFWS to determine the best approach to avoid and minimize potential impacts.

- Such measures may include hand excavating burrows and passive relocation of special-status reptiles and amphibians.

- Passive relocation of species shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW and/or USFWS.
- The relocation plan shall describe methods for passive relocation of the reptiles and amphibians, excavation of suitable burrows, and maintenance of the site to prevent reoccupation.

BIO-16 Conduct Nesting Special-status Bird Survey Prior to Construction and Avoid Effects During Construction

For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable nesting habitat for special-status birds or common birds or the presence of special-status species is observed, the agency implementing the proposed project component, in consultation with a qualified biologist, shall ensure that the measures described below are implemented to avoid and minimize effects.

A. Conduct Vegetation Removal between September 16 and January 31 to the Extent Feasible. Vegetation removal shall be conducted between September 16 and January 31, to the extent feasible, to minimize potential loss of active bird nests.

- If all construction activities (not just vegetation removal) occurring within suitable nesting habitat for special-status and common species can be conducted outside of the nesting season, no further mitigation measures for birds are required.

B. Conduct Pre-construction Surveys for Active Nests of Special-status Birds in Areas of Suitable Habitat before Starting Construction During Nesting Bird Season. If construction activities that could directly or indirectly affect suitable habitat for special-status birds cannot be conducted outside of the respective nesting seasons, the implementing agency shall, in coordination with a qualified biologist, shall complete pre-activity surveys for nesting birds.

- Surveys of all potential nesting habitat in the area shall be conducted by a qualified biologist during the nesting season, which is typically February 15 to September 1.
- Surveys shall be conducted within suitable nesting habitat that could be affected by construction activities and shall include a 0.5-mile buffer area (or larger area if required by established survey protocol) surrounding these areas.
- Where appropriate, pre-activity surveys shall follow established survey protocols or guidelines. These protocols include the following:
  - Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley[131]
  - Tricolored Blackbird Survey Methods[132]
  - Appendix D of the Staff Report on Burrowing Owl Mitigation[133]
- If no established survey protocol exists, the qualified biologist shall complete surveys no more than 1 week prior to the start of construction activities or more than 1 week prior to the restart of construction after a lapse of 14 days. If no nesting birds are detected during pre-activity surveys, no additional mitigation measures are required.

[131] Swainson's Hawk Technical Advisory Committee. 2000. Recommended Timing and Methodology for Swainson's Hawk Nesting Surveys in California's Central Valley.
[132] Airola, D., E. C. Beedy, S. Sanders, and J. Medley. 2024. Tricolored blackbird survey methods. California Fish and Wildlife Journal 110:e6.
[133] CDFW. 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency.

- A letter report documenting the survey methods and results shall be prepared and submitted to CDFW.

BIO-17 consult with CDFW Regarding Unavoidable Special-status Bird Nest Disturbance Prior to Construction and Avoid and Minimize Effects During Construction

For all MICUP components, if the measures described above in Mitigation Measure BIO-16 have been completed and ground disturbance or vegetation clearing must be initiated during the bird nesting season then the implementing agency shall ensure that the measures described below are implemented to minimize effects of the proposed project on nesting special-status birds, such that there is no direct loss of individuals of these species or proposed project-related nest failure.

A. Establish and Maintain Buffers Around Active Nest Sites to Avoid Nest Failure. If any active nests, or behaviors indicating active nests are present, or observed, the implementing agency shall establish appropriate-sized avoidance buffers around the nest sites, as determined by a qualified biologist in coordination with CDFW to avoid nest failure resulting from proposed project activities.

- The size and shape of the buffer shall depend on the species, nest location, nest stage, and specific construction activities to be performed while the nest is active. Primarily, CDFW follows the below-specified buffers in their *Appendix I CDFW's Conservation Measures for Biological Resources That May be Affected by Program-level Actions:*[134]
  - i. **Swainson's hawk or white-tailed kite**: A 0.5 mile no disturbance buffer shall be enforced.
  - ii. **Burrowing owl**: If burrowing owls are detected, disturbance to burrows will be avoided during the nesting season (February 1 through August 31). The qualified biologist will establish buffers around occupied burrows in accordance with guidance provided in the *Staff Report on Burrowing Owl Mitigation*.[135] Buffers around occupied burrows will be a minimum of 656 feet during the nesting season and 160 feet during the non-breeding season.
  - iii. **Other raptors (non-special-status and special-status, if not specified above):** A 500-foot no disturbance buffer shall be enforced.
  - iv. **Other non-raptor birds (non-special-status and special-status, if not specified above):** A 250-foot buffer shall be enforced.
    - The buffer shall be expanded if the birds are exhibiting agitated behavior, or the buffers may be adjusted (reduced) if a qualified biologist determines it would not be likely to adversely affect the nest, in coordination with CDFW.
    - If required, buffers shall be marked in the field by a qualified biologist using temporary fencing, high-visibility flagging, or other means that are equally effective in clearly delineating the buffer.

B. Monitor Nest Sites to Confirm that Project Activities Are Not Adversely Affecting Nesting Birds or Their Young. Monitoring shall be conducted by a qualified biologist, either continuously or periodically during work, to confirm that proposed project activity is not resulting in detectable adverse impacts on nesting birds or their young.

[134] CDFW. Unknown. Appendix I CDFW's Conservation Measures for Biological Resources That May Be Affected by Program-level Actions.
[135] CDFW. 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency.

- The qualified biologist shall be empowered to stop construction activities that, in the biologist's opinion, threaten to cause unanticipated and/or unpermitted adverse effects on special-status wildlife (*e.g.,* nest abandonment).
- If construction activities are stopped, the qualified biologist shall consult with CDFW to determine appropriate measures that shall be implemented to avoid adverse effects.
- No proposed project activity shall commence within the buffer areas until a qualified biologist has determined that the young have fledged or the nest site is otherwise no longer in use.

BIO-18 Conduct Burrowing Owl Survey Prior to Construction and Avoid and Minimize Effects During Construction

For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 that there is suitable burrows in suitable habitat for burrowing owl or their presence is observed, the agency implementing the proposed project component shall implement Mitigation Measure BIO-16, BIO-17, and ensure that the measures described below are implemented to avoid and minimize effects.

A. Breeding and Non-breeding Pre-activity Surveys for Burrowing Owl. The focused take avoidance survey for burrowing owl will be conducted within 14 days before on-site proposed project activities begin in each portion of the site regardless of nesting bird season guidelines stated above in Mitigation Measure BIO-16.

- Burrowing owls are known to utilize burrows as over wintering sites. Over wintering burrows shall be protected to the greatest extent feasible.

B. Active Nest Buffers. Burrows occupied during the breeding season (February 1 through August 31) and nonbreeding season shall be provided with a protective buffer until a qualified biologist verifies through noninvasive means that either (1) the birds have not begun egg-laying, or (2) juveniles from the occupied burrows are foraging independently and are capable of independent survival.

- The size of the buffer, which may range from 50 meters to 500 meters, will depend on distance from the nest to area of proposed project disturbance, type and intensity of disturbance, presence of visual buffers, time of year, and other variables that could affect susceptibility of the owls to disturbance[136] project.[137]
- Monitoring shall be conducted to confirm that proposed project activity is not resulting in detectable adverse impacts on nesting burrowing owls.

BIO-19 Consult with CDFW Regarding Unavoidable Burrowing Owl Disturbance Prior to Construction and Avoid and Minimize Effects During Construction

For all MICUP components, if complete avoidance is not feasible for active burrowing owl burrows, the agency implementing the proposed project component shall consult with CDFW to determine the best approach to avoid and minimize potential impacts.

- Activities such as passive relocation during non-breeding season may be permitted. Which may include installation of one-way doors, providing artificial burrows, and burrow excavation.

[137] CDFW. 2012. Staff Report on Burrowing Owl Mitigation. State of California, Natural Resources Agency. 3

- Passive relocation of owls shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW.
- A Relocation Plan and/ or Burrowing Owl Exclusion Plan shall describe methods for passive relocation of the owls, destruction of suitable burrows, and maintenance of the site to prevent owl reoccupation.

BIO-20 Conduct an Assessment of Suitable Bat Roosting and Ringtail Denning Habitat Prior to Construction and Avoid and Minimize Effects During Construction

For all MICUP components, to avoid effects of construction activities on roosting bats and denning ringtail, the agency implementing the proposed project component shall require that the following measures are implemented.

A. Conduct a Pre-tree Removal Assessment of Suitable Roosting and Denning Habitat within the Project Site. For all trees that are anticipated to be removed plus a 250-foot buffer an assessment of suitable bat roosting or ringtail denning habitat shall be conducted.

- The qualified biologist shall tag and record locations of trees that either have signs of bat presence (i.e., guano) or have the potential to be suitable roosting or denning habitat for bats and ringtail.

B. Provide a Protective Buffer for Occupied Ringtail Dens during the Breeding Season. If active ringtail dens are discovered during a den survey, or incidentally, a no-disturbance buffer of at least 0.25 mile will be implemented around the den, and tree removal will not proceed within the buffer until at least the end of the ringtail maternity season (June 30).

- If an active den is discovered, CDFW will be notified of the den and buffer location.
- The qualified biologist will confirm that the den is unoccupied before construction activities resume.

C. Monitor Dens to Ensure that Project Activities do not Result in Adverse Effects on Denning Ringtails. The qualified biologist shall monitor the active den during the proposed project activities to ensure that it does not result in detectable adverse impacts.

D. Provide a Protective Buffer for Occupied Bat Roosts during the Breeding and Overwintering Season. If active bat roosts are discovered during an emergence survey, or incidentally, a no-disturbance buffer of at least 250 feet will be implemented around the roost, and tree removal will not proceed within the buffer until at least the end of the maternity or overwintering season.

a. If an active maternity roost is discovered, CDFW will be notified of the location and buffer distance.
b. The qualified biologist will confirm that the roost is unoccupied before tree removal activities resume.

E. Monitor Roosts to Ensure that Project Activities do not results in Adverse Effects on Roosting Bats. The qualified biologist shall monitor the active nest during the proposed project activities to ensure that it is not resulting in detectable adverse impacts.

BIO-21 Consult with CDFW Regarding Unavoidable Tree with Suitable Bat Roosting Habitat Removal Prior to Construction and Minimize Effects During Construction

For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 and Mitigation Measure BIO-20 that avoiding effects on suitable bat roosting habitat is infeasible, the agency implementing the proposed project component shall require that the measures described below are implemented.

A. Tree Removal Timing between August 16 and December 1 OR between February 28 and May 1. Tree removal shall be conducted between August 16 and December 1 or between February 28 and May 1, to the extent feasible, to minimize potential loss of maternity roosts.

B. Conduct Emergence Surveys for Trees to be Removed after March 1. If tree removal is not possible during the winter and summer months, dates stated above, avoid removal of potential roost habitats until after March 1, or whenever weather conditions are suitable for conducting emergence surveys.

- Conduct dusk emergence surveys of all trees that will be removed that are deemed to be suitable roosting habitat. that will be removed.
- If active roosts are discovered during an emergence survey, buffers will be enforced, see Mitigation Measure BIO-20 above.

C. Two-step Tree Removals. If trees identified as providing suitable roosting habitat must be removed but do not support an active maternity or overwintering roost, implementation of the following measures shall occur during tree removal.

- Conduct removal of potential roost trees in the presence of a qualified bat biologist.
- Remove trees and/or brush surrounding potential roost trees before felling potential roost trees.
- Remove limbs without potential roosting habitat from the tree and leave the remaining trunk and limbs overnight (Step 1 – Day 1).
- Fell the remaining trunk and limbs the following day and leave all fallen material on the ground at least 1 night prior to removal from the project site (Step 2 – Day 2).
- As feasible, fell all affected trees and limbs slowly and gently, to minimize the likelihood of crushing bats that may be inside.
- As feasible, the qualified bat biologist will inspect all potential roost habitat for bats after felling and before removal from the project site.
- If any injured bats are found, the qualified bat biologist will collect and deliver the bat(s) to a bat rehabilitator permitted by CDFW.
- If bats are detected at any point, stop work immediately, leave the tree site and a surrounding 200-foot buffer, and consult with the qualified bat biologist.

D. If active roosts are discovered in trees that require removal and full avoidance is not possible, implement the following measure. The agency implementing the proposed project component shall consult with CDFW to determine the best approach to avoid and minimize potential impacts.

- Such measures may include full exclusion of bats during the non-maternity and overwintering seasons.

- Exclusion of bats shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW.
- The relocation plan shall describe methods for exclusion of bats and placement of alternative roosting habitat (i.e., roost boxes).

BIO-22 Consult with CDFW Regarding Unavoidable Tree with Suitable Ringtail Denning Habitat Removal and Minimize Effects During Construction

For all MICUP components, if it is determined during the implementation of Mitigation Measure BIO-1 and Mitigation Measure BIO-20 that avoiding effects on suitable ringtail denning habitat is infeasible, the agency implementing the proposed project component shall ensure that the measures described below are implemented.

A. Tree Removal Timing between June 30 and April 15. Tree removal shall be conducted between June 30 and April 15 of the following year to the extent feasible, to minimize potential loss of breeding ringtail dens.

B. Conduct Denning Surveys for Trees to be Removed after April 15 and Before June 30. If tree removal is not possible during the fall and winter months, dates stated above, a qualified biologist shall conduct denning surveys of all trees that are planned for removal that have been deemed suitable denning habitat.

- Within seven days prior to the start of nearby construction activities during the ringtail maternity season (April 15 to June 30), a den search shall be conducted.
- The qualified biologist will search for large trees (*i.e.,* greater than 12 inches diameter at breast height) with appropriate cavities (*i.e.,* holes larger than 3 inches in diameter, cavities extending approximately 12 inches down from the cavity hole).
- If found, the qualified biologist will inspect the cavity using a cell phone with a flash, or other tools (*e.g.,* borescopes) to determine whether ringtails are present.
- The qualified biologist will also search for dens in dense brush habitat and will note any sightings of fleeing adult ringtails.
- If active dens are discovered during a denning survey, buffers will be enforced as stated in Mitigation Measure BIO-20.

C. Two-step Tree Removal Outside Maternity Season. If trees identified as providing suitable denning habitat are planned for removal outside of the maternity season (from July 1 – April 14), the following measures shall be implemented.

- Perform tree removal in the presence of the qualified biologist.
- Remove limbs without potential roosting habitat from the tree and leave the remaining trunk and limbs overnight (Step 1 – Day 1).
- Fell the remaining trunk and limbs the following day and leave all fallen material on the ground at least 1 night prior to removal from the project site (Step 2 – Day 2).
- As practical, fell all affected limbs slowly and gently, to minimize the likelihood of crushing ringtail that may be denning inside.
- If any injured ringtail are found, the qualified biologist will collect and deliver the ringtail(s) to a rehabilitator permitted by CDFW.

- If ringtail are detected at any point, stop work immediately, leave the tree site and surrounding 200-foot buffer, and consult with the qualified biologist.

D. If active dens are discovered in trees that require removal and full avoidance is not possible, implement the following measure. The agency implementing the proposed project component shall consult with CDFW to determine the best approach to avoid and minimize potential impacts.

- Such measures may include full exclusion of ringtail during the non-breeding seasons.
- Exclusion of ringtail shall be conducted in accordance with an exclusion and relocation plan developed in coordination with and approved by CDFW.
- The relocation plan shall describe methods for relocation of ringtails.

BIO-23 Prepare a Special-status Fish Rescue and Relocation Plan Prior to Construction and Avoid and Minimize Effects During Construction and Operation

For project components for NSJWCD, SEWD, or City of Stockton, to avoid and minimize effects of construction and maintenance activities on all special-status fish species prior to any in-water work for MICUP construction or O&M, the agency implementing the project component shall do the following:

A. Create and Implement a Fish Rescue and Relocation Plan. The implementing agency shall design a comprehensive fish rescue and relocation plan to be submitted to NMFS for approval no less than 30 days prior to any isolation of in-water work areas and implement the plan during in-water construction and operation activities.

B. **Schedule In-water Activities to Avoid Times When Species May Be Present.** Construction activities will be scheduled for periods when salmonids do not have access to the project area (*i.e.,* during periods when flood control releases and/or river flooding due to heavy rain or snow melt are not projected to occur) or during key life-history periods (refer to Table 4.4-6).

- Based on the timing of potential presence alone, the period between mid-June to mid-September would provide the greatest protection for special-status species.
- Provisions will be made to allow migrating salmonids to bypass work areas in the channel in the event that unanticipated flood control releases or freshets occur.

C. Install NMFS-approved Fish Screens to any Expanded Pump Stations. All fish screens installed at expanded pump stations or used during dewatering activities would be fitted with NMFS-approved fish screens.

D. Monitor Water Turbidity Levels During In-Water Construction Activities. A qualified monitor would be present during all in-water construction activities. Monitoring would ensure that increases in turbidity over background conditions would not exceed levels specified by the Central Valley RWQCB and/or NMFS for the project. If turbidity exceeds the determined turbidity threshold during in-water construction activities, work will stop until turbidity thresholds are below the limit. Section 401 permits require preparation and implementation of an erosion control plan and/or a stormwater pollution prevention plan (SWPPP). At a minimum, the plan would contain the following types of BMPs:

- Complete revegetation and stabilization of disturbed soils in the proposed project footprint, including stream banks.

- Placement of interceptor ditches to direct water away from the tops of cut-and-fill slopes.
- Implementation of Central Valley RWQCB approved BMPs for sediment catch basins or traps to prevent sediment from being transported away from construction sites. These would be designed to minimize impacts to riparian, wetland, and open-water areas. Traps to be considered could include filter berms, straw-bale barriers, filter inlets, vegetative filter strips, culvert risers, coir and straw logs, and other erosion control BMPs as approved by the Central Valley RWQCB.
- Provisions of the erosion control plan and SWPPPP (if required) would be included in conditions of the Lake and Streambed Alteration Agreement pursuant to Sections 1600-1606 of the CFGC.

Table 4.4-6 Recommended Salmonid In-Water Work Windows

Species	Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Steelhead (adult)											X	X	X	X	X	X	X	X						
Steelhead (juvenile)													X	X	X	X	X	X	X	X				
Spring-Run Chinook salmon (adult)	X	X	X	X					X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Spring-Run Chinook salmon (juv.)	X	X											X	X	X	X	X	X	X	X	X	X	X	X
Fall-Run Chinook salmon (adult)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X								
Fall-Run Chinook salmon (juv.)	X	X											X	X	X	X	X	X	X	X	X	X	X	X

sDPS = southern Distinct Population Segment

White boxes = potentially present in the proposed project area

Gray Boxes with X = species is unlikely to be present in the proposed project area, in-water work is preferred; the months are split into two work windows, occurring on the 15th of each month

Level of Significance

Less than Significant with Mitigation

Sensitive Natural Communities

Significance Criterion b:	Would the proposed project have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service?
Significance Criterion c:	Would the proposed project have a substantial adverse effect on State or federally protected wetlands (including but not limited to, marsh, vernal pool, coastal, *etc*.) through direct removal, filling, hydrological interruption, or other means?

Impact BIO-2 MICUP Could Adversely Impact Riparian Habitat, Other Sensitive Natural Communities, or Protected Wetlands in the Project Area. Impacts Would be Less than Significant with Mitigation Incorporated.

The following 10 sensitive natural communities and other potential aquatic resources have the potential to be located within the proposed project components: fresh emergent marsh, wet meadow, valley foothill riparian, open water, riverine, lacustrine, and oak woodlands communities (blue oak woodland, blue oak-foothill pine woodland, and valley oak woodland) (refer to

Figure 4.4-3 through Figure 4.4-8 and Figure 4.4-10 through Figure 4.4-16). Additionally, the following aquatic resources have the potential to be jurisdictional and/or sensitive and were identified within the proposed project components: agricultural ditches, freshwater emergent wetlands, freshwater forested/shrub wetlands, freshwater pond, lake, riverine and vernal pools. Finally, the major waterways within the project area, the Mokelumne and Calaveras Rivers, have been classified as EFH for Pacific salmon, more specifically for Chinook salmon. Within the project area, the Mokelumne and Calaveras Rivers are designated as critical habitat for CCV steelhead. Designated critical habitat for sDPS green sturgeon and Delta smelt only occurs within a small portion of the project area and specifically in the Delta where the existing pump station for the City of Stockton project component is located. These resources were analyzed for potential conflicts with the proposed project components within each Partner Agency area (Table 4.4-6).

It should be noted that no field work has been conducted for MICUP; as such, determinations of habitat types and locations are based on a desktop review. Reconnaissance-level surveys of proposed project component areas have the ability to rule out or modify determinations made in this document as it relates to land cover types and sensitive natural communities. Thus, proposed project components for which it was determined that there is a low potential for presence of these community types occurring are not discussed further in detail.

Construction

North San Joaquin Water Conservation District

The NSJWCD project components area was determined to have the following sensitive natural communities present: oak woodlands, freshwater emergent wetlands, aquatic (lacustrine, riverine and open water), valley foothill riparian, and vernal pools. In addition to some of the above sensitive natural communities, additional jurisdictional aquatic resources that may be present in the NSJWCD project component area include: agricultural ditches, freshwater forested/scrub wetlands, and freshwater ponds. NMFS has designated both critical habitat for CCV steelhead and EFH for all Chinook salmon species within the entirety of the Mokelumne River, which overlap within the NSJWCD project components area.

RIPARIAN HABITAT AND SENSITIVE NATURAL COMMUNITIES

Riparian areas in the project area are considered sensitive natural communities and are regulated by CDFW. Loss of riparian cover, including removal of trees and shrubs, is possible as a result of improving and constructing pump stations and pipelines along the Mokelumne River. It is assumed that riparian trees will be preserved to the greatest extent feasible, but some loss of riparian area is anticipated. Loss of listed sensitive communities (blue oak woodland, blue oak-foothill pine woodland, valley oak woodland, fresh emergent wetlands, lacustrine, riverine, open water, vernal pools, and valley foothill riparian) also may occur from construction activities. The loss or degradation of riparian communities or other sensitive natural communities due to construction activities would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-24, Mitigation Measure BIO-25, and Mitigation Measure BIO-26 have been identified to address these impacts to riparian habitat or other sensitive natural communities. Implementing Mitigation Measures BIO-1, BIO-2, BIO-24, BIO-25, and BIO-26 would reduce this impact, because habitat assessments and aquatic mapping would be conducted, WEAP training would be conducted, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, spill

protection would be implemented, disturbed riparian and oak woodland would be revegetated, tree inventories would be conducted, and any necessary compensatory mitigation will be acquired. Therefore, the proposed project would not have a substantial adverse effect on riparian habitat or other sensitive natural community, and this NSJWCD construction impact would be less than significant with mitigation**.**

WETLANDS AND AQUATIC RESOURCES

Rivers, sloughs, canals, ditches, and potential wetland features in or adjacent to the project area may be considered Waters of the U.S. and/or State. Construction could result in substantial adverse effects on wetland and aquatic resources, including direct removal and/or hydrological interruption, should they be present in proposed disturbance footprints or vicinities, vegetation clearing, access, and/or staging areas. There also is potential for areas of permanent or temporary loss of wetlands and aquatic resources due to fill. The loss or degradation of aquatic resources due to construction activities would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-24, Mitigation Measure BIO-27, Mitigation Measure GEO-1, and SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-24, BIO-27, GEO-1, and SW-2 would reduce this impact, because habitat assessments and aquatic mapping would be conducted, WEAP training would be conducted, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, spill protection would be implemented, wetlands and aquatic resources disturbed would be revegetated, and any necessary compensatory mitigation will be acquired. Therefore, the proposed project would not have a substantial adverse effect on State or federally protected wetlands (including but not limited to, marsh, vernal pool, coastal, *etc*.) through direct removal, filling, hydrological interruption, or other means, and this NSJWCD construction impact would be less than significant with mitigation**.**

DESIGNATED CRITICAL HABITAT AND ESSENTIAL FISH HABITAT

Within the entirety of Mokelumne River, there is NMFS designated critical habitat for CCV steelhead and designated EFH for all Chinook salmon species. Construction activities within NSJWCD jurisdiction have the potential to permanently impact critical habitat and EFH through the modification and expansion of existing pump stations along the Mokelumne River, along with the removal of riparian vegetation for these activities. Temporary impacts would include dewatering and access routes to expand pump stations and pipelines on the Mokelumne River. Construction-related activities would have a potentially significant impact on critical habitat and EFH.

Mitigation Measure BIO-1, Mitigation Measure BIO-2, Mitigation Measure BIO-23, Mitigation Measures BIO-24, Mitigation Measure BIO-25, Mitigation Measure BIO-26, Mitigation Measure BIO-27, Mitigation Measure GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-23, BIO-24, BIO-25, BIO-26, BIO-27, GEO-1, and SW-2 would reduce this impact, because habitat assessments would be conducted, and then if needed, pre-construction surveys would be conducted, WEAP training would be conducted, fish specific work windows will be adhered to, turbidity will be monitored, fish rescue and relocation would be implemented, spill protection would be implemented, minimization of impacts to sensitive natural resources, tree inventory and compensation, disturbed riparian and oak woodland habitat would be revegetated, any necessary compensatory mitigation will be acquired, erosion plans would be created, and BMPs for in-water work would be followed. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on

special-status fish species, and this NSJWCD construction impact would be less than significant with mitigation**.**

Stockton East Water District

The SEWD project components area was determined to have the following sensitive natural communities present: freshwater emergent wetlands, aquatic (lacustrine and riverine), valley foothill riparian, and vernal pools. In addition to some of the above sensitive natural communities, additional jurisdictional aquatic resources that may be present in the SEWD project components area include freshwater forested/scrub wetlands and freshwater ponds. There is NMFS designated critical habitat for CCV steelhead within the entirety of the Calaveras River. NMFS has designated EFH for all Chinook salmon species in the Calaveras River, which overlaps with portions of the SEWD project components area.

RIPARIAN HABITAT AND SENSITIVE NATURAL COMMUNITIES

Riparian areas in the project area are considered sensitive natural communities and are regulated by CDFW. Loss of riparian cover, including removal of trees and shrubs, is possible from construction of pipelines crossing the Calaveras River. It is assumed that riparian trees will be preserved to the greatest extent feasible, but some loss of riparian area is anticipated. Additionally, there are other potentially sensitive natural communities (valley oak woodland, fresh emergent wetlands, lacustrine, riverine, vernal pools, and valley foothill riparian) within the project area. Loss of any of these individual sensitive communities may occur as a result of the proposed project construction activities. The loss or degradation of riparian communities or other sensitive natural communities due to construction activities would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-24, Mitigation Measure BIO-25, and Mitigation Measure BIO-26 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-24, BIO-25, and BIO-26 would reduce this impact, because habitat assessments and aquatic mapping would be conducted, WEAP training would be conducted, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, tree inventories would be conducted, and any necessary compensatory mitigation will be acquired. Therefore, the proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community, and this SEWD construction impact would be less than significant with mitigation**.**

WETLANDS AND AQUATIC RESOURCES

Rivers, sloughs, canals, ditches, aqueduct, and potential wetland features in or adjacent to the project area may be considered Waters of the U.S. and/or State. Construction could result in substantial adverse effects on wetland and aquatic resources, including direct removal and/or hydrological interruption, should they be present in proposed disturbance footprints or vicinities, vegetation clearing, access, and/or staging areas. There also is a potential for areas of permanent or temporary loss of wetlands and aquatic resources due to fill. The loss or degradation of aquatic resources due to construction activities would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-24, and Mitigation Measure BIO-27, Mitigation Measure GEO-1, and SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-24, BIO-27, GEO-1, and SW-2 would reduce this impact, because habitat assessments and mapping aquatic

resources would be conducted, WEAP training would be conducted, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, erosion plans would be created, BMPs for in-water work would be followed, and any necessary compensatory mitigation will be acquired. Therefore, the proposed project would not have a substantial adverse effect on State or federally protected wetlands (including but not limited to, marsh, vernal pool, coastal, *etc*.) through direct removal, filling, hydrological interruption, or other means, and this SEWD construction impact would be less than significant with mitigation**.**

DESIGNATED CRITICAL HABITAT AND ESSENTIAL FISH HABITAT

Within the entirety of Calaveras River, there is NMFS designated critical habitat for CCV steelhead and EFH for all Chinook salmon species. Construction activities within SEWD area have the potential to impact critical habitat and EFH permanently from pipeline construction activities along the Calaveras River, which could require the removal of riparian vegetation for these activities. Temporary impacts would include pipeline construction and associated dewatering in the Calaveras River. Construction-related proposed project activities would have a potentially significant impact on critical habitat and EFH.

Mitigation Measure BIO-1, Mitigation Measure BIO-2, Mitigation Measure BIO-23, Mitigation Measures BIO-24, Mitigation Measure BIO-25, Mitigation Measure BIO-26, Mitigation Measure BIO-27, Mitigation Measure GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-23, BIO-24, BIO-25, BIO-26, BIO-27, GEO-1, and SW-2 would reduce this impact because habitat assessments would be conducted, and then if needed, pre-construction surveys would be conducted, WEAP training would be conducted, fish specific work windows will be adhered to, fish rescue and relocation plan will be implemented, turbidity will be monitored, spill protection would be implemented, minimization of impacts to sensitive natural resources, tree inventory and compensation, disturbed riparian and oak woodland habitat would be revegetated, any necessary compensatory mitigation will be acquired, erosion plans would be created, and BMPs for in-water work would be followed. Therefore, the proposed project would not have a substantial adverse effect, either directly or through habitat modifications, on any special-status fish species, and this SEWD construction impact would be less than significant with mitigation**.**

City of Stockton

The City of Stockton project components area was determined to have the following sensitive natural communities present: oak woodlands, freshwater emergent wetlands, aquatic (lacustrine and riverine), and valley foothill riparian. In addition to some of the above sensitive natural communities, additional jurisdictional aquatic resources that may be present in the City of Stockton project component area include: agricultural ditches. There is NMFS-designated critical habitat for CCV steelhead within the entirety of the Mokelumne River and Calaveras River, both of which overlap within the City of Stockton project components. NMFS has designated EFH for all Chinook salmon species in the Mokelumne and Calaveras Rivers.

RIPARIAN HABITAT AND SENSITIVE NATURAL COMMUNITIES

Riparian areas in the project area are considered sensitive natural communities and are regulated by CDFW. Additionally, there are other potentially sensitive natural communities (valley oak woodland, fresh emergent wetlands, lacustrine, riverine and valley foothill riparian) within the project area.

Loss of any of these individual sensitive communities may occur from the proposed project construction of recharge basins or detention basins. The loss or degradation of riparian communities or other sensitive natural communities due to construction activities would be considered a potentially significant impact. In addition to implementing Mitigation Measure BIO-1 and Mitigation Measure BIO-2, Mitigation Measure BIO-24, Mitigation Measure BIO-25, and Mitigation Measure BIO-26 have been identified to address these impacts.

Implementing Mitigation Measures BIO-1, BIO-2, BIO-24, BIO-25, and BIO-26 would reduce this impact because habitat assessments and aquatic mapping would be conducted, WEAP training would be conducted, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, spill protection would be implemented, disturbed riparian and oak woodland would be revegetated, tree inventories would be conducted, and any necessary compensatory mitigation will be acquired. Therefore, the proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community, and this City of Stockton construction impact would be less than significant with mitigation**.**

WETLANDS AND AQUATIC RESOURCES

Rivers, sloughs, canals, ditches, and potential wetland features in or adjacent to the project area may be considered Waters of the U.S. and/or State. However, no City of Stockton project components would be constructed along these waterways. Therefore, the proposed project would have no construction impact on wetlands and aquatic resources.

DESIGNATED CRITICAL HABITAT AND ESSENTIAL FISH HABITAT

Within the entirety of Calaveras River, there is NMFS designated critical habitat for CCV steelhead and designated EFH for all Chinook salmon species. Further, NMFS has designated both critical habitat for CCV steelhead and EFH for all Chinook salmon species within the entirety of the Mokelumne River, which overlap with the existing WID Diversion Dam on the Mokelumne River. No construction activities are planned at the WID Diversion Dam or within the Calaveras River associated with the City of Stockton. Although the proposed project location is located within critical habitat for these species, the proposed project itself will not result in any additional degradation to potential habitat as the locations are already heavily altered by water diversion infrastructure. There will be no construction activities occurring at the existing pump station located in the Delta or at the WID diversion dam. Therefore, no City of Stockton construction impact on designated critical habitat or EFH would occur.

Operation

North San Joaquin Water Conservation District

RIPARIAN HABITAT AND SENSITIVE NATURAL COMMUNITIES

Maintenance activities would have no impact on riparian habitat and sensitive natural communities because the areas would have been previously disturbed during construction. Flood-MAR would only occur in vineyards or agricultural lands, which do not include riparian or sensitive natural communities. MICUP operation would result in increased diversions, including for NSJWCD at PODs and rediversion from storage in Camanche Reservoir, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to riparian habitat and sensitive natural communities are expected to be minimized because diversions would only occur in wetter years

when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced stream seepage from higher groundwater levels (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years). Therefore, O&M would not have a substantial adverse effect on any riparian habitat or other sensitive natural community, and O&M impacts would be less than significant.

WETLANDS AND AQUATIC RESOURCES

Most maintenance activities would have no impact to wetlands and/or aquatic resources because the areas in which these activities are planned for would have been previously disturbed during construction. MICUP operation would result in increased diversion, including for NSJWCD at PODs and rediversion from storage in Camanche Reservoir, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to wetlands and aquatic resources are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years).

Maintenance of pump screens could have an impact on aquatic resources; however, this is unlikely and would not be caused by the MICUP project. The NSJWCD PODs already have fish screens that are regularly maintained. In addition, NSJWCD performs this work pursuant to a CDFW 1600 RMA. Flood-MAR and direct recharge at proposed new recharge basins would only occur in vineyards or agricultural lands, which do not include wetlands or aquatic resources. Flood-MAR and other direct recharge of water is done at low flow rates on porous soils. There is minimal to no risk that surface water runoff could occur due to flooding during Flood-MAR applications, that would cause adverse impacts to surrounding wetland or aquatic resources by introduction of polluted or sediment-dense water. The proposed project is also unlikely to have an adverse effect on State or federally protected wetlands (including but not limited to, marsh, vernal pool, coastal, *etc*.) through surface runoff, because these resources are not located adjacent to proposed recharge operation projects. NSJWCD O&M-related impacts would be less than significant.

DESIGNATED CRITICAL HABITAT AND ESSENTIAL FISH HABITAT

The NSJWSD project components area includes designated critical habitat for CCV steelhead and EFH for Chinook salmon in the Mokelumne River. Pump operations, screen maintenance, and water diversions could result in hydrological flow interruption, potentially resulting in effects to physical and biological features of designated critical habitat, including free flowing water. Increased diversion, including for NSJWCD at PODs and rediversion from storage in Camanche Reservoir, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to designated critical habitat and EFH are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years). As discussed in the operational impact to special-status fish in Impact BIO-1, reduction in flow in the lower Mokelumne River channel would maintain minimum flow requirements protective of CCV steelhead and Chinook salmon, salinity impacts to fish in the Delta would be minimal and potentially avoided with implementation of Term 91, and increases in flows during drier period would benefit

fish. Therefore, O&M would have a less than significant impact on designated critical habitat and EFH.

Stockton East Water District

RIPARIAN HABITAT AND SENSITIVE NATURAL COMMUNITIES

Maintenance activities would have no impact on riparian habitat and sensitive natural communities. Flood-MAR would occur only in agricultural areas which do not include riparian or sensitive natural communities. MICUP operation would result in increased diversions, including for SEWD through the Mokelumne Aqueduct, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to riparian habitat and sensitive natural communities are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years). Therefore, the O&M would not have a substantial adverse effect on any riparian habitat or other sensitive natural community, and O&M impacts would be less than significant.

WETLANDS AND AQUATIC RESOURCES

Most maintenance activities would have no impact on wetlands and/or aquatic resources because the areas in which these activities are planned for will have been previously disturbed during construction. MICUP operation would result in increased diversions, including for SEWD through the Mokelumne Aqueduct, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to wetlands and aquatic resources are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years).

Flood-MAR and direct recharge at proposed new recharge basins would only occur in vineyards or agricultural lands, which do not include wetlands or aquatic resources. Flood-MAR and other direct recharge of water is done at low flow rates on porous soils. There is minimal to no risk that surface water runoff could occur due to flooding during Flood-MAR applications, that would cause adverse impacts to surrounding wetland or aquatic resources by introduction of polluted or sediment-dense water. The proposed project is also unlikely to have an adverse effect on State or federally protected wetlands through surface runoff because these resources are not located adjacent to proposed recharge operation projects. SEWD O&M-related impacts would be less than significant.

DESIGNATED CRITICAL HABITAT AND ESSENTIAL FISH HABITAT

The SEWD project area includes designated critical habitat for CCV steelhead and EFH for Chinook salmon in the Calaveras River. There would be no water diversions from the Calaveras River. There is also designated critical habitat for Delta smelt in the lower Mokelumne and San Joaquin Rivers and designated critical habitat for CCV steelhead and EFH for Chinook salmon in the Mokelumne River. MICUP operation would result in increased diversion, including for SEWD through the Mokelumne Aqueduct, would slightly reduce overall amounts of water available within the

Mokelumne River, but any effects to designated critical habitat and EFH are expected to be minimized because diversions would only occur in wetter years when more water is available, In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years). As discussed in the operational impact to special-status fish in Impact BIO-1, MICUP would maintain minimum flow requirements protective of CCV steelhead and Chinook salmon, salinity impacts to fish in the Delta would be minimal and potentially avoided with implementation of Term 91, and increases in flows during drier period would benefit fish. Therefore, O&M would have a less than significant impact on designated critical habitat and EFH.

City of Stockton

RIPARIAN HABITAT AND SENSITIVE NATURAL COMMUNITIES

The City of Stockton would divert water from existing diversion facilities either in the Delta or from the WDD facility owned and operated by WID on the Mokelumne River. These areas are already developed or previously disturbed, and O&M-related activities would not impact any known riparian habitat. MICUP operation would result in increased diversions, including for City of Stockton at WDD, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to riparian habitat and sensitive natural communities are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years). Therefore, the O&M would not have a substantial adverse effect on riparian habitat or other sensitive natural community, and O&M impacts would be less than significant.

WETLANDS AND AQUATIC RESOURCES

Most maintenance activities would have no impact on wetlands and/or aquatic resources because the areas in which these activities are planned for would have been previously disturbed with any potential aquatic resources avoided or mitigated for. O&M activities would include maintenance of screens, which could have an impact on aquatic resources; however, the effects are anticipated to be small and localized. MICUP operation would result in increased diversions, including for City of Stockton at WDD, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to wetlands and aquatic resources are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to -8 for estimated decreases in flows in wetter years and increases in flows in drier years). Therefore, the project would not have a substantial adverse effect on wetlands or other aquatic resources, and O&M impacts would be less than significant**.**

DESIGNATED CRITICAL HABITAT AND ESSENTIAL FISH HABITAT

USFWS has designated critical habitat for sDPS green sturgeon and Delta smelt and the general designation boundaries overlap with the City of Stockton project component in the Delta. Operational use and maintenance activities occurring at the existing pump station located in the Delta would be minimal and the proposed project itself would not result in pumping of additional

water from this location, and therefore, would not result in degradation of designated critical habitat for green sturgeon or Delta smelt.

NMFS also has designated both critical habitat for CCV steelhead and EFH for all Chinook salmon species within the entirety of both the Mokelumne and Calaveras River, which overlaps within the existing diversion facilities owned and operated by WID on the Mokelumne River. MICUP operation would result in increased diversion, including for City of Stockton at WDD, would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to designated critical habitat and EFH are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced seepage from groundwater recharge (refer to Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years). As discussed in the operational impact to special-status fish in Impact BIO-1, reduction in flow in the lower Mokelumne River channel would maintain minimum flow requirements protective of CCV steelhead and Chinook salmon, salinity impacts to fish in the Delta would be minimal and potentially avoided with implementation of Term 91, and increases in flows during drier period would benefit fish. Therefore, O&M would have a less than significant impact on designated critical habitat and EFH.

Table 4.4-7 Sensitive Habitat Potential Impacts by Partner Agency

	NSJWCD		SEWD		City of Stockton	
Habitat Classification	**Construction**	**O&M**	**Construction**	**O&M**	**Construction**	**O&M**
Fresh Emergent Wetlands	LTSMI	LTS	LTSMI	NI	LTSMI	NI
Oak Woodlands	LTSMI	NI	–	–	LTSMI	NI
Riparian	LTSMI	LTS	LTSMI	LTS	LTSMI	LTS
Wet Meadow	–	–	–	–	–	NI
Vernal Pools	LTSMI	LTS	LTSMI	NI	–	–
Critical Habitat	LTSMI	LTS	LTSMI	NI	NI	LTS
Essential Fish Habitat (EFH)	LTSMI	LTS	LTSMI	LTS	NI	LTS
Marsh	LTSMI	NI	LTSMI	LTS	LTSMI	LTS
Mokelumne Aqueduct and Agricultural Ditches	LTSMI	LTSMI	LTSMI	LTSMI	NI	NI
Mokelumne River	LTSMI	LTSMI	–	–	NI	LTS
Calaveras River	–	–	LTSMI	LTSMI	NI	NI
Other Natural Creeks or Sloughs	LTSMI	LTSMI	LTSMI	LTSMI	NI	NI

Mitigation Measures

Implement Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, to SW-2, and SW-3 are required in addition to the following mitigation measures.

BIO-24 Conduct Wetland Delineation, Aquatic Resources, and Sensitive Natural Communities Mapping Prior to Construction and Avoid and Minimize Effects to Sensitive Aquatic or Natural Community Resources During Construction and Operation

If it is determined during implementation of Mitigation Measure BIO-1 that potentially jurisdictional aquatic resources or sensitive natural communities are present within the construction area, the agency implementing the proposed project component in consultation with a qualified biologist, will conduct focused aquatic and sensitive habitat mapping.

No net loss of aquatic or sensitive resources would be achieved through impact avoidance, minimization, and/or compensatory mitigation.

A. Conduct a Wetland Delineation and Aquatic Resource Mapping. Conduct wetland delineation and aquatic resources mapping prior to the start of construction. All aquatic habitat within the study area will be delineated to determine extent and type of jurisdictional features potentially qualifying as Waters of the U.S. and/or State. Aquatic habitat that will be temporarily or permanently impacted by the project will be quantified.

- If aquatic resources can be avoided, follow **Mitigation Measure BIO-1** for avoidance methods.

B. Conduct Sensitive Habitat Mapping. Conduct sensitive habitat mapping prior to the start of construction. All sensitive habitat within the study area will be delineated to determine the extent of habitat and potential impacts. Special focus will be made on sensitive habitat that will be temporarily or permanently impacted by the project.

- If sensitive habitat can be avoided, follow **Mitigation Measure BIO-1** for avoidance methods.

C. Compensate for Wetlands, Aquatic Resources, and Sensitive Habitats. If wetlands, aquatic resources, or sensitive habitats cannot be avoided, follow **Mitigation Measure BIO-2**, **Mitigation Measure BIO-26,** and/or **Mitigation Measure BIO-27** for unavoidable loss of habitats.

BIO-25 Conduct Tree Survey and Obtain Removal Permits Prior to Construction-Related Removal or Trimming

If tree removal cannot be avoided, the agency implementing the proposed project component shall ensure a tree survey is conducted by a qualified biologist or by an International Society of Arboricultural Certified Arborist, prior to removal or trimming. This survey will document tree location, species, trunk size, and health for all trees to be removed. If only trimming is to occur, documentation of number and size of branches to be removed and species will be noted. Any tree removal permits or necessary approvals from the County or local jurisdictions shall occur prior to any tree removals.

BIO-26 Mitigate Unavoidable Loss of Riparian Habitat at Minimum 1:1 Ratio Prior to Operation

Mitigation for permanent impacts on sensitive communities shall be provided at a minimum 1:1 ratio. Mitigation can be achieved through on-site restoration, in-lieu fee payment, or purchase of mitigation credits at a USACE- and/or CDFW-approved mitigation bank. Mitigation, as required in regulatory permits issued through CDFW, USACE, and/or the RWQCB, may be applied to satisfy this measure.

BIO-27 Mitigate Unavoidable Loss of Aquatic Resources is at Minimum 1:1 Ratio Prior to Operation

Mitigation for permanent impacts on aquatic resources shall be provided at a minimum 1:1 ratio. Mitigation can be achieved through on-site restoration, in-lieu fee payment or purchase of mitigation credits at a USACE- and/or CDFW-approved mitigation bank. Mitigation, as required in regulatory permits issued through CDFW, USACE, and/or the RWQCB, may be applied to satisfy this measure.

Level of Significance

Less than Significant with Mitigation

Wildlife Movement Corridors

Significance Criterion d:	Would the proposed project interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?

Impact BIO-3 MICUP Construction and Operation Would Have Minimal Impacts to Fish and Wildlife Movement Corridors. Impacts Would be Less Than Significant.

Each of the project components under MICUP were analyzed for their potential to interfere with existing wildlife movement corridors and/or fish passage (Table 4.4-8). Due to most of the project area being actively used for agricultural purposes and urban development, there is a substantial number of pre-existing barriers to wildlife movements, as discussed in the *Fish Passage and Wildlife Movement Corridors* section above. However, riparian areas associated with the Mokelumne River, Calaveras River, and their tributaries provide cover and facilitate terrestrial and aquatic wildlife movement. Since agricultural ditches and canals provide submarginal aquatic habitat for wildlife movements, they are not included in this analysis. Reconnaissance-level surveys of project component areas could rule out or modify determinations made in this document as it relates to wildlife movement and barriers.

There are no known terrestrial migratory wildlife corridors or wildlife nursery sites within any of the MICUP project component areas. The closest known IBA listed by BirdLife International is Salt Spring Valley at the base of foothills outside Stockton,[138] which is not located within the proposed project component areas. The Mokelumne River and Calaveras River would be considered wildlife movement corridors for aquatic and semi-aquatic species. Spawning areas for fall/late fall-run Chinook and CCV steelhead occur within the upper portions of Mokelumne River below Camanche Dam, which is within the NSJWCD jurisdiction.

Construction

MICUP construction activities would occur over a minimum of 2 to 8 years, sometimes with long delays over the construction period. Not all proposed project components would have construction consecutively (see Section 2.4.6 *Construction Schedule).* Planned construction activities of clearing and grubbing vegetation, earthwork, trenching, drilling, demolishing and expanding pump stations,

[138] Audubon Society. 2013. *California Important Bird Areas Interactive Site Map.* Accessed on January 13, 2025 via: https://ca.audubon.org/conservation/california-iba-interactive-site-map

staging, and general equipment and personnel movement could temporarily disturb movement of some wildlife individuals along riparian and aquatic habitats. In many of the project areas, impacts would be relatively minor as work is planned to occur within existing pump station locations and generally outside of aquatic and riparian habitats. Although some proposed project activities may temporarily affect fish and wildlife movement during construction, animals would be able to continue to move through the project area during construction, and no long-term impacts on fish or wildlife movement would result.

North San Joaquin Water Conservation District

NSJWCD project components intersect with the Mokelumne River, which is considered a substantial wildlife movement corridor for aquatic species. The planned activities for these areas include the complete replacement and expansion of the North System Pump Station and CalFed Pump Stations. The South System Pump Station would be upgraded within its existing footprint and would require an additional fish screen. Construction of this project component could interfere substantially with fish or wildlife movement or migration due to the expansion of the North and CalFed Pump Stations on the Mokelumne River beyond their current footprints. Project construction would be considered a potentially significant impact.

Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2 would reduce this impact, because habitat assessments would be conducted, and then if needed, pre-construction surveys would be conducted, fish specific work windows will be adhered to, WEAP training would be conducted, biological construction monitoring during ground disturbance and vegetation removal would occur, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, turbidity will be monitored, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, erosion plans would be created, BMPs for in-water work would be followed, and any necessary compensatory mitigation will be acquired. Therefore, construction of the proposed project would not interfere substantially with the movement of native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites, and this NSJWCD construction impacts would be less than significant with mitigation**.**

Stockton East Water District

SEWD project component activities do not intersect with the Mokelumne River but do intersect with the Calaveras River and some minor tributaries that could be considered substantial movement corridors. Pipeline construction across the Calaveras River could temporarily interfere with fish and wildlife migration. This proposed project component has the potential to interfere with wildlife movement or migration due to the locations of proposed pipelines crossings and disturbance due to construction methods for trenching across the river. These construction activities would be considered a potentially significant impact.

Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2 would reduce this impact, because habitat assessments would be conducted, and then if needed, pre-construction surveys would be conducted, fish specific work windows will be adhered to, fish rescue and relocation plan would be implemented, WEAP training would be conducted, biological construction monitoring during ground disturbance and vegetation removal would occur, BMPs and fencing would be implemented to minimize disturbance and avoid sensitive areas, turbidity will

be monitored, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, erosion plans would be created, BMPs for in-water work would be followed, and any necessary compensatory mitigation will be acquired. Therefore, the proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites, and this SEWD construction impact would be less than significant with mitigation**.**

City of Stockton

Although City of Stockton project components intersect with the Mokelumne and Calaveras Rivers, which would be considered substantial movement corridors, the planned activities for these areas would utilize existing pipelines and lined and unlined canals. Additionally, the diversion location planned off the Mokelumne River would utilize existing infrastructure. Agricultural ditches immediately adjacent to project components may provide sub-marginal movement for some species, however, there are no planned construction activities on the existing canals. Therefore, there would be no City of Stockton construction impact to existing wildlife movement corridors and/or fish passage.

Operation

All Districts

The operation of each of the groundwater recharge methods (Agricultural in-lieu, ASR, direct recharge, and Flood-MAR) would not substantially impact wildlife movements, as these operations would occur in agricultural lands, such as existing vineyards, or in areas disturbed by construction activities associated with the installation of ASR or dry wells. In fact, the FloodMAR-related flooding of agricultural fields and construction of retention basins within the project area may provide additional foraging and refuge for migratory birds. The flooded fields may also provide amphibian species with additional migratory routes to suitable breeding habitats. Therefore, the operation of flooding for groundwater recharge would have no impact to existing wildlife movement corridors and/or fish passage but have a net benefit to migratory birds and amphibians.

O&M activities for pumping stations, pipelines, diversion structures, and ASR and dry wells (described in Section 2.3.3 *Groundwater Recharge Methods*) would not interfere substantially with fish or wildlife movement, as these activities would occur in previously disturbed areas. Regular maintenance for screened diversions would result in proper operation and reduce risk of impingement to fish in the area. The proposed project is not expected to cause any additional operational-related impacts to fish. It is assumed the annual maintenance of the recharge basins would occur in the last two weeks of February and would only temporarily disturb potential migratory bird habitat during the days, if they are not drained. If basins are drained for two weeks, this only poses a very small window in which migratory birds cannot utilize this space for resting and/or refugia. Therefore, operational impacts related to existing wildlife movement corridors and/or fish passage would be less than significant and even result in a net benefit to migratory birds.

MICUP operation would result in diversion of water that would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to fish and aquatic species migration corridors are expected to be minimized because diversions would only occur in wetter years when more water is available. In addition, during critical dry months and years when water levels are lower in the river, MICUP would result in increased flows and water in the river due to reduced

seepage from groundwater recharge (refer to Tables 4.9-6 to 4.9-7 and Figures 4.9-4a to 4.9-8 for estimated decreases in flows in wetter years and increases in flows in drier years). As discussed in the operational impact to special-status fish in Impact BIO-1, reduction in flow in the lower Mokelumne River channel would maintain minimum flow requirements protective of CCV steelhead and Chinook salmon and increases in flows during drier period would benefit fish and aquatic species. Therefore, operational impacts related to fish and aquatic species migratory corridors would be less than significant.

Table 4.4-8 Wildlife Movement Corridors Potential Impacts by Partner Agency

	NSJWCD		SEWD		City of Stockton	
Movement Corridor	Construction	O&M	Construction	O&M	Construction	O&M
Migratory Wildlife Corridors	LTSMI	LTS	LTSMI	LTS	NI	LTS
Fish	LTSMI	LTS	LTSMI	LTS	NI	LTS
Wildlife Nursery Site	–	–	–	–	–	–

Mitigation Measures

Implement Mitigation Measures BIO-1, BIO-2, BIO-23, GEO-1, and SW-2.

Level of Significance

Less than Significant with Mitigation

Local Biological Resources Policies or Ordinances Consistency

Significance Criterion e:	Would the proposed project conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?

Impact BIO-4 MICUP Would be Required to Conform with Applicable Local Policies and Ordinances Protecting Biological Resources. Impacts Would be Less Than Significant with Mitigation Incorporated.

Local policies and ordinances were analyzed for potential conflicts with the proposed project and biological resources. Jurisdictions and policies are delineated for applicability to each district's project components (Table 4.4-9). If the district or proposed project component is not applicable to any of the local policies identified, it is not discussed in this section. While a majority of the below policies and ordinances require compliance with the SJMSCP, HCPs are discussed further in the Section, *Impact BIO-5*.

Construction

North San Joaquin Water Conservation District

San Joaquin County General Plan

The San Joaquin County General Plan requires the protection of significant biological and ecological resources, coordination with SJCOG to comply with the terms of the SJMSCP, the preparation of the baseline habitat assessment by a qualified biologist, and no net loss of riparian or wetland habitat.

Some proposed project components could have a substantial effect on biological resources and could result in loss of riparian or wetland habitats, oak trees, heritage trees, or special-status species and their habitats. This would be a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-2 through Mitigation Measure BIO-27, Mitigation Measure GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts.

SAN JOAQUIN COUNTY ORDINANCE – DEVELOPMENT TITLE 9

The San Joaquin County Ordinance requires coordination with the County and, where necessary, obtaining a permit where trees, riparian habitat, wetlands, and waterway habitats may be impacted. Proposed project components could have a substantial effect on biological resources and could result in loss of trees, riparian, and wetland habitats. Tree removal has not been determined for proposed project components at this stage in the planning process; however, a tree inventory would be necessary for jurisdictional native oak trees, heritage oak trees, or historical trees. Based on the County's listed exemptions under Section 9-1505.8 *Trees*, it is possible that MICUP's proposed activities are exempt based on "flood control facilities, and/or other public facilities." Additionally, agricultural practices are not subject to the tree ordinance (Chapter 9-1505). However, if any of the proposed project components are located within riparian habitat, they would be subject to Chapter 9-1510 *Riparian Habitat* and require the County's Review Authority to approve construction activities. A qualified biologist would likely be required to prepare a Riparian Habitat Mitigation Plan to protect existing riparian habitat or a plan to replace, preserve, or develop new habitat, or a combination thereof (Section 9-1510.3). Any loss of trees, riparian, and wetland habitats a result of proposed project implementation would be a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-24, Mitigation Measure BIO-25, Mitigation Measures BIO-26, and Mitigation Measure BIO-27 have been identified to address these impacts.

Altogether, implementing Mitigation Measures BIO-1 through BIO-27, Mitigation Measure GEO-1, and Mitigation Measure SW-2 would reduce this impact, because habitat assessments would be conducted, and then if needed, species-specific surveys would be conducted, pre-construction surveys would be conducted, WEAP training would be conducted, biological construction monitoring as needed would be conducted, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, sitting equipment and open pipes would be checked for wildlife daily, open holes would be checked for wildlife daily to prevent entrapment, refuse would be removed, fence materials to avoid entanglement of snakes and wildlife will be used, appropriate permits and authorizations will be acquired, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, buffers around active nests, burrows, cavities, and roosts will be enforced, turbidity will be monitored, spill protection would be implemented, a tree survey would be conducted, tree removal permits acquired as necessary, erosion plans would be created, BMPs for in-water work would be followed, fish rescue and relocation plans will be implemented, fish specific work windows will be adhered to if possible, no net loss of riparian or wetland habitat would occur, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not conflict with any local policies or ordinances protecting biological resources, and this NSJWCD construction impact would be less than significant with mitigation**.**

SAN JOAQUIN COUNTY GENERAL PLAN

The San Joaquin County General Plan requires the protection of significant biological and ecological resources, coordination with SJCOG to comply with the terms of the SJMSCP, the preparation of the baseline habitat assessment by a qualified biologist, and no net loss of riparian or wetland habitat. Some proposed project components could have a substantial effect on biological resources and could result in loss of riparian or wetland habitats, oak trees, heritage trees, or special-status species and their habitats. This would be a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-2 through Mitigation Measure BIO-27, Mitigation Measure GEO-1, and Mitigation Measure SW-2 have been identified to address these impacts.

SAN JOAQUIN COUNTY ORDINANCE – DEVELOPMENT TITLE 9

The San Joaquin County Ordinance requires coordination with the County and, where necessary, obtaining a permit where trees, riparian habitat, wetlands, and waterway habitats may be impacted. Proposed project components could have a substantial effect on biological resources and could result in loss of trees, riparian, and wetland habitats. Tree removal has not been determined for proposed project components at this stage in the planning process; however, a tree inventory would be necessary for jurisdictional native oak trees, heritage oak trees, or historical trees. Based on the County's listed exemptions under Section 9-1505.8 *Trees*, it is possible that MICUP's proposed activities are exempt based on "flood control facilities, and/or other public facilities." Additionally, agricultural practices are not subject to the tree ordinance (Chapter 9-1505). However, if any of the proposed project components are located within riparian habitat, they would be subject to Chapter 9-1510 *Riparian Habitat* and require the County's Review Authority to approve construction activities. A qualified biologist would likely be required to prepare a Riparian Habitat Mitigation Plan to protect existing riparian habitat or a plan to replace, preserve, or develop new habitat, or a combination thereof (Section 9-1510.3). Any loss of trees, riparian, and wetland habitats as a result of proposed project implementation would be a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-24, Mitigation Measure BIO-25, Mitigation Measures BIO-26, and Mitigation Measure BIO-27 have been identified to address these impacts.

Altogether, implementing Mitigation Measures BIO-1 through BIO-27, Mitigation Measure GEO-1, and Mitigation Measure SW-2 would reduce this impact, because habitat assessments would be conducted, and then if needed, species-specific surveys would be conducted, pre-construction surveys would be conducted, WEAP training would be conducted, biological construction monitoring as needed would be conducted, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, sitting equipment and open pipes would be checked for wildlife daily, open holes would be checked for wildlife daily to prevent entrapment, refuse would be removed, fence materials to avoid entanglement of snakes and wildlife will be used, appropriate permits and authorizations will be acquired, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, buffers around active nests, burrows, cavities, and roosts will be enforced, turbidity will be monitored, spill protection would be implemented, a tree survey would be conducted, tree removal permits acquired as necessary, erosion plans would be created, BMPs for in-water work would be followed,

fish rescue and relocation plans will be implemented, fish specific work windows will be adhered to if possible, no net loss of riparian or wetland habitat would occur, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not conflict with any local policies or ordinances protecting biological resources, and this SEWD construction impact would be less than significant with mitigation**.**

City of Stockton

CITY OF STOCKTON GENERAL PLAN

The City of Stockton General Plan requires the protection of natural resource areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, and parks from encroachment or destruction by incompatible development, coordination with SJCOG to comply with the terms of the SJMSCP, the preparation of the baseline habitat assessment by a qualified biologist, and no net loss of riparian or wetland habitat. Some proposed project components could have a substantial effect on biological resources and could result in loss of special-status species and their habitats. This would be a potentially significant impact. Some proposed project components could have a substantial effect on biological resources, which would be a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation BIO-2, Mitigation BIO-10, Mitigation BIO-11, Mitigation BIO-12, Mitigation BIO-15, Mitigation BIO-16, Mitigation BIO-17, Mitigation BIO-18, Mitigation BIO-19, Mitigation GEO-1, and Mitigation SW-2 have been identified to address these impacts.

CITY OF STOCKTON MUNICIPAL CODE

The City of Stockton Municipal Code requires obtaining a permit where trees may be impacted. Tree removal is not anticipated within the City of Stockton Water Treatment Plant location; however, a tree inventory would be necessary for jurisdictional native oak trees, heritage oak trees, or historical trees. Any loss of trees that are outlined in the municipal code because of proposed project implementation would have a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-28 has been identified to address these impacts.

Altogether, implementing Mitigation Measures BIO-1, BIO-2, BIO-10, BIO-11, BIO-12, BIO-15, BIO-16, BIO-17, BIO-18, BIO-19, BIO-28, GEO-1, and SW-2 would reduce this impact, because habitat assessments would be conducted, and then if needed, species-specific surveys would be conducted, pre-construction surveys would be conducted, WEAP training would be conducted, biological construction monitoring as needed would be conducted, BMPs and fencing would be installed to minimize disturbance and avoid sensitive areas, stop-work for special-status species presence will occur, vehicle speeds will be reduced, vehicles will be stored in staging areas, sitting equipment and open pipes would be checked for wildlife daily, open holes would be checked for wildlife daily to prevent entrapment, refuse would be removed, fence materials to avoid entanglement of snakes and wildlife will be used, appropriate permits and authorizations will be acquired, spill protection would be implemented, disturbed riparian and oak woodland habitat would be revegetated, buffers around active nests and burrows will be enforced, spill protection would be implemented, a tree survey would be conducted, and tree removal permits acquired as necessary. Therefore, the proposed project would not conflict with any local policies or ordinances protecting biological resources, and this City of Stockton construction impact would be less than significant with mitigation**.**

SAN JOAQUIN COUNTY GENERAL PLAN

The San Joaquin County General Plan requires the protection of significant biological and ecological resources, coordination with SJCOG to comply with the terms of the SJMSCP, the preparation of the baseline habitat assessment by a qualified biologist, and no net loss of riparian or wetland habitat. Some proposed project components could have a substantial effect on biological resources and could result in loss of special-status species and their habitats. This would be a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation BIO-2, Mitigation BIO-10, Mitigation BIO-11, Mitigation BIO-12, Mitigation BIO-15, Mitigation BIO-16, Mitigation BIO-17, Mitigation BIO-18, Mitigation BIO-19, Mitigation GEO-1, and Mitigation SW-2 have been identified to address these impacts

SAN JOAQUIN COUNTY ORDINANCE – DEVELOPMENT TITLE 9

The San Joaquin County Ordinance requires coordination with the County and, where necessary, obtaining a permit where trees, riparian habitat, wetlands, and waterway habitats may be impacted. Proposed project components could have a substantial effect on biological resources and could result in loss of trees, riparian, and wetland habitats. Tree removal has not been determined for project components at this stage in the planning process; however, a tree inventory would be necessary for jurisdictional native oak trees, heritage oak trees, or historical trees. Based on the County's listed exemptions under Section 9-1505.8 *Trees*, it is possible that MICUP's proposed activities are exempt based on "flood control facilities, and/or other public facilities." Additionally, agricultural practices are not subject to the tree ordinance (Chapter 9-1505). However, if any of the proposed project components are located within riparian habitat, they would be subject to Chapter 9-1510 *Riparian Habitat* and require the County's Review Authority to approve construction activities. A qualified biologist would likely be required to prepare a Riparian Habitat Mitigation Plan to protect existing riparian habitat or a plan to replace, preserve, or develop new habitat, or a combination thereof (Section 9-1510.3). Any loss of trees, riparian, and wetland habitats as a result of proposed project implementation would be a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-24, Mitigation Measure BIO-25, Mitigation Measures BIO-26, and Mitigation Measure BIO-27 have been identified to address these impacts.

Operation

North San Joaquin Water Conservation District

O&M activities would have primarily no conflict with any local policies or ordinances protecting biological resources because the areas would have been previously disturbed from construction, and no additional tree removal or additional impacts would occur. However, operational activities would include increased diversion and maintenance of screens, as well as potential runoff from Flood-MAR activities, all of which could conflict with the San Joaquin County General Plan. Therefore, the proposed project would have the potential to conflict with local policies or ordinances, and this would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-18, Mitigation Measure BIO-19, Mitigation Measure BIO-23, Mitigation Measure BIO-24, Mitigation Measure BIO-26, Mitigation Measure BIO-27, Mitigation measure SW-2, and Mitigation Measure SW-3 have

been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-18, BIO-19, BIO-23, BIO-24, BIO-26, BIO-27, SW-2,and SW-3 would reduce this impact, because habitat assessments would be conducted, species specific surveys would be conducted, as needed, buffers around active burrows will be enforced, turbidity will be monitored, spill protection would be implemented, BMPs for in-water work would be followed, fish rescue and relocation plans will be implemented, fish specific work windows will be adhered to if possible, no net loss of riparian or wetland habitat would occur, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not conflict with any local policies or ordinances protecting biological resources, and this NSJWD operational impact would be less than significant with mitigation**.**

Stockton East Water District

Operational use and maintenance activities would have primarily no conflict with any local policies or ordinances protecting biological resources because the areas would have been previously disturbed from construction, and no additional tree removal or additional impacts would occur. However, operational activities will include increased diversion and maintenance of screens, as well as potential runoff from flood-MAR activities, all of which could be in conflict with the San Joaquin County General Plan. Therefore, the proposed project would have the potential to conflict with local policies or ordinances. This would be considered a potentially significant impact.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-18, Mitigation Measure BIO-19, Mitigation Measure BIO-23, Mitigation Measure BIO-24, Mitigation Measure BIO-26, Mitigation Measure BIO-27, Mitigation measure SW-2, and Mitigation Measure SW-3 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-18, BIO-19, BIO-23, BIO-24, BIO-26, BIO-27, SW-2,and SW-3 would reduce this impact, because habitat assessments would be conducted, species specific surveys would be conducted, as needed, buffers around active burrows will be enforced, turbidity will be monitored, spill protection would be implemented, BMPs for in-water work would be followed, fish rescue and relocation plans will be implemented, fish specific work windows will be adhered to if possible, no net loss of riparian or wetland habitat would occur, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not conflict with any local policies or ordinances protecting biological resources, and this SEWD construction impact would be less than significant with mitigation**.**

City of Stockton

O&M activities would have primarily no conflict with any local policies or ordinances protecting biological resources because the areas would have been previously disturbed from construction, and no additional tree removal or additional impacts would occur. However, operational use and maintenance activities would include increased diversion and maintenance of screens, of which could conflict with the San Joaquin County General Plan and City of Stockton General Plan. While increased diversion levels may slightly reduce overall amounts of water available to migratory fish, those effects are expected to be minimized by diversions only occurring during peak flows of wetter years, and any effects are also expected to quickly dissipate with tidal influence. Therefore, the City of Stockton operation component would have a less than significant conflict with local policies or ordinances.

In addition to implementing Mitigation Measure BIO-1, Mitigation Measure BIO-18, Mitigation Measure BIO-19, Mitigation Measure BIO-23, Mitigation Measure BIO-24, Mitigation Measure BIO-

26, Mitigation Measure BIO-27, Mitigation measure SW-2, and Mitigation Measure SW-3 have been identified to address these impacts. Implementing Mitigation Measures BIO-1, BIO-2, BIO-18, BIO-19, BIO-23, BIO-24, BIO-26, BIO-27, SW-2, and SW-3 would reduce this impact, because habitat assessments would be conducted, species specific surveys would be conducted, as needed, buffers around active burrows will be enforced, turbidity will be monitored, spill protection would be implemented, BMPs for in-water work would be followed, fish rescue and relocation plans will be implemented, fish specific work windows will be adhered to if possible, no net loss of riparian or wetland habitat would occur, and compensatory mitigation for permanent habitat loss will be acquired, as needed. Therefore, the proposed project would not conflict with any local policies or ordinances protecting biological resources, and this City of Stockton operational impact would be less than significant with mitigation**.**

Table 4.4-9 Local Policies and Ordinance Consistency Potential Impacts by Partner Agency

	NSJWCD		SEWD		City of Stockton	
Local Policies and Ordinances	**Construction**	**O&M**	**Construction**	**O&M**	**Construction**	**O&M**
City of Stockton General Plan	–	–	–	–	LTSMI	LTSMI
San Joaquin County General Plan	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI	LTSMI
City of Stockton Municipal Code	–	–	–	–	LTSMI	LTSMI
San Joaquin County Ordinances – Development Title	LTSMI	NI	LTSMI	NI	LTSMI	LTSMI

Mitigation Measures

Implement Mitigation Measures BIO-1, BIO-2, BIO-3, BIO-4, BIO-5, BIO-6, BIO-7, BIO-8, BIO-9, BIO-10, BIO-11, BIO-12, BIO-13, BIO-14, BIO-15, BIO-16, BIO-17, BIO-18, BIO-19, BIO-20, BIO-21, BIO-22, BIO-23, BIO-24, BIO-25, BIO-26, BIO-27, GEO-1, SW-2, and SW-3 .

Level of Significance

Less than Significant with Mitigation

Habitat or Natural Community Conservation Plans Consistency

Significance Criterion f:	Would the proposed project conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?

Impact BIO-5 MICUP Would not Conflict with an Adopted HCP, NCCP, or Other Approved Local, Regional, or State Habitat Conservation Plan. no Impact Would Occur.

Adopted HCPs, NCCPs, and other local, regional, or State HCPs were analyzed for potential conflicts with the proposed project in terms of biological resources. Two HCPs (SJMSCP and Calaveras River HCP) were identified as having potential jurisdiction within the project area; these are delineated for applicability to each of the Partner Agency's project components (Table 4.4-10). If the district or proposed project component is not applicable to any of the local policies identified, it is not discussed in this section. Coverage by HCPs per special-status species can be found in Appendix E2.

Construction

MICUP Project Components

The entirety of the NSJWCD, SEWD, and City of Stockton project component areas are located within the SJMSCP. The SJMSCP covers numerous plants, wildlife, and fish species. Participation in the SJMSCP is voluntary for local jurisdictions within the plan area. Certain land uses, such as water diversions and water conveyances, and agricultural activities are not covered under the SJMSCP. Coverage for each proposed project component would be determined on a project-by-project basis by the JPA Technical Advisory Committee. Since the SJMSCP is voluntary for each of the proposed project components, there would be no construction impact associated with implementation of the proposed project. Should the district choose to 'opt out' of SJMSCP coverage, the district would be required to work with the local jurisdiction and permitting agencies (CDFW, USFWS, and NMFS) to establish alternative measures for mitigating impacts to biological resources. Therefore, construction activities for all MICUP project components would not conflict with the provisions of an adopted HCP, and there would be no impact.

The Calaveras River HCP, which does not include groundwater recharge projects as a covered activity, covers only aquatic species within the Calaveras River. Although the Calaveras River is located within the SEWD, project components are anticipated to pull water only from the Mokelumne River. However, up to three pipelines could be constructed through and within the Calaveras River that would result in temporary disruption to habitat. This project component's activities would not conflict with the Calaveras River HCP's biological goals (i.e., to maintain a viable rainbow trout and steelhead population below New Hogan Dam on the Calaveras River) or its key conservation actions (i.e., improving barriers to fish passage, screening diversions to reduce fish entrainment, maintaining flow in important fish habitat and maintaining water quality for the fish population). All mitigation measures listed within the Calaveras River HCP would be adhered to for any in-water construction work. Therefore, there are no conflicts, and no SEWD construction impact associated with the Calaveras River HCP.

Operation

MICUP Project Components

The entirety of the NSJWCD, SEWD, and City of Stockton project component areas are located within the SJMSCP. Coverage for each proposed project component would be determined on a project-by-project basis by The JPA Technical Advisory Committee. Since the SJMSCP is voluntary for each of the project components, there would be no impact associated with implementation of the proposed project. Should the district choose to 'opt out' of SJMSCP coverage, the district would be required to work with the local jurisdiction and permitting agencies (CDFW, USFWS, and NMFS) to establish alternative measures for mitigating impacts to biological resources.

Therefore, operational activities would not conflict with the provisions of an adopted HCP, and there would be no operational impact from MICUP project components.

Table 4.4-10 HCP and NCCP Consistency Potential Impacts by Partner Agency

	NSJWCD		SEWD		City of Stockton	
Local Policies and Ordinances	**Construction**	**O&M**	**Construction**	**O&M**	**Construction**	**O&M**
San Joaquin County Habitat Conservation Plan	NI	NI	NI	NI	NI	NI
Calaveras River Habitat Plan	NI	NI	NI	NI	NI	NI

Mitigation Measures

No mitigation is required.

Level of Significance

No Impact

4.4.5 Cumulative Impacts

The geographic scope of the cumulative biological resources analysis varies based on the biological resource under consideration and phase of construction, all of which are analyzed below. The geographic scope of analysis for cumulative biological resource impacts encompasses areas within and adjacent to the project area, and, particularly for special-status fish species, the lower Mokelumne River Watershed and all surface waters extending from the Mokelumne River through the Delta. The timeframe during which MICUP could contribute to cumulative biological resource impacts primarily includes construction phase with a decrement of impacts during the operation phase. For MICUP, the operations phase is permanent.

The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1, *Cumulative Projects List*, which lists the relevant plans and larger-scale projects considered in conjunction with the proposed project (refer to Chapter 4.0, *Environmental Impact Analysis*). Many of the projects in Table 4-1 are construction-based projects such as, commercial, industrial, residential development, and rezoning/land use. Significant cumulative impacts related to biological resource impacts could occur if the impacts of the proposed project are combined with the impacts of one or more of the cumulative projects identified in Table 4-1. Concurrent activities that would directly or indirectly cause substantial adverse effects to special-status species, riparian habitat or other sensitive natural communities, and/or State or federally protected wetlands; interfere substantially with movement of any migratory fish or wildlife species or migratory wildlife corridors; impede the use of native wildlife nursery sites; or conflict with local policies, ordinances, or the provisions of an adopted HCP, NCCP or similar conservation plan, would be considered a substantial cumulative impact.

Operations for all Biological Resources

Most of the cumulative projects would not combine with the proposed project and result in cumulative impacts to operations because many of the projects are construction-based (commercial, industrial, and residential development, rezoning/land use projects) and would not result in significant operational impacts (to which MICUP could contribute to). That is, O&M of the proposed project would recharge unappropriated water during wet years under A029835, and require maintenance of water infrastructure as well as agricultural land, like existing conditions. Maintenance activities of the proposed project would not combine with operational impacts of land use-based projects. Additionally, the proposed project would divert/redivert water from the

Mokelumne River in wet years, but none of the cumulative projects propose new water diversions. MICUP would also increase flow in the Mokelumne River in drier months and years because of reductions in seepage due to groundwater recharge under MICUP.

However, some of the cumulative projects such as PA-2300198 (agricultural production), the Delta Water Treatment Plant Groundwater Recharge Basin (utility development), and the Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan (water infrastructure) include similar infrastructure and uses in the same areas as MICUP. Proposed development in the project vicinity, including land use projects, would benefit from the proposed project because implementation of project components would support water supply reliability, which would be used by proposed development.

With the implementation of mitigation, the proposed project would result in less-than-significant impacts to biological resources during operation. Therefore, the proposed project's contribution to cumulative biological resource impacts would be less than cumulatively considerable. Impacts would be less than significant.

Construction

Special-status Plant, Wildlife, and Fish Species

Significant cumulative impacts related to special-status plant, wildlife, and fish species and their habitats could occur if the impacts of the proposed project combined with the impacts of one or more of the cumulative and larger-scale projects identified in Table 4-1 would substantially increase adverse effects to biological resources impacts. Like the proposed project, cumulative projects have the potential to directly and indirectly adversely affect special-status plant, wildlife, and fish species and their habitats. If the projects are constructed at the same time and within proximity to each other, both temporary and permanent impacts to a variety of special-status plant, wildlife, and fish species, including loss of individuals of special-status species or degradation of habitat supporting these species, could be cumulatively significant.

The following mitigation measures have been identified to address this significant impact. Mitigation Measure BIO-1 would first assess the habitat types present and whether they have the potential to support the presence of special-status plant or wildlife species. Mitigation Measure BIO-2 would aid in avoiding and minimizing impacts to all special-status species and sensitive biological resources with the potential to occur within the project area. If determined necessary, additional species-specific mitigation measures for the species that have the potential to occur in the project area that would also be implemented include: conducting pre-construction surveys, species-specific surveys, WEAP training, biological construction monitoring; restricting the timing of vegetation removal and trimming; implementing BMPs, including avoidance fencing and spill protection; and revegetating disturbed areas would be revegetated. It is expected that each of the projects listed in Table 4-1 would require some level of environmental review and include mitigation measures to avoid and minimize adverse effects to biological resources. Through compliance with this requirement, the potential for significant cumulative biological resource impacts from construction would be reduced.

Cumulative projects may result in significant impacts to special-status plant, wildlife, and fish species and their habitats if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project).

With the implementation of mitigation measures, MICUP would result in less-than-significant impacts regarding adverse effects to special-status plant, wildlife, and fish species and their habitats. Therefore, the proposed project's contribution to cumulative special-status plant, wildlife, and fish species and their habitats impacts from construction would be less than cumulatively considerable.

Sensitive Natural Communities

Significant cumulative impacts related to sensitive natural communities, including riparian habitat, could occur if the impacts of the proposed project combined with the impacts of one or more of the cumulative and larger-scale projects identified in Table 4-1 would substantially increase adverse effects to biological resources impacts. Like the proposed project, cumulative projects have the potential to directly and indirectly adversely affect sensitive natural communities, including riparian habitat. If the projects are constructed at the same time and within proximity to each other, the loss and degradation of sensitive natural communities, including riparian habitat, could be cumulatively significant. Mitigation measures that have been identified to address this significant impact include: conducting habitat assessments and aquatic mapping, WEAP training, and tree inventories; implementing BMPs, including avoidance fencing and spill protection; revegetating disturbed areas; and acquiring any necessary compensatory mitigation. Through compliance with this requirement, the potential for significant cumulative biological resource impacts from construction would be reduced.

Cumulative projects may result in significant impacts to sensitive natural communities, including riparian habitat and vernal pools, if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project).

With the implementation of mitigation measures, MICUP would result in less-than-significant impacts regarding adverse effects to sensitive natural communities, including riparian habitat. Therefore, the proposed project's contribution to cumulative sensitive natural communities impacts from construction would be less than cumulatively considerable.

Wildlife Movement Corridors

Significant cumulative impacts from construction related to interfering substantially with fish or wildlife movement or migration could occur if the impacts of the proposed project combined with the impacts of one or more of the cumulative and larger-scale projects identified in Table 4-1 would substantially increase adverse effects to biological resource impacts. Like the proposed project, cumulative projects have the potential to interfere substantially with fish or wildlife movement or migration either directly or indirectly. If the projects are constructed at the same time within proximity to each other, the interference with fish or wildlife movement or migration from construction could be cumulatively significant. Mitigation measures that have been identified to address this significant impact include: conducting habitat assessments and aquatic mapping, WEAP training, biological construction monitoring, and tree inventories; implementing BMPs, including avoidance fencing, in-water work measures, and spill protection; revegetating disturbed areas; adhering to fish specific work windows; monitoring turbidity; creating and implementing erosion plans; and acquiring any necessary compensatory mitigation. Through compliance with this requirement, the potential for significant cumulative biological resource impacts from construction would be reduced.

Cumulative projects may result in significant impacts to resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites, if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project).

With the implementation of mitigation measures, MICUP would result in less-than-significant impacts regarding adverse effects to resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. Therefore, the proposed project's contribution to cumulative resident or migratory wildlife corridors or impede the use of native wildlife nursery sites impacts would be less than cumulatively considerable.

Local Policies and Ordinance Consistency

Significant cumulative impacts related to conflicting with local policies or ordinances that protect biological resources could occur if the impacts of the proposed project combined with the impacts of one or more of the cumulative and larger-scale projects identified in Table 4-1 would substantially increase adverse effects to biological resources impacts. Like the proposed project, cumulative projects have the potential to conflict with local policies or ordinances protecting biological resources. If the projects are constructed at the same time and within proximity to each other, the conflict with local policies or ordinances protecting biological resources could be cumulatively significant. Mitigation measures that have been identified to address this significant impact include: conducting habitat assessments; ensuring no net loss of aquatic resources and riparian habitat; conducting a tree survey; and acquiring tree removal permits and any necessary compensatory mitigation, as necessary. Through compliance with this requirement, the potential for significant cumulative biological resource impacts from construction would be reduced.

Cumulative projects may result in significant conflict with local policies or ordinances protecting biological resources if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project).

With the implementation of mitigation measures, MICUP would result in less-than-significant impacts regarding conflict with local policies or ordinances protecting biological resources. Therefore, the proposed project's contribution to cumulative conflict with local policies or ordinances protecting biological resources impacts would be less than cumulatively considerable.

HCPs, NCCPs, and Other Conservation Plan Consistency

The proposed project would have no impact on adopted HCPs, NCCPs, and other local, regional, or state HCPs. Since the SJMSCP is voluntary for each of the project components, there would be no impact associated with implementation of the proposed project. Should the district choose to 'opt out' of SJMSCP coverage, the district would be required to work with the local jurisdiction and permitting agencies (CDFW, USFWS, and NMFS) to establish alternative measures for mitigating impacts to biological resources. All mitigation measures listed within the Calaveras River HCP would be adhered to for any in-water work with the Calaveras River. Therefore, cumulative effects are not anticipated.

Mitigation Measures

Mitigation Measures GEO-1, SW-2, SW-3, and BIO-1 through BIO-28.

Level of Significance

Less than Significant with Mitigation

Overall Level of Cumulative Significance

Less than Significant with Mitigation

4.5 Cultural and Tribal Cultural Resources

4.5.1 Introduction

This section addresses the cultural resources and tribal cultural resources impacts associated with construction and operation of the proposed project. This section includes a summary of known existing cultural resources and tribal cultural resources as well as the cultural resources sensitivity in the Place of Use (defined as encompassing all areas within which water resulting from the construction and operation of the proposed project could be used including the three Partner Agency jurisdiction areas), a relevant regulatory framework, and an evaluation of potential impacts of the proposed project related to cultural resources and tribal cultural resources.

The information presented in this section is based primarily on the following:

- Desktop research including a review of the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), and the list of California Historical Landmarks, and the California Office of Historic Preservation (OHP) Built Environment Resources Directory (BERD) which inventories all known previously recorded built environment resources in San Joaquin County,
- Additional archival and background information related to the project area's prehistoric and historic development,
- Tribal consultation conducted by San Joaquin County.

4.5.2 Environmental Setting

Cultural Resources Definitions

The term "cultural resources" under CEQA encompasses historic, archaeological, and tribal cultural resources as well as burial sites. Below is a brief summary of each definition:

- **Historical Resources.** Historical resources are resources listed in, or determined eligible for listing in, the CRHR, a resource included in a local register of historical resources or identified in a historical resources survey, or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant. Historical resources may include resources of indigenous or non-indigenous origin and are typically described as either built environment, archaeological, or tribal cultural.
- **Built Environment Resources.** Built environment resources include buildings, structures, objects, and associated features such as public spaces, roads, and other infrastructure. Built environment resources are considered significant if they are identified as historical resources under CEQA.
- **Archaeological Resources.** Archaeology is the study of artifacts and material culture with the aim of understanding human activities and cultures in the past. Archaeological resources may be associated with indigenous and non-indigenous cultures. Archaeological resources are considered significant if they are identified as historical or unique archaeological resources under CEQA.

- **Tribal Cultural Resources.** Tribal cultural resources include sites, features, places, cultural landscapes, sacred places, or objects that are of cultural value to one or more California Native American Tribes. Tribal cultural resources are considered to be significant if identified by a consulting tribe and significance is agreed upon by the lead agency, or if identified by a consulting tribe and also eligible as a historical resource under CEQA.
- **Burial Sites and Cemeteries.** Burial sites and cemeteries are formal or informal locations where human remains have been interred.

Overall Cultural Setting

The Place of Use is primarily situated within a region known as the Delta and Eastside Streams portion of California's Central Valley.[1] The "Delta" is an estuary where, unlike classic deltas, multiple rivers come together, including the Sacramento, San Joaquin, Cosumnes, Mokelumne, and Calaveras Rivers. Topographically, the area consists of a low-elevation flatland with alluvial plains, river channels, old lakebeds, and marshes in the west to rolling hills in the east. Though land use in modern times is predominantly agriculture, prior to reclamation the area was once covered by extensive wetlands created by tidal action in the Delta, as well as seasonal flooding along streams.[2][3]

Following is a brief overview of the archaeological context and historical background of the Place of Use. It is not intended to be a comprehensive review of the currently available sources, rather, it serves as a general overview. Further details can be found in ethnographic studies, mission records, and major published sources.

Archaeological Context

California prehistory is generally divided into three broad time periods: Paleoindian Period (circa 11,550-8,550 B.C), Archaic Period (8,550 B.C.-A.D. 1100) and Emergent Occupation (A.D. 1000-European Contact).[4] The prehistoric chronological sequence for the Central Valley presented below is based on Rosenthal et al. (2007) and Moratto (1984).

PALEOINDIAN PERIOD (11,550-8550 B.C.)

Little is known about the Paleoindian Period in the Central Valley. Geoarchaeological studies have demonstrated that erosion and deposition have buried or destroyed early archaeological deposits. Most claims of ancient human occupation have been dismissed by Moratto (1984) based on radiocarbon dating. Currently, the earliest accepted date of human occupation in the Central Valley ranges from 11,550 to 9,550 B.C. and comes from fluted projectile points similar to Clovis points found at sites near Tracy Lake and the Tulare Lake Basin.[5]

[1] United States Geological Survey (USGS), *"California's Central Valley"*. 2021. https://ca.water.usgs.gov/projects/central-valley/delta-eastside-streams.html, accessed August 17, 2021.
[2] USGS, 2021.
[3] Michael J. Moratto, *California Archaeology*. (Salinas, California: Coyote Press, 1984).
[4] David A. Fredrickson, *Early Cultural of the North Coast Ranges, California*, Ph.D. dissertation, University of California, Davis, 1973. Moratto, 1984.
Jeffrey Rosenthal, Gregory White, and Mark Sutton, "The Central Valley: A View from the Catbird's Seat," *California Prehistory: Colonization, Culture, and Complexity*, edited by Terry L. Jones and Kathryn A. Klar, pp. 147-164 (Lanham Maryland: AltaMira Press, 2007).
[4] Rosenthal et al., 2007.
[5] Rosenthal et al., 2007.

LOWER ARCHAIC (8,550-5,550 B.C.)

Climate change at the end of the Pleistocene caused significant periods of alluvial deposition beginning around 9,050 B.C. The Lower Archaic, like the Paleoindian Period, is represented only by limited isolated finds. One isolated flaked stone crescent was identified on an ancient alluvial fan west of Orland in the Sacramento Valley, one deposit has been found on the former shoreline of Buena Vista Lake, and Lower Archaic artifacts are common along the former shore of Tulare Lake.[6]

Typical Lower Archaic artifacts include flaked stone crescents and stemmed points. The identification of projectile points and a diverse faunal assemblage at KER-116, (the only Lower Archaic site identified in the Central Valley proper to date), point to hunting being an important subsistence activity.[7] Milling tools and plant remains are largely absent in the valley, thus plant use during the Lower Archaic remains unclear. Several foothill sites contain milling implements and evidence of the use of nut crops such as acorn and pine.[8] The relationship between foothill and valley floor adaptations is largely unknown during the Lower Archaic. However, distinct adaptations are apparent in the Middle Archaic, and it is possible that these divergent traditions first emerged in the Lower Archaic.[9]

MIDDLE ARCHAIC (5,550-550 B.C.)

The Middle Archaic began with substantial climate change to much warmer, drier conditions. Fans and floodplains stabilized after an initial period of deposition in 5,550 B.C. Archaeological deposits dating to the early Middle Archaic are rare in the Central Valley proper due to these geomorphic changes.[10] The late Middle Archaic, however, is relatively well-represented. Late Middle Archaic sites point to diverse adaptations and the emergence of organized subsistence practices and residential stability along river corridors by 6,000 years ago. The typical pattern of the Middle Archaic has been identified as the Windmiller Pattern, first identified on old levee ridges adjacent to freshwater marshes near the confluence of the Mokelumne and Cosumnes rivers. This pattern is represented by extended burials oriented to the west and a sophisticated material culture.[11] Middle Archaic sites are relatively common in the foothills surrounding the Central Valley and show relatively little change from the Lower Archaic.[12]

During this time, the mortar and pestle become more widespread suggesting a shift toward more intensive subsistence practices. Fishing technologies, such as bone gorges, hooks, and spears, also appear during the Middle Archaic suggesting a new focus on fishing. Several other technologies become apparent during this time, particularly in the northern San Joaquin and southern Sacramento Valleys.[13] Baked-clay impressions of twined basketry, simple pottery, and other baked clay objects have been found at several sites. Personal adornment items also became more frequent. Exchange with outside groups is evidenced by the presence of obsidian, shell beads and

[6] Ibid.
[7] Ibid.
[8] R. M. Lajeunesse and J. M. Pryor, "SkyRocket Appendices," (Freson: Department of Anthropology, California State University, Fresno, 1996).
[9] Rosenthal et al., 2007.
[10] Ibid.
[11] Ibid.
[12] Kelly R. McGuire, "Test Excavations at CA-FRE-61, Fresno County, California", Occasional Papers in *Anthropology No 5.,* (Bakersfield: Museum of Anthropology, California State University, Bakersfield, 1995).
[13] Rosenthal et al., 2007.

ornaments.[14] Trade also seemed to be focused on utilitarian items such as obsidian or finished obsidian tools from at least five separate sources.[15]

UPPER ARCHAIC (550 B.C. – A.D. 1100)

The Upper Archaic began with the onset of the Late Holocene, marked by a cooler, wetter climate. The Upper Archaic is better represented in the archaeological record than earlier periods. Cultural diversity was more pronounced and is marked by contrasting material cultures throughout the valley.[16]

During this period, numerous specialized technologies were developed such as bone tools and implements, manufactured goods such as Olivella and Haliotis beads and ornaments, well-made ceremonial blades, and ground-stone plummets. Beginning after circa 2,700 years ago, lower Sacramento Valley settlements shifted to a pattern of large, mounded villages, now identified as the Berkeley Pattern, while a continuation of the Windmiller Pattern was seen the San Joaquin Valley.[17]

Upper Archaic period economies varied by region throughout the Central Valley. Economies were primarily focused on seasonal resources such as acorns, salmon, shellfish, rabbits, and deer.[18]

EMERGENT OCCUPATION (A.D. 1100- HISTORIC)

The stable climatic conditions of the Upper Archaic continued into the Emergent Period. In the Delta Region, this period is associated with the Augustine Pattern.[19] After A.D. 1000, many of the technologies identified during the Archaic disappeared to be replaced by cultural traditions recorded at European contact. The bow and arrow replaced the atlatl as the preferred hunting method sometime between A.D. 1000 and 1300.

Increased social complexity is evidenced by increased variation in burial types and offerings and larger residential communities. Grave offerings such as shell beads, ornaments, and ritually "killed" mortars and pestles are often found in association with burials. Diverse and sophisticated fishing technology is often recovered from Emergent Period sites, including various types of harpoons, fishhooks, gorges, and netting.[20] Pottery was produced at several sites in the lower Sacramento Valley and Delta area, known as Cosumnes brownware. Baked clay human and animal effigies have also been identified at several sites in the region during this time.

As with the Archaic Period, Emergent Period economies varied geographically, though throughout the Central Valley fishing and plant harvesting increased in importance. Most Emergent residential sites contain diverse faunal assemblages containing mammal and bird remains and large amounts of fish bone. After circa 1,000 years ago, the mortar and pestle become the dominant tool type and small seeds increase in archaeological deposits over time.[21]

[14] Rosenthal et al., 2007.
Moratto, 1984.
[15] Ibid.
[16] Rosenthal et al., 2007.
[17] Rosenthal et al., 2007.
[18] Ibid.
[19] Ibid.
[20] Ibid.
[21] Ibid.

Ethnographic Background

The three geographical divisions of the Miwok are the Coast Miwok, Lake Miwok and Interior Miwok. The Interior Miwok is further divided into the Plains Miwok and the Sierra Miwok.[22] The primary differences recorded by ethnographers between the Interior and Sierra Miwok are language, topographic area, and ecological context. The traditional territory of the Interior Miwok is bordered by Yokuts to the south, Maidu to the north, Washo to the east and Patwin to the west.

Miwok settlements typically included thatched, conical houses and semi-subterranean earth-covered dwellings in winter, constructed by higher status families. Houses generally had a central hearth and an earth oven for cooking purposes. Large, semi-subterranean assembly houses were constructed for use as a ritual and social gathering place. In summer, a circular brush hut was constructed for use in mourning ceremonies. Other structures included sweathouses for curing disease and purification prior to hunting, small conical structures used by menstruating women, and grinding houses built over bedrock mortars to permit food processing in inclement weather. Acorn granaries were constructed for long-term acorn storage.[23]

Miwok social organization is characterized by the moiety pattern, with all living things belonging to one of two categories: land and water. Moieties typically married outside their own groups which played an important role in many ceremonies.[24] On the other hand, political organization centered on small tribelets of approximately 300 to 500 people and several distinct settlements. A chief headed each tribelet, and a representative of the chief of each settlement had oversight of local affairs. Chiefs acted as advisors and managed use of natural resources by preventing trespassing on tribelet territory and determining the appropriate time to begin the acorn harvest each season. The chief also arbitrated any disputes and sanctioned the punishment of criminal offenders.[25]

Traditional Miwok artistry includes twined and coiled basketry, usually from willow and redbud trees. Other activities included the manufacturing of tule mats used as floor covering. Woven blankets were often made of rabbit skin strips or feathers attached to cordage woven from plant fibers. Tule balsa rafts were used to navigate rivers and sloughs.[26]

Traditional Miwok subsistence practices centered on the use of acorns and other seeds as primary plant food sources and on hunting of mule deer, tule elk, pronghorn antelope, and various species of waterfowl. Hunting was done typically with a sinew-backed bow and arrow. Fishing was a particularly important activity for the Miwok, primarily with various types of nets; Seines were used in large rivers and sloughs where the pace of water flow was slow, while hook and line was typically used to take sturgeon, while harpoons were the most common implement for salmon fishing.[27]

Records of exploitation of the Interior Miwok people by the Mission San Jose begin as early as 1811.[28] Several triblets of Plains Miwok engaged in armed resistance in the 1820s and 1830s in attempts to resist missionization. As a direct result of the establishment of the mission system, the Interior Miwok population dramatically declined. Despite this, the Interior Miwok continue to populate Amador, San Joaquin and Calaveras Counties and surrounding areas.[29]

[22] Kroeber 1925; Levy 1978
[23] Kroeber 1925; Levy 1978
[24] Levy 1978
[25] Kroeber 1925; Levy 1978
[26] Levy 1978
[27] Levy 1978
[28] Ibid.
[29] California Valley Miwok Tribe 2023; Ione Band of Miwok Indians 2023

Historical Background

Post-contact history for the State of California is generally divided into three periods: the Spanish Period (1769–1822), Mexican Period (1822–1848), and American Period (1848–present). Although Spanish, Russian, and British explorers visited the area for brief periods between 1529 and 1769, the Spanish Period in California begins with the establishment in 1769 of a settlement at San Diego and the founding of Mission San Diego de Alcalá, the first of 21 missions constructed between 1769 and 1823. Independence from Spain in 1821 marks the beginning of the Mexican Period, and the signing of the Treaty of Guadalupe Hidalgo in 1848, ending the Mexican-American War, signals the beginning of the American Period when California became a territory of the United States.

SPANISH PERIOD (1769 – 1822)

Spanish explorers made sailing expeditions along the coast of California between the mid-1500s and mid-1700s. Juan Rodriguez Cabrillo in 1542 led the first European expedition to observe what was known by the Spanish as Alta (upper) California. For more than 200 years, Cabrillo and other Spanish, Portuguese, British, and Russian explorers sailed the Alta California coast and made limited inland expeditions, but they did not establish permanent settlements.[30] The Spanish crown laid claim to Alta California based on the surveys conducted by Cabríllo and Vizcaíno.[31]

By the 18th century, Spain developed a three-pronged approach to secure its hold on the territory and counter against other foreign explorers. The Spanish established military forts known as presidios, as well as missions and pueblos (towns) throughout Alta California. The 1769 overland expedition by Captain Gaspár de Portolá marks the beginning of California's Historic period, occurring just after the King of Spain installed the Franciscan Order to direct religious and colonization matters in assigned territories of the Americas. Portolá established the Presidio of San Diego as the first Spanish settlement in Alta California in 1769. Franciscan Father Junípero Serra also founded Mission San Diego de Alcalá that same year, the first of the 21 missions that would be established in Alta California by the Spanish and the Franciscan Order between 1769 and 1823.

Construction of missions and associated presidios was a major emphasis during the Spanish Period in California to integrate the Native American population into Christianity and communal enterprise. Incentives were also provided to bring settlers to pueblos or towns; just three pueblos were established during the Spanish Period, only two of which were successful and remain as California cities (San José and Los Angeles).

During this period, Spain also granted ranchos to prominent citizens and soldiers, though very few in comparison to the subsequent Mexican Period. To manage and expand their herds of cattle on these large ranchos, colonists enlisted the labor of the surrounding Native American population, often forcibly.[32] The missions governed the local Native Americans and sought to convert the population to Christianity. The influx of European settlers brought the local Native American population in contact with European diseases which they had no immunity against, resulting in a catastrophic reduction in native populations throughout the State.[33]

[30] Walton Bean, *California: An Interpretive History,* (New York: McGraw Hill, 1968)
[31] Blake Gumprecht, *The Los Angeles River: Its Life, Death, and Possible Rebirth,* (Maryland: The Johns Hopkins University Press, 1999).
[32] Zephyrin Engelhardt, *San Fernando Rey, the Mission of the Valley*, (Chicago: Franciscan Herald Press, Chicago, 1927a.)
Andres Resendez, *The Other Slavery: The Uncovered Story of Indian Enslavement in America*, (New York: Houghton Mifflin, 2016).
[33] William McCawley, *The First Angelinos: The Gabrielino Indians of Los Angeles,* (Novato: Bellena Press Cooperative, 1996).

MEXICAN PERIOD (1822 – 1848)

Several factors kept growth within Alta California to a minimum, including the threat of foreign invasion, political dissatisfaction, and unrest among the indigenous population. After more than a decade of intermittent rebellion and warfare, New Spain won independence from Spain in 1821. In 1822, the Mexican legislative body in California ended isolationist policies designed to protect the Spanish monopoly on trade, and decreed California ports open to foreign merchants.[34]

Extensive land grants were established in the interior during the Mexican Period, in part to increase the population inland from the more settled coastal areas where the Spanish had first concentrated their colonization efforts. The secularization of the missions following Mexico's independence from Spain resulted in the subdivision of former mission lands and establishment of many additional ranchos. Commonly, former soldiers and well-connected Mexican families were the recipients of these land grants, which now included the title to the land.[35]

The Mexican Period ended in early January 1848, following several decisive battles against the United States. On January 10, leaders of the Pueblo of Los Angeles surrendered peacefully after Mexican General Jose Maria Flores withdrew his forces. Shortly thereafter, newly appointed Mexican Military Commander of California Andrés Pico surrendered all of Alta California to US Army Lieutenant Colonel John C. Fremont in the Treaty of Cahuenga.

AMERICAN PERIOD (1848 – PRESENT)

The American Period officially began with the signing of the Treaty of Guadalupe Hidalgo in 1848, in which the United States agreed to pay Mexico $15 million for conquered territory including the present-day states of California, Nevada, Utah, and parts of Colorado, Arizona, New Mexico, and Wyoming. Settlement of Southern California continued to increase during the early American Period. Ranchos were sold or otherwise acquired by Americans, with many subdivided into agricultural parcels or towns.

The discovery of gold in northern California in 1848 led to the California Gold Rush and California's population, particularly that of the bay area, grew exponentially. During this time, San Francisco became California's first true city, growing from a population of 812 to 25,000 in only a few years.[36] During the 1850s cattle boom, rancho vaqueros drove large herds from southern to northern California to feed that region's burgeoning mining and commercial boom.

By 1853, the population of California exceeded 300,000. Thousands of settlers and immigrants continued to pour into the state, particularly after the completion of the transcontinental railroad in 1869. By the 1880s, the railroads had established networks throughout northern California, resulting in fast and affordable shipment of goods, as well to transport new residents to the growing region.[37]

SAN JOAQUIN COUNTY HISTORY AND HISTORIC DEVELOPMENT

Europeans were active in what is now San Joaquin County by the late 1820s. The Mexican military established a presence in the region by 1829. That year, the Mexican army fought Native American forces that included Estanislao, an escaped indigenous captive, at a fortified site along the Stanislaus

[34] Ramon Gutierrez et al., *Contested Eden: California Before the Goldrush,* (Berkeley: University of California Berkeley Press, 1998).
[35] Burgess Shumway, *California Ranchos, (*San Bernadino: Borgo Press, 2007).
[36] J.M. Guinn, "Gold! Gold! Gold! from San Francisquito!", *Los Angeles, Biography of a City*, edited by John Caughey and LaRee Caughey, (Berkeley: University of California Press, 1977).
[37] Glenn Dumke, "The Boom of the 1880s in Southern California," *Southern California Quarterly,* 76, 1994.

River, which was eventually named for Estanislao. After three unsuccessful attempts, a Mexican detachment led by Mariano G. Vallejo took the Native American stronghold, and the indigenous combatants dispersed into the surrounding countryside.[38] Further European incursions into the area were made by fur trappers, who likely began hunting what is in the area by the late 1820s. The location of the community of French Camp is situated at a rendezvous spot established by French Canadian hunters in the 1830s and 1840s. The arrival of fur trappers in this era was catastrophic for the indigenous population. Indians residing in the region had little previous contact with Europeans and, as a result, had acquired little immunity to the diseases the colonizers brought with them. By 1833, European observers "reported seeing skulls and bodies under every shade tree."

The earliest permanent European and Euro-American settlements in San Joaquin County predate the California Gold Rush. Charles M. Weber, a German immigrant and eventual founder of Stockton, arrived in Stanislaus County in 1841 as part of the Bidwell-Bartleson expedition. Bidwell initially settled in San Jose and formed a business partnership with blacksmith William Gulnac. In 1842, however, Weber and Gulnac assembled a team of 12 men to settle a colony in what is now French Camp. In 1847, Weber left the colony and founded Stockton, but with the discovery of gold in 1848, briefly left for present El Dorado County to operate a trading company. He soon returned to Stockton and worked to position the town as the area's main shipping point to supply the goldmines. Stockton was officially incorporated as a city on July 23, 1850.[39] In the 1850s, the influx of gold seekers and the resulting growth of local trade fueled Stockton's growth as the county's main commercial center.[40]

In the second half of the19th century, the county's population grew sufficiently to feed the expansion of agriculture and industry. As was the case through much of the state, in the 1850s and 1860s, agricultural enterprise flourished in fertile San Joaquin Valley after frustrated miners descended to establish farms. Earthen ditches and temporary dams on small creeks provided water for irrigation of these early agricultural pursuits.[41] Secondary population centers grew to support the agricultural areas, giving birth to such communities as Lockeford (1859) and Lodi (1874). Additional growth centered on railroad development, which began in 1869, when transcontinental service first reached Stockton.[42] By the 1890s, Stockton's port and rail access allowed the city to emerge as the principal industrial and transportation hub for the county's agricultural periphery. Around the turn of the 20th century, a thriving shipbuilding industry first developed along the city's San Joaquin River waterfront.[43]

Through the 20th century, San Joaquin County area grew modestly and retained its largely agricultural character, but to sustain agriculture in the area water for irrigation was required. Accordingly, over the next century , irrigation and other districts were formed in order to manage the area's water supply. One of the earliest irrigation districts in the area was the Woodbridge Irrigation District (WID), which formed in 1924 and diverted water from the Mokelumne River to

[38] Douglas Kyle, *Historic Spots in California*. 5th ed. Revised by Douglas E. Kyle. (Palo Alto, CA: Stanford University Press, 2002).
[39] City of Stockton, *Stockton 2040 General Plan Update Existing Conditions Technical Memorandum: Cultural Resources*, 11, 2016. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/GP_UpdateCulturalResources.pdf, accessed online December 30, 2024.
[40] Ibid.
[41] California Department of Transportation and JRP Historical Consulting Services, *Water Conveyance Systems In California Historic Context Development and Evaluation Procedures,* 2000. https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/ser/canalsditches-a11y.pdf, accessed online December 30, 2024.
[42] Ibid.
[43] Visit Stockton, "A Historical Study of Stockton, California," 2021. Visit Stockton website, https://www.visitstockton.org/about-us/stockton-history/, accessed September 1, 2021.

provide water to 63 square miles.[44] The Linden Irrigation District was formed in 1929, later subsumed by Stockton East Water District (SEWD). The North San Joaquin Water Conservation District (NSJWCD) and SEWD were both formed in 1948, with NSJWCD to provide water to 150,000 acres on both sides of the Mokelumne River east of Lodi and SEWD to provide water to the City of Stockton and the surrounding urban area, as well as extensive agricultural areas south and east of the City of Stockton.[45] SEWD also contracted with the United States Bureau of Reclamation for a water supply from New Hogan Dam in 1964 that provided the SEWD with a supply of surface water, and contracted with the City of Stockton and other urban water users to construct the surface water treatment plant.[46] Additionally, the Central San Joaquin Water Conservation District was formed in 1958 under the State of California Water Conservation District Act of 1937 in order to receive supplemental surface water from the Bureau of Reclamation.

In addition to the construction of irrigation-related infrastructure, the 20th century saw additional water infrastructure developments necessary to support growth in the Bay Area. The first of three Mokelumne Aqueducts was constructed in 1929 through the San Joaquin Valley by the East Bay Municipal Utility District (EBMUD).[47] The Mokelumne Aqueducts were constructed to provide drinking water to the East Bay Area. EBMUD constructed Camanche Dam forming the Camanche Reservoir in 1964 with financial support from the U.S. Army Corps of Engineers.[48]

In part due to the irrigation-related and water infrastructure developments noted above, the County continued to expand its population throughout the 20th and into the 21st century. The City of Tracy experienced a population boom in the 1970s as new residents from the San Francisco Bay Area relocated to Tracy, speeding up its urbanization.[49] The City of Stockton remains the County's main urban center, with 291,000 residents accounting for roughly 40 percent of the County's population of 762,000.

Known and Potential Cultural Resources

The Place of Use is in California's Central Valley within San Joaquin County. Project components proposed as part of MICUP would occur in unincorporated portions of the County and in unincorporated communities such as Thornton, Linden, and Lockeford. Proposed project components would also occur in the incorporated communities of the City of Stockton and eastern reaches of the City of Lodi.

Built Environment Resources

Identification of significant or potentially significant built environment resources included a review of the on-line lists for the NRHP, CRHR, and California Historical Landmarks and the California OHP's BERD. Review of the NRHP, CRHR, and California Historical Landmarks identified 51 designated built

[44] Woodbridge Irrigation District (WID), "About Us," 2024. WID website, https://www.woodbridgeirrigation.org/about-us, accessed December 30, 2024.
[45] North San Joaquin Water Conservation District (NSJWCD), "About NSJWCD," 2024. NSJWCD website, https://www.nsjwcd.com/about-nsjwcd, accessed December 30, 2024.
Stockton East Water District GSA (SEWD), "History," 2024. SEWD website, https://www.sewd.net/history, accessed December 30, 2024.
[46] SEWD 2024.
[47] East Bay Municipal Water District, "Mokelumne Aqueducts Resiliency Project", 2024. EBMWD website, https://www.ebmud.com/about-us/construction-and-maintenance/construction-my-neighborhood/mokelumne-aqueducts-resiliency-project-mar, accessed December 30, 2024.
[48] U. S. Congress. House. Committee on Appropriations, *Public Works Appropriations Hearings 1963*, Volume 5, 913, 1963. https://www.google.com/books/edition/Hearings/6Ere7fjYmwsC?hl=en&gbpv=1, accessed through Google Books December 30, 2024.
[49] Tracy Historical Museum, "Tracy History," 2021. Tracy Historical Museum website, https://tracymuseum.org/tracy-history/, accessed September 1, 2021.

environment resources in the Place of Use and its immediate surroundings (Table 4.5-1). Additionally, review of the BERD identified more than 2,300 built environment resources that have been recorded in San Joaquin County. There may also be additional built environment resources that have yet to be identified through consultation with the CHRIS or through surveys.

Built environment resources present in the Place of Use include, or may include, buildings and structures, in addition to trails, roads, railroads, small and large-scale mining features, logging features, occupation areas (short and long term), water conveyance features, and cemeteries.

Table 4.5-1 Known Built Environment Resources within the Place of Use[1]

City/Community	Resource
California Historical Landmarks[2]	
Clements	Lone Star Mill (155)
French Camp	California Chicory Works (935)
French Camp	French Camp (668)
Lodi	Lodi Arch (931/N902)
Lockeford	Lockeford (Locke's Ford) (365)
Lockeford	Harmony Grove Church Site (P591)
Stockton	Burial place of John Brown (Juan Flaco) (513)
Stockton	Temple Israel Cemetery (765)
Stockton	Reuel Colt Gridley Monument (801)
Stockton	Temporary Detention Camps for Japanese Americans-Stockton Assembly Center (934)
Stockton	Weber Point (165)
Stockton	Site of First Building in Present City of Stockton (178)
Stockton	Stockton Developmental Center (1016)
Stockton	Sikh Temple Site (1039)
Thornton	Benson's Ferry (149)
Thornton	Site of Mokelumne City (162)
Woodbridge	Site of Wood's Ferry and Wood's Bridge (163)
Woodbridge	San Joaquin Valley College (520)
Woodbridge	Town of Woodbridge (358)
Unincorporated	Trail of the John C. Frémont 1844 Expedition (995)
Unincorporated	Site of battle between forces under General Vallejo and San Joaquin Valley Indians (214)
National Register of Historic Places and California Register of Historical Resources	
Clements	I.O.O.F. Lodge #355
Lockeford	Locke House and Barn
Lockeford	Locke's Meat Market
Lodi	Hotel Lodi
Lodi	Lodi Arch
Lodi	Morse–Skinner Ranch House
Lodi	Terminous Culling Chute
Lodi	Woman's Club of Lodi
Stockton	Cole's Five Cypress Farm

City/Community	Resource
Stockton	Commercial and Savings Bank
Stockton	El Dorado Elementary School
Stockton	Elks Building
Stockton	Farmer's and Merchant's Bank
Stockton	Fox California Theater
Stockton	Wong K. Gew Mansion
Stockton	Benjamin Holt House
Stockton	Hotel Stockton
Stockton	Nippon Hospital
Stockton	Old Weber School
Stockton	Philomathean Clubhouse
Stockton	Moses Rodgers House
Stockton	Sperry Office Building
Stockton	Sperry Union Flour Mill
Stockton	Stockton Savings and Loan Society Bank
Stockton	Tretheway Block
Stockton	United States Post Office
Stockton	Oak Lawn/Shippee Home Ranch
Stockton	Western Pacific Railway Depot
Woodbridge	I.O.O.F. Hall
Woodbridge	Woodbridge Masonic Lodge No. 131

[1] This list may not include all historical resources listed on the NRHP and CRHR.

[2] California Historical Landmarks 1-769 need to be reevaluated using current standards.

Sources: California Office of Historic Preservation 2024; National Register of Historic Places 2024

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

There are no known designated historical resources owned and/or operated by NSJWCD within the Place of Use. However, the district was formed in 1948 and, therefore, likely owns and/or operates infrastructure over 45 years of age which has the potential to qualify as historical resources pending further evaluation. Additionally, there are many properties over 45 years of age owned by others throughout the NSJWCD jurisdiction that also have the potential to qualify as historical resources pending further evaluation.

STOCKTON EAST WATER DISTRICT

There are no known designated historical resources owned and/or operated by SEWD. However, the district was formed in 1948 and, therefore, likely owns and/or operates infrastructure over 45 years of age which has the potential to qualify as historical resources pending further evaluation. Additionally, there are many properties owned by others throughout the SEWD jurisdiction that also have the potential to qualify as historical resources pending further evaluation.

CITY OF STOCKTON

There are no known designated historical resources owned and/or operated by City of Stockton. However, the City was founded in 1850 and has a long history of providing water through its Municipal Utilities Department (MUD) such that the City likely owns and/or operates infrastructure over 45 years of age which has the potential to qualify as historical resources pending further evaluation. Additionally, there are many properties owned by others throughout the MUD area jurisdiction that also have the potential to qualify as historical resources pending further evaluation.

Archaeological Resources

Due to the expansive nature of the Place of Use, a search of the Statewide California Historical Resources Information System (CHRIS) Inventory, which contains archaeological resource records and reports, was not conducted as part of this EIR. Therefore, specific archaeological resources within the Place of Use have not been identified. There may also be archaeological resources that have yet to be identified through field surveys and recorded with the CHRIS.

Based on a review of published sources, archaeological resources are known to exist throughout the Place of Use.[50] Archaeological resource types present, or expected to exist, within San Joaquin County include occupation areas (both short- and long-term, from the prehistoric and post-contact periods), burial areas, ceremonial areas, resource collection and processing sites, lithic scatters, quarries, rock art sites, trails, refuse dumps, features such as privies or wells, and isolated examples of artifacts.

Tribal Cultural Resources

As part of its tribal cultural resource identification process pursuant to California Assembly Bill (AB) 52, San Joaquin County sent letters via certified mail to 4 Native American tribal contacts identified by the Native American Heritage Commission (NAHC) as being traditionally and culturally affiliated with the Place of Use. The tribes that were contacted include the following:

- Wilton Rancheria
- Ione Band of Miwok Indians
- United Auburn Indian Community of the Auburn Rancheria

Under AB 52, tribes have 30 days to respond and request consultation. As of the writing of this EIR, the County has not received any responses for consultations under AB 52.

4.5.3 Regulatory Framework

Federal Regulations

National Historic Preservation Act

Projects that have a federal nexus, such as federal permitting or funding, must comply with the provisions of the National Historic Preservation Act of 1966 (NHPA), as amended (16 United States Code [USC] 470f). The NHPA of 1966 established a federal program for the preservation of historic properties, including built environment, archaeological, and traditional cultural properties. Towards this end, the NHPA establishes both institutions and defined processes to direct federal agencies

[50] Rosenthal et al. 2007

and support state and local governments in their historic preservation programs and activities. These institutions and processes include the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPO), the National Register of Historic Places (NRHP), and the Section 106 review process, further described below.

SECTION 106 OF NATIONAL HISTORIC PRESERVATION ACT

Section 106 of the NHPA (Section 106) (16 United States Code 470f) requires federal agencies to account for the effects of their undertakings on historic properties, and to afford the ACHP a reasonable opportunity to comment on such undertakings. Historic properties are defined as buildings, structures, districts, sites, or objects which are included in or eligible for inclusion in the NRHP. A description of the NRHP is included below. Section 106 is implemented through 36 CFR Part 800, which outlines the process for historic preservation review, including participants, identification efforts, and the assessment and resolution of adverse effects. Per 36 CFR 800.16(y), a federal undertaking is defined as any project requiring or receiving a federal permit, license, approval, or funding. Federal agencies must take steps to determine if the undertaking would result in adverse effect to historic properties and take measures to avoid or resolve those effects as feasible.

According to 36 CFR 800.4, to comply with Section 106, the following steps shall be undertaken in support of an undertaking.

Determine Scope of Identification Efforts

In consultation with the State Historic Preservation Officer/Tribal Historic Preservation Officer (SHPO/THPO), the agency official shall:

- Determine and document the area of potential effects, as defined in 36 CFR 800.16(d);
- Review existing information on historic properties within the area of potential effects, including any data concerning possible historic properties not yet identified;
- Seek information, as appropriate, from consulting parties, and other individuals and organizations likely to have knowledge of, or concerns with, historic properties in the area, and identify issues relating to the undertaking's potential effects on historic properties; and
- Gather information from any Indian tribe or Native Hawaiian organization identified pursuant to 36 CFR 800.3(f) to assist in identifying properties, including those located off tribal lands, which may be of religious and cultural significance to them and may be eligible for the National Register, recognizing that an Indian tribe or Native Hawaiian organization may be reluctant to divulge specific information regarding the location, nature, and activities associated with such sites. The agency official should address concerns raised about confidentiality pursuant to 36 CFR 800.11(c).

Identify Historic Properties

Based on the information gathered in the efforts described above and in consultation with the SHPO/THPO and any Indian tribe or Native Hawaiian organization that might attach religious and cultural significance to properties within the area of potential effects, the agency official shall take the steps necessary to identify historic properties within the area of potential effects.

- **Level of effort.** The agency official shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. The agency official shall take into account past planning, research and studies, the magnitude and nature of the undertaking and the degree of Federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the area of potential effects.

Evaluate Historic Significance

- Apply NRHP criteria
- Determine whether a property is eligible for listing in the NRHP

Assess Adverse Effects

- Apply criteria of adverse effect (36 CFR 800.5)

Resolve Adverse Effects

- Continue consultation
- Prepare memorandum of agreement to document resolution of adverse effects

SECTION 101 OF NATIONAL HISTORIC PRESERVATION ACT

Authorized by Section 101 of the NHPA, the NRHP is the nation's official list of cultural resources worthy of preservation. The NRHP recognizes the quality of significance in American, state, and local history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects. Properties eligible for listing in the NRHP are considered historic properties pursuant to Section 106 and historical resources pursuant to CEQA. Per 36 CFR Part 60.4, a property is eligible for listing in the NRHP if it meets one or more of the following criteria:

Criterion A: Is associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: Is associated with the lives of persons significant in our past

Criterion C: Embodies the distinctive characteristics of a type, period, or method of installation, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction

Criterion D: Has yielded, or may be likely to yield, information important in prehistory or history

In addition to meeting at least one of the above designation criteria, resources must also retain integrity. The NPS recognizes seven aspects or qualities that, considered together, define historic integrity. To retain integrity, a property must possess several, if not all, of these seven qualities, defined in the following manner:

Location: The place where the historic property was constructed or the place where the historic event occurred

Design: The combination of elements that create the form, plan, space, structure, and style of a property

Setting: The physical environment of a historic property

Materials: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property

Workmanship: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory

Feeling: A property's expression of the aesthetic or historic sense of a particular period of time

Association: The direct link between an important historic event or person and a historic property

Certain properties are generally considered ineligible for listing in the NRHP, including cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions, relocated structures, or commemorative properties. Additionally, a property must be at least 50 years of age to be eligible for listing in the NRHP. The NPS states that 50 years is the general estimate of the time needed to develop the necessary historical perspective to evaluated significance (NPS 1997: 41). Properties which are less than 50 years must be determined to have "exceptional importance" to be considered eligible for NRHP listing.

State Regulations

Public Resources Code Sections 5024.1 and 4852

Codified by Public Resources Code (PRC) Sections 5024.1 and 4852 in 1992, the CRHR is an authoritative listing and guide to be used by State and local agencies, private groups, and citizens in identifying the existing historical resources of the State and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change (PRC Section5024.1(a)). The criteria for eligibility for the CRHR are consistent with the NRHP criteria but have been modified for state use to include a range of historical resources that better reflect the history of California (PRC Section 5024.1(b)). Unlike the NRHP however, the CRHR does not have a defined age threshold for eligibility; rather, a resource may be eligible for the CRHR if it can be demonstrated sufficient time has passed to understand its historical or architectural significance.[51] Further, resources may still be eligible for listing in the CRHR even if they do not retain sufficient integrity for NRHP eligibility.[52] Generally, the California OHP recommends resources over 45 years of age be recorded and evaluated for historical resources eligibility.[53]

Properties are eligible for listing in the CRHR if they meet one of more of the following criteria:

Criterion 1: Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage

Criterion 2: Is associated with the lives of persons important to our past

Criterion 3: Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values

[51] California Office of Historic Preservation, "California Register and National Register: A Comparison (for purposes of determining eligibility for the California Register)," *California Office of Historic Preservation Technical Assistance Series #10*, (Sacramento, California: Department of Parks and Recreation, 2006).
[52] California Office of Historic Preservation, 2006.
[53] California Office of Historic Preservation, *Instructions for Recording Historical Resources*, (Sacramento, California: Department of Parks and Recreation, 1995).

Criterion 4: Has yielded, or may be likely to yield, information important in prehistory or history

California Environmental Quality Act

CEQA GUIDELINES SECTION 15064.5(A) – CEQA DEFINITION OF HISTORICAL RESOURCES

California PRC Section 21804.1 requires lead agencies to determine if a project could have a significant impact on historical resources. As defined in PRC Section 21084.1, a historical resource is a resource listed in, or determined eligible for listing in, the CRHR; a resource included in a local register of historical resources or identified in a historical resources survey pursuant to PRC Section 5024.1(g); or any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant. PRC Section 21084.1 also states resources meeting the above criteria are presumed to be historically or culturally significant unless the preponderance of evidence demonstrates otherwise. Resources listed in the NRHP are automatically listed in the CRHR and are, therefore, historical resources under CEQA. Historical resources may include eligible built environment resources and archaeological resources of the prehistoric or historic periods.

CEQA GUIDELINES SECTION 15064.5(B) – SUBSTANTIAL ADVERSE CHANGE IN SIGNIFICANCE

According to CEQA, an impact that results in a substantial adverse change in the significance of a historical resource is considered a significant effect on the environment. A substantial adverse change could result from physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired (CEQA Guidelines Section 15064.5 [b][1]). Material impairment is defined as demolition or alteration in an adverse manner [of] those characteristics of a historical resource that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in, the CRHR or a local register (CEQA Guidelines Section 15064.5[b][2][A]).

CEQA GUIDELINES SECTION 15064.5(C) – EFFECTS ON ARCHAEOLOGICAL RESOURCES

CEQA Guidelines Section 15064.5(c) provides further guidance on the consideration of archaeological resources. If an archaeological resource does not qualify as a historical resource, it may meet the definition of a "unique archaeological resource" as identified in PRC Section 21083.2. PRC Section 21083.2(g) defines a unique archaeological resource as an artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria: 1) it contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information; 2) has a special and particular quality such as being the oldest of its type or the best available example of its type; or 3) is directly associated with a scientifically recognized important prehistoric or historic event or person.

If it can be demonstrated that a project will cause damage to a unique archaeological resource, the lead agency may require reasonable efforts be made to permit any or all of these resources to be preserved in place or left in an undisturbed state. To the extent that resources cannot be left undisturbed, mitigation measures are required (PRC Section 21083.2[a], [b]).

If an archaeological resource does not qualify as a historical or unique archaeological resource, the impacts of a project on those resources will be less than significant and need not be considered further (CEQA Guidelines Section 15064.5[c][4]).

CEQA GUIDELINES SECTION 15064.5(D) – EFFECTS ON HUMAN REMAINS

CEQA Guidelines Section 15064.5 also provides guidance for addressing the potential presence of human remains, including those discovered during the implementation of a project. Native American human remains and associated burial items may be significant to descendant communities and/or may be scientifically important for their informational value. They may be significant to descendant communities for patrimonial, cultural, lineage, and religious reasons. Human remains may also be important to the scientific community, such as prehistorians, epidemiologists, and physical anthropologists. The specific stake of some descendant groups in ancestral burials is a matter of law for some groups, such as Native Americans (CEQA Guidelines Section 15064.5(d); PRC Section 5097.98). CEQA and other State regulations regarding Native American human remains provide the following procedural requirements to assist in avoiding potential adverse effects on human remains within the contexts of their value to both descendant communities and the scientific community:

- When an initial study identifies the existence or probable likelihood that a project would affect Native American human remains, the lead agency is to contact and work with the appropriate Native American representatives identified through the NAHC to develop an agreement for the treatment and disposal of the human remains and any associated burial items (CEQA Guidelines Section 15064.5(d); PRC Section 5097.98).
- If human remains are accidentally discovered, the county coroner must be contacted. If the county coroner determines that the human remains are Native American, the coroner must contact the NAHC within 24 hours. The NAHC must identify the most likely descendant (MLD) to provide for the opportunity to make recommendations for the treatment and disposal of the human remains and associated burial items.
- If the MLD fails to make recommendations within 48 hours of being granted access to the site or the project applicant rejects the recommendations of the MLD, the Native American human remains and associated burial items must be reburied in a location not subject to future disturbance within the project site (PRC Section 5097.98).

CEQA GUIDELINES SECTION 15126.4 – CULTURAL RESOURCES MITIGATION

Section 15126.4 of the CEQA Guidelines stipulates an EIR shall describe feasible measures to minimize significant adverse impacts. In addition to being fully enforceable, mitigation measures must be completed within a defined time period and be roughly proportional to the impacts of the project. Generally, a project which is found to comply with the *Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings* (the Standards) is considered to be mitigated below a level of significance (CEQA Guidelines Section 15126.4(b)(1)). For historical resources of an archaeological nature, lead agencies should also seek to avoid damaging effects where feasible. Preservation in place is the preferred manner to mitigate impacts to archaeological sites; however, data recovery through excavation may be the only option in certain instances (CEQA Guidelines Section 15126.4(b)(3)).

California Health and Safety Code Section 7050.5 – Human Remains

Section 7050.5 of the California Health and Safety Code states that in the event of discovery or recognition of any human remains in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent remains until the coroner of the county in which the remains are discovered has

determined if the remains are subject to the coroner's authority. If the human remains are of Native American origin, the coroner must notify the Native American Heritage Commission (NAHC) within 24 hours of this identification.

California Public Resources Code Section 5097.91– Sacred Lands Inventory

Section 5097.91 of the PRC established duties include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. This inventory is referred to as the NAHC Sacred Lands File. Under Section 5097.9 of the PRC, a State policy of noninterference with the free expression or exercise of Native American religion was articulated along with a prohibition of severe or irreparable damage to Native American sanctified cemeteries, places of worship, religious or ceremonial sites or sacred shrines located on public property. Section 5097.98 of the PRC specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a county coroner. Section 5097.5 defines as a misdemeanor the unauthorized disturbance or removal of archaeological, historic, or paleontological resources located on public lands.

California Assembly Bill 52 – Effects on Tribal Cultural Resources

California Assembly Bill (AB) 52 expanded upon CEQA by defining a new resource category, "tribal cultural resources." AB 52 establishes that "a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment" (PRC Section 21084.2). AB 52 further states when feasible, the lead agency shall avoid damaging effects to tribal cultural resources and identifies examples of mitigation that, if feasible, may be considered to avoid or minimize significant adverse impacts to tribal cultural resources (PRC Section 21084.3).

PRC Section 21074 (a)(1)(A) and (B) and (a)(2) defines tribal cultural resources as "sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe," and meets either of the following criteria:

a. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in PRC Section 5020.1(k).
b. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of PRC Section 5024.1. In applying the criteria set forth in subdivision (c) of PRC Section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe.

In recognition of California Native American tribal sovereignty and the unique relationship of California local governments and public agencies with California Native American tribal governments and with respect to the interests and roles of project proponents, it is the intent AB 52 to accomplish all of the following:

1. Recognize that California Native American prehistoric, historic, archaeological, cultural, and sacred places are essential elements in tribal cultural traditions, heritages, and identities.
2. Establish a new category of resources in CEQA called "tribal cultural resources" that considers the tribal cultural values in addition to the scientific and archaeological values when determining impacts and mitigation.

3. Establish examples of mitigation measures for tribal cultural resources that uphold the existing mitigation preference for historical and archaeological resources of preservation in place, if feasible.
4. Recognize that California Native American tribes may have expertise with regard to their tribal history and practices, which concern the tribal cultural resources with which they are traditionally and culturally affiliated (because CEQA calls for a sufficient degree of analysis, tribal knowledge about the land and tribal cultural resources at issue should be included in environmental assessments for projects that may have a significant impact on those resources).
5. In recognition of their governmental status, establish a meaningful consultation process between California Native American tribal governments and lead agencies, respecting the interests and roles of all California Native American tribes and project proponents, and the level of required confidentiality concerning tribal cultural resources, early in the CEQA environmental review process, so that tribal cultural resources can be identified, and culturally appropriate mitigation and mitigation monitoring programs can be considered by the decision-making body of the lead agency.
6. Recognize the unique history of California Native American tribes and uphold existing rights of all California Native American tribes to participate in, and contribute their knowledge to, the environmental review process pursuant to CEQA.
7. Ensure that local and tribal governments, public agencies, and project proponents have information available, early in CEQA environmental review process, for purposes of identifying and addressing potential adverse impacts to tribal cultural resources and to reduce the potential for delay and conflicts in the environmental review process.
8. Enable California Native American tribes to manage and accept conveyances of, and act as caretakers of, tribal cultural resources.
9. Establish that a substantial adverse change to a tribal cultural resource has a significant effect on the environment.

AB 52 also establishes a formal consultation process for California tribes regarding those resources. The consultation process must be completed before a CEQA document can be certified or adopted. AB 52 requires that lead agencies consult with "a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project." Native American tribes to be included in the process are those that have requested notice of projects proposed in the jurisdiction of the lead agency.

Local Regulations

San Joaquin County Historic Resource Preservation Ordinance

Chapter 9-1053 of the San Joaquin County Code pertains to historic preservation. The intent of the chapter is to establish regulations for the preservation of historic resources, such as cultural, archaeological, architectural, aesthetic, and environmental resources, within San Joaquin County. The ordinance does not identify procedures or criteria for the designation of historic resources. However, the ordinance requires the issuance of a use permit shall be required prior to any change in the use of an historical resource.

City of Stockton Municipal Code

Chapter 16.220 of the City of Stockton Municipal Code addressed cultural resources. The chapter's purpose is to foster appreciation and pride of the city's past, enhance historic sites, encourage utilization of structures, maintain the architectural style and character of the city, promote and encourage continued existing private ownership and utilization of existing structures, preserve architectural styles, protect against adverse effects, and stabilize values. The City's Cultural Heritage Board (CHB) maintains the ability to designate landmarks, historic sites, structures of merit, and historic preservation districts. The criteria associated with these designations is provided below.

LANDMARK

1. Archaeological Interest. Its potential for yielding significant information of archaeological interest;
2. Architectural Craftsmanship. Its embodiment of elements demonstrating outstanding attention to architectural and/or engineering craftsmanship, design, detail, or materials;
3. Architectural Style. Its exemplification of a particular architectural style or way of life important to the City, the State, or the Nation;
4. Architectural Type. Its exemplification of the best remaining architectural type in the City;
5. Historic Event. Its location as a site of a significant historic event;
6. Heritage. Its character, interest, or value as a significant part of the heritage of the City, the State, or the Nation;
7. Visual Feature. Its unique location or singular physical characteristic representing an established and familiar visual feature of the City;
8. Relationship to Another Landmark. Its relationship to any other landmark, if its preservation is essential to the integrity of that landmark;
9. Significant Person. Its identification with a person(s) who significantly contributed to the culture and development of the City, the State, or the Nation;
10. Work of a Significant Person. Its identification as the creation, design, or work of a person(s) whose effort has significantly influenced the heritage of the City, the State, or the Nation; or
11. Natural Environment. Its integrity as a natural environment that strongly contributes to the well-being of the people of the City, the State, or the Nation.

HISTORIC SITE AND STRUCTURE OF MERIT

1. Archaeological Interest. Its potential for yielding significant information of archaeological interest;
2. Heritage. Its character, interest, or value as a significant part of the heritage of the City, the State, or the Nation;
3. Visual Feature of the City. Its unique location or singular physical characteristic representing an established and familiar visual feature of the City;
4. Way of Life. Its exemplification of a particular way of life important to the City, the State, or the Nation;
5. Historic Event. Its location as a site of a significant historic event regardless of its current configuration, development, or use;

6. Significant Person. Its identification with a person(s) who significantly contributed to the culture and development of the City, the State, or the Nation; or
7. Significant Person of a Specific National Origin. Its identification with a person(s) representative of a specific national origin who have contributed to the culture and development of the City, the State, or the Nation.

HISTORIC PRESERVATION DISTRICT

1. Have substantial value as part of the development, cultural, or heritage characteristics of, or is associated with, the life of a person(s) important in the history of the City, the State, or the Nation;
2. Are associated with an event that has made a substantial contribution to the broad patterns of our history;
3. Were constructed in a distinctive architectural style characteristic of an era of history;
4. Are the work of an architect or designer who has substantially influenced the development of the City, the State, or the Nation;
5. Are part of, or related to, a park, square, or other distinctive area and should be developed or preserved in compliance with a plan based on an aesthetic, architectural, cultural, or historic motif;
6. Contain elements of craftsmanship, design, detail, or materials, which represent an important innovation;
7. Embody distinguishing characteristics of an architectural style or engineering specimen;
8. Owe to their unique location or singular physical characteristic, represents an established feature of the neighborhood, community, or City; or
9. Would help preserve and protect a historic area or place of historic interest in the City, by retaining the structure.

General Plans

SAN JOAQUIN COUNTY GENERAL PLAN

Part 3.4 of the San Joaquin County General Plan, adopted in December 2016, consists of a Natural and Cultural Resources Element that outlines the County's goals and policies for how it will ensure that development occurs in a manner that limits impacts to natural and cultural resources. Goal NCR-6 specifically addresses Cultural and Historic Resources, stating that the focus of the goal section is to "identify ways to protect, preserve, and enhance the valuable cultural and historic resources that are vital to the character of the County."[54]

Goal NCR-6: To protect San Joaquin County's valuable architectural, historical, archaeological, and cultural resources.

- **NCR-6.1:** Protect Historical and Cultural Resources

  The County shall protect historical and cultural resources and promote expanded cultural opportunities for residents to enhance the region's quality of life and economy.

[54] San Joaquin County, *County Wide General Plan 2035 Policy Document Part 3, Goals and Policies, 3.4 Natural and Cultural Resources Element"*, 2017. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/Part%203.4a_Natural%20and%20Cultural%20Resources_2016-11-21.pdf, accessed August 19, 2021.

- **NCR-6.2:** No Destruction of Resources

  The County shall ensure that no significant architectural, historical, archaeological, or cultural resources are knowingly destroyed through County action.

- **NCR-6.3**: Encourage Public and Private Preservation Efforts

  The County shall continue to encourage efforts, both public and private, to preserve the historical and cultural heritage of San Joaquin County and its communities and residents.

- **NCR-6.4:** Registration of Historic Properties

  The County shall encourage owners of eligible historic properties to apply for State and Federal registration, to participate in tax incentive programs for historical restoration, and to enter into Mills Act Contracts.

- **NCR-6.5:** Protect Archaeological and Historical Resources

  The County shall protect significant archaeological and historical resources by requiring an archaeological report be prepared by a qualified cultural resource specialist prior to the issuance of any discretionary permit or approval in areas determined to contain significant historic or prehistoric archaeological artifacts that could be disturbed by project construction.

- **NCR-6.6:** Tribal Consultation

  The County shall consult with Native American tribes regarding proposed development projects and land use policy changes consistent with the State's Local and Tribal Intergovernmental Consultation requirements.

- **NCR-6.7**: Adaptive Reuse of Historic Structures

  The County shall encourage the adaptive reuse of architecturally significant or historic buildings if the original use of the structure is no longer feasible and the new use is allowed by the underlying land use designation and zoning district.

- **NCR-6.8:** Land Use and Development

  The County shall encourage land uses and development that retain and enhance significant historic properties and sustain historical community character.

- **NCR-6.9:** The County shall support educational and outreach programs that promote public awareness of and support preservation of historical and cultural resources.

CITY OF STOCKTON GENERAL PLAN

The City of Stockton 2040 General Plan, Land Use Element contains goals, policies, and actions intended to promote the preservation of archaeological and built environment historical resources.[55] These include provisions to preserve the character of neighborhoods and historic districts and establish requirements for the preparation of cultural resources field reports, site studies, Native American consultation, and implementation of measures to mitigate effects to cultural resources. In addition, Chapter 16.220 of the City of Stockton Municipal Code provides regulations for the preservation of the city's cultural resources. Under the ordinance, a qualifying resource may be designated under one of four categories: Landmark, Historic Preservation District, Historic Site, and Structure of Merit.

[55] Stockton, City of. *Envision Stockton 2040 General Plan*, Land Use Element, adopted December 4, 2018, https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf, accessed online in December 2024.

CITY OF LODI GENERAL PLAN

The City of Lodi General Plan Conservation Element outlines 13 policies intended to preserve archaeological and built environment cultural resources.[56] Policies related to the protection of archaeological resources include specific requirements related to the conduct of background research and field surveys, best practices in the case of the inadvertent discovery of archaeological discoveries, and procedures to follow if human remains are found. Policies relevant to built environment resources require efforts to relocate historically significant buildings proposed for demolition, prepare adequate environmental review prior to the issuance of permits, coordinate with local historical societies, and, where applicable, adhere to current Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring, and Reconstructing Historic Buildings.

4.5.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 CEQA Guidelines Appendix G significance criteria questions related to Cultural Resources and Tribal Cultural Resources.

Would MICUP (the proposed project):

a) Cause a substantial adverse change in the significance of a historic resource pursuant to §15064.5?

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

c) Disturb any human remains, including those interred outside of formal cemeteries?

d) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is:

   1. Listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k)?

      or

   2. A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1. In applying the criteria set forth in subdivision (c) of Public Resource Code section 5024.1, the lead agency shall consider the significance of the resource to a California Native American tribe?

Approach to Analysis

This evaluation focuses on whether implementation of the proposed project would impact historical resources, archaeological resources, human remains, or tribal cultural resources.

[56] Lodi, City of. *Lodi General Plan,* Conservation Element, adopted December 4, 2024, https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF, accessed online in December 2024.

Both direct and indirect impacts associated with implementation of the proposed project were considered for the analysis presented below. Direct impacts are typically associated with construction and/or ground-disturbing activities, and have the potential to immediately alter, diminish, or destroy all or part of the character and quality of a cultural resource or tribal cultural resource. Indirect impacts are typically associated with post-project implementation conditions that have the potential to alter or diminish the setting of a cultural resource or tribal cultural resource by introducing visual intrusions on existing sites that are considered undesirable.

Historical Resources

The analysis of impacts related to historical resources is based on results of review of the NRHP, the CRHR, the list of California Historical Landmarks, and the California OHP's BERD. Rincon architectural historians evaluated impacts on historical resources based on the likelihood that historical structures, sites, districts, or landscapes are present within the Place of Use and the likely effects of construction or operation on these resources. To more clearly differentiate between archaeological and built environment resources, the analysis presented under Impact CR-1 is limited to built environment resources.

Archaeological Resources and Human Remains

The analysis of the impacts related to archaeological resources and human remains is based on the a review of published sources on the pre- and post-contact history of the Place of Use. Rincon Archaeologists evaluated impacts on archaeological resources and human remains based on the likelihood that these types of resources are present within the Place of Use and the likely effects of construction or operation on these resources. Analysis related to archaeological resources, including those that may be considered historical resources pursuant to Section 15064.5, and those that may be considered unique archaeological resources pursuant to Section 21083.2, are presented under CR-2.

Tribal Cultural Resources

In order to identify tribal cultural resources and analyze potential impacts of the proposed project on such resources, the County sent letters to four Native American tribal contacts identified by the NAHC and County as being traditionally and culturally affiliated with the project area notifying them of the proposed project and inquiring if the tribe would like to consult on the proposed project in accordance with AB 52 (see Appendix F). None of the contacted tribes responded to the notification letter and as such, no known tribal cultural resources were identified in the Place of Use. The analysis of impacts related to tribal cultural resources is based on the results of the County's AB 52 consultation process.

Specific Thresholds of Significance

For purposes of this analysis, the following thresholds are used to evaluate the significance of cultural resources and tribal cultural resources impacts resulting from implementation of the proposed plan.

- Impair a historical resource's ability to convey its significance (i.e., affect a resource's inclusion in the NRHP or CRHR) or not adhere to the Secretary of Interior's Standards for Rehabilitation. Specifically, the significance of a historical resource would be "materially impaired" if the proposed project could result in the following effects at or adjacent to a known historical site within the project area:

  - Demolish or materially alter in an adverse manner those physical characteristics of an historical resource that convey its historical significance and that justify its inclusion in, or eligibility for, inclusion in the CRHR; or
  - Demolish or materially alter in an adverse manner those physical characteristics that account for its inclusion in a local register of historical resources... or its identification in a historical resources survey... unless the public agency reviewing the effects of the project establishes by a preponderance of evidence that the resource is not historically or culturally significant; or
  - Demolish or materially alter in an adverse manner those physical characteristics of a historical resource that convey its historical significance and that justify its eligibility for inclusion in the CRHR as determined by a lead agency for purposes of CEQA. (CEQA Guidelines Section 15064.5[b][2])

- Physically damage or destroy archaeological data or human remains.
- Physically damage, destroy, or otherwise adversely impact a site, feature, place, or cultural landscape with cultural value to a California Native American tribe. Specifically, the significance of a tribal cultural resource would be "materially impaired" if the proposed project could result in the following effects within the project area:
  - Demolish or materially alter in an adverse manner tribal cultural resources listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code section 5020.1(k); or
  - Demolish or materially alter in an adverse manner tribal cultural resources determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code section 5024.1.

Impact Evaluation

Built Environment Historical Resources

Significance Criterion a:	Would the proposed project cause a substantial adverse change in the significance of a historical resource pursuant to §15064.5?

Impact CR-1 IMPLEMENTATION OF THE PROPOSED PROJECT HAS THE POTENTIAL TO RESULT IN SIGNIFICANT IMPACTS DUE TO CONSTRUCTION OF WATER INFRASTRUCTURE THAT COULD CAUSE A SUBSTANTIAL ADVERSE CHANGE IN THE SIGNIFICANCE OF A HISTORICAL RESOURCE. THIS IMPACT WOULD BE SIGNIFICANT AND UNAVOIDABLE EVEN WITH MITIGATION.

Construction

As indicated in Table 4.5-1, there are 51 designated historical resources located in the Place of Use and more than 2,300 built environment resources that have been previously recorded in San Joaquin County. Additionally, due to the historic-period development of the Place of Use, currently unidentified historical resources may be present throughout the Place of Use pending further analysis. Given the presence of known and potential historical resources throughout the Place of Use, there may be impacts to historical resources as a result of implementation of the proposed project. Built environment historical resource impact discussions are presented below for the three Partner Agencies involved in the proposed project.

North San Joaquin Water Conservation District

Under the proposed project, the NSJWCD would increase the capacity of its North and South Systems, expand use of existing privately owned and operated pumps, construct new recharge basins and Flood-MAR facilities, construct aquifer storage and recovery (ASR) wells from a new turnout along the Mokelumne Aqueduct, and systematically replace existing aging pipelines. There are no designated historical resources within the known footprint of the NSJWCD MICUP components that could possibly be demolished or materially altered as part of project construction. However, the district was formed in 1948 and, therefore, owns and/or operates infrastructure over 45 years of age, for example the North System Pump Station, which was built in the late 1960s, which has the potential to qualify as a historical resource pending further analysis. Additionally, there are many properties throughout the NSJWCD area that are over 45 years of age and therefore have the potential to qualify as a historical resource pending further analysis.

Project components proposed under the project could have the potential to result in vibration-related impacts to buildings, structures, or other built environment features over 45 years of age in their vicinity. This impact to built environment resources would be potentially significant. However, these impacts would be reduced to less than significant with implementation of Mitigation Measure NOI-3, described in detail in Section 4.11, *Noise*, that requires the development and implementation of a vibration control plan for construction activities involving large earthmoving equipment within 21 feet of fragile/historic structures or within 15 feet of any residential structure (including non-engineered timber and masonry buildings without plaster) and construction activities involving a roller within 37 feet of fragile/historic structures or within 26 feet of a residential structure (including non-engineered timber and masonry buildings without plaster).

If proposed project components, for example upgrades to the NSJWCD North System and CalFed pump stations, involve the modification or demolition of buildings, structures, or other built environment features over 45 years of age, or their immediate surroundings, it is possible that impacts related to built environment historical resources could occur. A proposed project component that results in the demolition or adverse modification of a qualifying historical resource or its immediate surroundings would materially impair the resource and result in a significant impact on the environment pursuant to Section 16064.5(b) of the CEQA Guidelines. NSJWCD construction impacts related to built environment historical resources would be considered potentially significant, because implementation of the proposed project could result in the substantial adverse change of historical resources pursuant to CEQA.

Implementation of Mitigation Measure CR-1 would reduce impacts related to built environment historical resources by identifying and evaluating significant historical resources and managing relocation, rehabilitation, or alteration in compliance with the Standards as applicable. Nonetheless, even with implementation of Mitigation Measure CR-1, existing and eligible historical resources may still be materially impaired by future infrastructure development that would be carried out under the proposed project. While Historic American Building Survey (HABS) documentation would reduce impacts to the greatest extent feasible in cases where compliance with the Standards or avoidance is not possible, legal precedent has established that such a measure cannot mitigate impacts to a level of less than significant, because the loss of historical fabric cannot be readily compensated for by commemorative mitigation.[57] Therefore, impacts related to built environment historical resources due to construction of MICUP components within NSJWCD would be significant and unavoidable.

[57] *League for Protection of Oakland's etc. Historic Resources v. City of Oakland* (1997) 52 Cal.App.4th 896.

Stockton East Water District

Under the proposed project, the SEWD would install a new turnout on the Mokelumne Aqueduct to enable implementation of the West Linden and Mosher Creek recharge/Flood-MAR areas and associated dry wells, construct additional ASR wells south of the aqueduct, and construct several pipelines to convey water from the Mokelumne Aqueduct. In support of the proposed project, existing infrastructure would be modified, and new infrastructure would be constructed.

There are no designated historical resources within the known footprint of the SEWD project components that would be demolished or materially altered as part of project construction. However, the district was formed in 1948 and, therefore, likely owns and/or operates, or may operate as part of the proposed project, infrastructure over 45 years of age, which have the potential to qualify as historical resources pending further analysis. Additionally, there are many properties throughout the SEWD area that are over 45 years of age and therefore have the potential to qualify as a historical resource pending further analysis.

Project components proposed under the project could have the potential to result in vibration-related impacts to buildings, structures, or other built environment features over 45 years of age in their vicinity. This impact to built environment resources would be potentially significant. However, these impacts would be reduced to less than significant with implementation of Mitigation Measure NOI-3, described in detail in Section 4.11, *Noise*, that requires the development and implementation of a vibration control plan for construction activities involving large earthmoving equipment within 21 feet of fragile/historic structures or within 15 feet of any residential structure (including non-engineered timber and masonry buildings without plaster) and construction activities involving a roller within 37 feet of fragile/historic structures or within 26 feet of a residential structure (including non-engineered timber and masonry buildings without plaster).

If project components, for example the installation of a new turnout on the Mokelumne Aqueduct, would involve the modification or demolition of buildings or structures over 45 years of age, or their immediate surroundings, it is possible that impacts to built environment historical resources could occur. A proposed project component that results in the demolition or adverse modification of a qualifying historical resource or its immediate surroundings would materially impair the resource and result in a significant impact on the environment pursuant to Section 16064.5(b) of the CEQA Guidelines. SEWD construction impacts related to built environment historical resources would be considered potentially significant, because implementation of the proposed project could result in the substantial adverse change of built environment historical resources pursuant to CEQA.

Implementation of Mitigation Measure CR-1 would reduce impacts related to built environment historical resources by identifying and evaluating significant historical resources and managing relocation, rehabilitation, or alteration in compliance with the Standards as applicable. Nonetheless, even with implementation of Mitigation Measure CR-1, existing and eligible historical resources could still be materially impaired by future infrastructure development that would be carried out under the proposed project. While Historic American Building Survey (HABS) documentation would reduce impacts to the greatest extent feasible in cases where compliance with the Standards or avoidance is not possible, legal precedent has established that such a measure cannot mitigate impacts to a level of less than significant, because the loss of historical fabric cannot be readily compensated for by commemorative mitigation.[58] Therefore, impacts related to built environment

[58] *League for Protection of Oakland's etc. Historic Resources v. City of Oakland* (1997) 52 Cal.App.4th 896.

historical resources due to construction of MICUP components within SEWD would be significant and unavoidable.

City of Stockton

Under the proposed project, the City of Stockton would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at its existing Delta Water Treatment Plant (DWTP). Recharge basins and dry wells proposed under the proposed project would be built on site at the DWTP. The DWTP was constructed circa 2010 and includes no historic-period buildings, structures, or features. Therefore, modification of the DWTP with construction of new recharge basins and dry wells proposed under the proposed project does not have the potential to result in the substantial adverse change in the significance of historical resources pursuant to CEQA.

Under the proposed project, the City of Stockton would construct up to 70 acres of new recharge basins and up to 6,000 linear feet of new pipelines to deliver MICUP water to these recharge basins. Construction of recharge basins and pipelines would not involve the modification or demolition of buildings, structures, or other built environment features over 45 years of age, or their immediate surroundings. Therefore**,** no impact to built environment historic resources would occur due to construction of MICUP components within the City of Stockton.

Operation

All Districts

Given that impacts to historical resources occur during construction, there would be no operational impact related to historical resources.

Mitigation Measures

The following mitigation measure is required for construction activities associated with project components for NSJWCD and SEWD.

CR-1 Prepare Historical Resources Evaluation Prior to Approval of Projects Involving Structures 45 years or Older and Implement Mitigation Prior to and During Construction

Prior to construction activities that would modify an existing facility that is 45 years or older, the following steps shall be undertaken:

- Prior to proceeding with the historical resources evaluation (HRE) described below, a qualified architectural historian or historian (who meets the Secretary of the Interior's Professional Qualifications Standards in architectural history and/or history as defined in Code of Federal Regulations, Title 36, Part 61) shall conduct a review of the applicable registers of historical resource to determine the presence of qualifying resources within a proposed project component site and its immediate surroundings and to confirm that its condition is consistent with that presented in associated designation documentation. This effort, which may include a field survey, shall be documented in a report (that may be combined with the report described in the third bullet below as necessary and appropriate) that shall be submitted to the applicable Partner Agency for review and approval prior to initiation of a project component.

- Based on guidance provided by the California Office of Historic Preservation (OHP), not all built environment resources merit recordation. Therefore, the professional judgement of an architectural historian (that meets the Secretary of the Interior's Professional Qualification Standards (SOI PQS) in architectural history or history as defined in Code of Federal Regulations, Title 36, Part 61) shall be relied upon to determine if built environment resources with potential significance requiring recordation are present within a given project component site or its immediate surroundings. If a project component site or property in its immediate surroundings includes a building, structure, or other built environment feature that is 45 years of age or older that merits recordation and has the potential to be significantly impacted by the project, the applicable Parter Agency shall prepare a HRE for the property containing said building, structure, or feature. The evaluation shall consider the eligibility of the feature for listing in the National Register of Historic Places and California Register of Historical Resources, in addition to any applicable local register of historical resources.
- The HRE shall be prepared by a SOI PQS architectural historian or historian. The HRE shall include an intensive-level evaluation prepared in accordance with the guidelines and best practices promulgated by the California OHP. The building, structure or other built environment feature shall be evaluated within an appropriate historic context and documented in a report that meets the California OHP guidelines. All evaluated resources shall be documented on California Department of Parks and Recreation Series 523 Forms (DPR forms) in accordance with the guidance included in the California Office of Historic Preservation's *instruction for Recording Historical Resources* The report with attached DPR forms shall be submitted to the applicable Partner Agency for review and approval prior to proceeding with construction of the project component.
- If qualifying built environment historical resources with the potential to be significantly impacted by a proposed project component are identified within a proposed project component site or its immediate surroundings, efforts shall be made to ensure that impacts are mitigated. In such instances, the above-noted HRE report shall be amended or supplemented with a report that identifies the resource's character-defining features and recommends treatment methods for character-defining features. The report shall demonstrate how the proposed project component complies with the Secretary of the Interior's Standards for the Treatment of Historic Properties (SOI Standards) and avoids impacts to historical resources pursuant to CEQA. The report shall be submitted to the applicable Partner Agency for review and approval prior to proceeding with construction of the project.
- If built environment historical resources are identified and compliance with the SOI Standards is not possible, appropriate site-specific mitigation measures that reduce impacts to historical resources to the greatest extent feasible shall be established and undertaken. Mitigation measures may include, but would not be limited to, documentation of the historical resource in the form of a Historic American Building Survey (HABS) or Historic American Engineering Record (HAER) report that complies with the Secretary of the Interior's Standards for Architectural and Engineering Documentation, or development of an interpretative display that relates the history and significance of the resource to the public.

Level of Significance

Significant and Unavoidable

Archaeological Resources

Significance Criterion b:	Would the proposed project cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?

Impact CR-2 IMPLEMENTATION OF THE PROPOSED PROJECT HAS THE POTENTIAL TO RESULT IN SIGNIFICANT IMPACTS DUE TO CONSTRUCTION OF WATER INFRASTRUCTURE THAT COULD CAUSE A SUBSTANTIAL ADVERSE CHANGE IN THE SIGNIFICANCE OF AN ARCHAEOLOGICAL RESOURCE, INCLUDING THOSE THAT QUALIFY AS HISTORICAL RESOURCES. THIS IMPACT WOULD BE SIGNIFICANT AND UNAVOIDABLE EVEN WITH MITIGATION.

Construction

Archaeological resources are known to exist within the Place of Use. As such, known and potential archaeological resources may be encountered during construction of proposed MICUP components. Construction activities involving ground disturbance have the potential to impact archaeological resources that may be considered historical and/or unique archaeological resources. Project components that may impact previously undisturbed areas during construction could adversely impact archaeological resources by exposing them to potential vandalism or causing displacement from the original context and integrity. Archaeological impact discussions are presented below for the three Partner Agencies involved in the proposed project.

North San Joaquin Water Conservation District

Under the proposed project, the NSJWCD would increase the capacity of its North and South Systems, expand use of existing privately owned and operated pumps, construct new recharge basins and Flood-MAR facilities, construct aquifer storage and recovery (ASR) wells from a new turnout along the Mokelumne Aqueduct, and systematically replace existing aging pipelines. In support of the proposed project, ground disturbance may occur through the modification of existing infrastructure and the construction of new infrastructure. There are no specific archaeological resources within the known footprint of the proposed NSJWCD MICUP components described above. However, both known and unknown archaeological resources may occur throughout the NSJWCD's service area.

Given that the proposed new NSJWCD ASR wells (20 total) and up to 189,000 linear feet of new pipeline would involve ground disturbance with well construction areas of up to three acres and pipeline construction depths of up to 15 feet, it is possible that impacts to archaeological resources qualifying as historical resources or unique archaeological resources could occur. A proposed project which resulted in the destruction of or damage to an archaeological resource qualifying as a historical resource would have the potential to materially impair the resource and result in a significant impact on the environment pursuant to Section 16064.5(b) of the CEQA Guidelines. Impacts associated with the proposed project would be potentially significant because implementation of the proposed project could result in the substantial adverse change of archaeological resources that may qualify as historical resources pursuant to CEQA.

Implementation of Mitigation Measure CR-2 would reduce impacts related to archaeological resources by identifying and evaluating significant archaeological resources and managing their treatment as applicable. Nonetheless, even with implementation of Mitigation Measure CR-2, archaeological resources could be damaged by future infrastructure development that would be carried out under the proposed project. While the appropriate final disposition of resources and the

preparation of a mitigation plan upon inadvertent discovery reduce impacts to the greatest extent feasible, the potential remains for archaeological resources to be damaged or destroyed as a result of project construction. Therefore, NSJWCD construction impacts related to archeological resources would be significant and unavoidable.

Stockton East Water District

Under the proposed project, the SEWD would install a new turnout on the Mokelumne Aqueduct to enable implementation of the West Linden and Mosher Creek recharge/Flood-MAR areas and associated dry wells, construct additional ASR wells south of the aqueduct, and construct several pipelines to convey water from the Mokelumne Aqueduct. There are no specific archaeological resources within the known footprint of the SEWD MICUP components. However, research conducted in support of this EIR indicates both known and unknown archaeological resources may occur throughout the SEWD service area.

Given that the proposed new SEWD dry wells and ASR wells and up to 95,000 linear feet of new pipeline would involve ground disturbance with well construction areas of up to three acres and pipeline construction depths of up to 15 feet, it is possible that impacts to archaeological resources qualifying as historical resources or unique archaeological resources could occur. A proposed project which resulted in the destruction or damage to an archaeological resource qualifying as a historical resource would have the potential to materially impair the resource and result in a significant impact on the environment pursuant to Section 16064.5(b) of the CEQA Guidelines. Impacts associated with the proposed project would be potentially significant because implementation of the proposed project could result in the substantial adverse change of archaeological resources that may qualify as historical resources pursuant to CEQA.

Implementation of Mitigation Measure CR-2 would reduce impacts related to archaeological resources by identifying and evaluating significant archaeological resources and managing their treatment as applicable. Nonetheless, even with implementation of Mitigation Measure CR-2, archaeological resources could be damaged by future infrastructure development that would be carried out under the proposed project. While the appropriate final disposition of resources and the preparation of a mitigation plan upon inadvertent discovery reduce impacts to the greatest extent feasible, the potential remains for archaeological resources to be damaged or destroyed because of project construction. Therefore, SEWD construction impacts related to archeological resources would be significant and unavoidable.

City of Stockton

Under the proposed project, the City of Stockton would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at its existing DWTP. Recharge basins and dry wells proposed under the proposed project would be built onsite at the DWTP. Additional offsite recharge basins and pipelines would also be built as part of the MICUP project components for the City. In support of the proposed project, ground disturbance would occur as part of the construction of the new recharge basins, pipelines, and dry wells. No specific archaeological resources were identified within the known footprint of the projects described above. However, research conducted in support of this EIR indicates both known and unknown archaeological resources may occur throughout the City of Stockton's service area.

Given that the proposed new City of Stockton recharge basins, pipelines, and dry wells would involve major ground disturbance, it is possible that impacts to archaeological resources qualifying as historical resources or unique archaeological resources could occur. A proposed project which

resulted in the destruction or damage to an archaeological resource qualifying as a historical resource would have the potential to materially impair the resource and result in a significant impact on the environment pursuant to Section 16064.5(b) of the CEQA Guidelines. Impacts associated with the proposed project would be potentially significant because implementation of the proposed project could result in the substantial adverse change of archaeological resources that may qualify as historical resources pursuant to CEQA.

Implementation of Mitigation Measure CR-2 would reduce impacts related to archaeological resources by identifying and evaluating significant archaeological resources and managing their treatment as applicable. Nonetheless, even with implementation of Mitigation Measure CR-2, archaeological resources could be damaged by future infrastructure development that would be carried out under the proposed project. While the appropriate final disposition of resources and the preparation of a mitigation plan upon inadvertent discovery reduce impacts to the greatest extent feasible, the potential remains for archaeological resources to be damaged or destroyed as a result of project construction. Therefore, City construction impacts related to archeological resources would be significant and unavoidable.

Operation

All Districts

Given that potential impacts to archaeological resources would occur during construction, there would be no operational impact related to archaeological resources.

Mitigation Measures

The following mitigation measures are required for construction activities associated with project components and would be required for MICUP components that have the potential to damage, destroy, or alter an archaeological resource.

CR-2 Prepare Archaeological Resources Assessment Prior to Project Approval and Implement Mitigation Prior to and During Construction

Prior to approval of a project component that involves ground disturbance activities, the implementing agency shall prepare an archaeological resources assessment under the supervision of an archaeologist that meets the Secretary of the Interior's Professional Qualification Standards in either prehistoric or historic archaeology (qualified archaeologist) as defined in Code of Federal Regulations, Title 36, Part 61).

- Archaeological Resources Assessments shall include a California Historical Resources Information System records search at the Central California Information Center (CCAIC) with a minimum 0.5-mile radius and a Sacred Lands File search maintained by the Native American Heritage Commission. The records searches will characterize the results of previous cultural resource surveys and disclose any cultural resources that have been recorded and/or evaluated in and around a project site. A Phase I pedestrian survey shall be undertaken at a project site to locate any surface cultural materials. A geoarchaeological review (examination of CHRIS and ethnographic data, historical, geological, and soil maps, aerial imagery, geotechnical reports) shall be conducted to assess the potential for the project to encounter unknown archaeological resources during construction. A qualified archaeologist shall identify known archaeological resources and classify the project site as having high, medium, or low sensitivity for unknown archaeological resources. The assessment shall also include recommendations for additional

studies and/or mitigation, as necessary, such as monitoring during construction-related ground disturbance. Construction monitoring shall be recommended when archaeological resources are present and/or the assessment identifies a high likelihood of archaeological resources being present.

- If the CHRIS search or Phase I archaeological survey identifies resources that may be affected by a project, the archaeological resources assessment shall also include Phase II testing and evaluation. If resources are determined significant (i.e., eligible for the CRHR and/or NRHP) or unique the City shall first consider whether avoidance and preservation in place is feasible. and If resource avoidance and preservation in place is not possible, appropriate site-specific mitigation measures shall be identified in the Phase II evaluation.
- For archaeological resources found eligible under CRHR Criterion 4/NRHP Criterion D (data potential) that cannot be avoided and will be impacted by the project, mitigation shall include, but would not be limited to, a Phase III data recovery program. The data recovery program shall make provisions for adequately recovering the scientifically consequential information from and about the resource. For archaeological resources that are found eligible under CRHR Criteria 1/NRHP Criteria A (events), 2/B (persons), and/or 3/C (design/craftsmanship) that cannot be avoided and will be impacted by the project, other appropriate mitigation shall be determined by a qualified archaeologist in consultation with the implementing agency and, if the resource is of indigenous origin, local interested Tribes. Mitigation may include but would not be limited to development of interpretive or educational materials or preservation of all or portions of the archaeological site.
- Final disposition of any recovered artifacts or samples, which could include but would not be limited to curation or onsite reburial, shall occur as specified by the qualified archaeologist in consultation with the City and, if the resource is of indigenous origin, local interested Tribes. Artifacts and samples include material recovered from all phases of work, including the Phase I survey, Phase II testing, Phase III data recovery, and construction monitoring.

Level of Significance

Significant and Unavoidable

Disturbance of Human Remains

Significance Criterion c:	Would the proposed project disturb any human remains, including those interred outside of formal cemeteries?

Impact CR-3 THE DISCOVERY OF HUMAN REMAINS IS ALWAYS A POSSIBILITY DURING GROUND-DISTURBING ACTIVITIES. GROUND DISTURBANCE ASSOCIATED WITH IMPLEMENTATION OF THE PROPOSED PROJECT MAY DISTURB OR DAMAGE KNOWN OR UNKNOWN HUMAN REMAINS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT WITH ADHERENCE TO EXISTING REGULATIONS.

Construction

Human burials outside of formal cemeteries can occur in a variety of contexts including but not limited to archaeological contexts, outside of the boundaries of formal cemeteries, or in private family cemeteries. Excavations during construction activities could have the potential to disturb these resources that could include Native American burial sites, particularly in areas where ground disturbance has not already occurred or where excavation depths exceed those previously attained.

Therefore, human remains may be encountered as a result of implementation of the proposed project. Proposed MICUP components that may involve ground disturbance include, but are not limited to, the construction of new or expanded pump stations, pipeline improvements and extensions, and construction of new recharge facilities.

Human burials, in addition to being potential archaeological resources, have specific provisions for treatment in PRC Section 5097. The California Health and Safety Code (Section 7050.5, 7051, and 7054) has specific provisions for the protection of human burial remains. Existing regulations address the illegality of interfering with human burial remains, and protect them from disturbance, vandalism, or destruction. They also include established procedures to be implemented if Native American skeletal remains are discovered. PRC Section 5097.98 also addresses the disposition of Native American burials, protects such remains, and established the NAHC to resolve any related disputes.

All projects are subject to State of California Health and Safety Code Section 7050.5, which states that, if human remains are unearthed, no further disturbance can occur until the county coroner has made the necessary findings as to the origin and disposition of the remains pursuant to the PRC Section 5097.98. If the remains are determined to be of Native American descent, the coroner has 24 hours to notify the NAHC, which will determine and notify a most likely descendant (MLD). The MLD shall complete the inspection of the site and make recommendations to the landowner within 48 hours of being granted access.

Human remains impact discussions are presented below for the three Partner Agencies involved in the proposed project.

North San Joaquin Water Conservation District

Under the proposed project, the NSJWCD would increase the capacity of its North and South Systems, expand use of existing privately owned and operated pumps, construct new recharge basins and Flood-MAR facilities, construct aquifer storage and recovery (ASR) wells from a new turnout along the Mokelumne Aqueduct, and systematically replace existing aging pipelines. Ground disturbance associated with construction of these NSJWCD project components has the potential to encounter human remains, which would be a potentially significant impact. However, with adherence to PRC Section 5097 and California Health and Safety Code Sections 7050.5, 7051, and 7054, NSJWCD construction impacts related to disturbance of human remains would be less than significant.

Stockton East Water District

Under the proposed project, the SEWD would install a new turnout on the Mokelumne Aqueduct to enable implementation of the West Linden and Mosher Creek recharge/Flood-MAR areas and associated dry wells, construct additional ASR wells south of the aqueduct, and construct several pipelines to convey water from the Mokelumne Aqueduct. Ground disturbance associated with construction of these SEWD project components has the potential to encounter human remains, which would be a potentially significant impact. However, with adherence to PRC Section 5097 and California Health and Safety Code Sections 7050.5, 7051, and 7054, SEWD construction impacts related to disturbance of human remains would be less than significant.

City of Stockton

Under the proposed project, the City of Stockton would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at its existing DWTP. Recharge basins and dry wells proposed under the proposed project would be built onsite at the DWTP. Ground disturbance associated with construction of these City of Stockton project components, as well as additional recharge basins and pipelines, has the potential to encounter human remains, which would be a potentially significant impact. However, with adherence to PRC Section 5097 and California Health and Safety Code Sections 7050.5, 7051, and 7054, City of Stockton construction impacts related to disturbance of human remains would be less than significant.

Operation

All Districts

Given that potential impacts to human remains would occur during construction, there would be no operational impact related to human remains.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

Tribal Cultural Resources

Significance Criterion d:	Would the proposed project cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code Section 21074 that is either 1) listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k) or 2) a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1?

Impact CR-4 IMPLEMENTATION OF THE PROPOSED PROJECT WOULD NOT IMPACT TRIBAL CULTURAL RESOURCES. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

San Joaquin County sent letters via certified mail to Native American tribal contacts identified by the NAHC as being traditionally and culturally affiliated with the Place of Use notifying the tribes of the project and inviting them to consult under AB 52. No tribes responded to the letters and no tribal cultural resources were identified in the Place of Use. Therefore, impacts to tribal cultural resources would be less than significant.

Tribal cultural resource impact discussions are presented below for the three Partner Agencies involved in the proposed project.

North San Joaquin Water Conservation District

Under the proposed project, the NSJWCD would increase the capacity of its North and South Systems, expand use of existing privately owned and operated pumps, construct aquifer storage and recovery (ASR) wells throughout its service area, and systematically replace existing aging pipelines. These construction activities would include ground disturbance through the modification of existing infrastructure and the construction of new infrastructure, and introduction of new elements that may be inconsistent with the existing setting. AB 52 consultation conducted for the proposed project did not identify tribal cultural resources within the NSJWCD project components.

Tribal cultural resources impacts associated with construction of the NSJWCD project components would be less than significant.

Stockton East Water District

Under the proposed project, the SEWD would construct additional ASR wells throughout the district, install a new turnout on the Mokelumne Aqueduct to enable implementation of the West Linden project component, construct two large-scale recharge basins and associated dry wells, and construct several pipelines to convey water from the Mokelumne Aqueduct. In support of the proposed project, existing infrastructure would be modified, and new infrastructure would be constructed, resulting in ground disturbance, and introduction of new elements that may be inconsistent with the existing setting. AB 52 consultation conducted for the proposed project did not identify tribal cultural resources within the SEWD project components.

Tribal cultural resources impacts associated with construction of the SEWD project components would be less than significant.

City of Stockton

Under the proposed project, the City of Stockton would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at its existing DWTP. Additional offsite recharge basins and pipelines also would be built under the proposed project. Ground disturbance would occur as part of construction of the new recharge basins, dry wells and pipelines. AB 52 consultation conducted for the proposed project did not identify tribal cultural resources within the City of Stockton project components.

Tribal cultural resources impacts associated with construction of the City of Stockton project components would be less than significant.

Operation

All Districts

Given that impacts to tribal cultural resources occur during construction, there would be no operational impacts related to tribal cultural resources.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

4.5.5 Cumulative Impacts

The geographic scope of the cumulative cultural and tribal cultural resources analysis is the Place of Use and adjacent areas. The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects identified in Table 4-1 of Section 4, Environmental Setting and located in unincorporated San Joaquin County, City of Stockton, and City of Lodi. The general approach to cumulative impact analysis used in this EIR is discussed in Section 4, Environmental Setting.

Built Environment Historical Resources

The combination of the proposed project as well as other relevant projects and programs, plans and larger scale projects could potentially involve the cumulative demolition or alteration of historical resources. Even though various cumulative projects could require the reduction of impacts to built environment historical resources to the maximum extent feasible, cumulative development could nonetheless cause the loss of built environment historical resources. This would represent a significant cumulative impact.

The proposed project would result in significant and unavoidable impacts even with implementation of Mitigation Measure CR-1. As such, the incremental effect of implementation of the proposed project would be cumulatively considerable. Therefore, the cumulative impact related to historical resources would be significant and unavoidable.

Archaeological Resources

Projects facilitated by the proposed project in conjunction with other nearby past, present and reasonably foreseeable future projects could involve the cumulative disturbance of areas that may contain archaeological resources. Even though various cumulative projects could require the reduction of impacts to archaeological resources to the maximum extent feasible, cumulative development could nonetheless cause the loss of archaeological resources that qualify as historical resources or unique archaeological resources. Cumulative destruction, damage, or alteration of archaeological resources that qualify as historical resources or unique archaeological resources remains a possibility throughout the Place of Use and immediate surroundings. This would represent a significant cumulative impact.

The proposed project would result in significant and unavoidable impacts even with implementation of Mitigation Measure CR-2. As such, the incremental effect of implementation of the proposed project would be cumulatively considerable. Therefore, the cumulative impact related to archaeological resources would be significant and unavoidable.

Human Remains

Projects facilitated by the proposed project in conjunction with other nearby past, present and reasonably foreseeable future projects could potentially disturb areas that may contain previous unknown human remains. While there is the potential for significant cumulative impacts to human remains, it is anticipated that potential impacts associated with individual cumulative projects would be addressed on a case-by-case basis and would be subject to local and State regulations regarding the treatment of human remains. Therefore, with compliance with State regulations and the applicable local policies, the cumulative impact related to human remains would be less than significant.

Tribal Cultural Resources

Projects facilitated by the proposed project in conjunction with other nearby past, present and reasonably foreseeable future projects could involve the cumulative disturbance of areas that may contain tribal cultural resources. While there is the potential for significant cumulative impacts to tribal cultural resources, it is anticipated that potential impacts associated with individual cumulative projects would be addressed on a case-by-case basis and would be subject to State regulations regarding the treatment of tribal cultural resources. Therefore, with compliance with State regulations, the cumulative impact related to tribal cultural resources would be less than significant.

Overall Level of Cumulative Significance

Significant and Unavoidable

4.6 Geology and Soils

4.6.1 Introduction

This section addresses the geology, soils, and paleontological resources impacts associated with construction and operation of the proposed project. This section includes: a description of the existing geology, soils, and paleontological resource conditions within the project area (defined as the Place of Use that also encompasses the three Partner Agency areas); a summary of applicable regulations related to geology and soil hazards and paleontological resources; an evaluation of the potential impacts of the proposed project related to the geologic and soil conditions and the paleontological resources within the project area and in the surrounding area; and an evaluation of cumulative impacts.

Information in this section is based on the San Joaquin County[1] and City of Stockton[2] General Plans and their respective General Plan environmental impact reports,[3] [4] the United States Geological Survey (USGS) National Geologic Map, the California Geological Survey (CGS)[5], the University of California Museum of Paleontology (UCMP), the Paleobiology Database (PBD), and primary scientific literature.

4.6.2 Environmental Setting

Geologic Setting

San Joaquin County

San Joaquin County lies within the region of California referred to as the Great Valley geomorphic province.[6, 7] The Great Valley geomorphic province is a long alluvial plain about 50 miles wide and approximately 400 miles long running through central California. The Great Valley can be further divided into the northern portion (the Sacramento Valley) and the southern portion (the San Joaquin Valley). The valleys were created as a result of the uplift of the two mountain ranges that flank them, the Coast Ranges to the west and the Sierra Nevada mountain range to the east. Prior to the creation of these mountain ranges, the Great Valley was dominated by marine deposition that changed once the seas withdrew and new sediments were being deposited throughout the San Joaquin and Sacramento Valleys. The project area is located within the San Joaquin Valley portion of the geomorphic province. The San Joaquin Valley is drained by the San Joaquin River.[8, 9]

[1] San Joaquin County. 2016. San Joaquin County General Plan. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed December 30, 2024.
[2] City of Stockton. 2018. Envision Stockton 2040 General Plan. Available: https://www.stocktonca.gov/business/planning___engineering/general_plan.php#collapse1910b1. Accessed December 30, 2024.
[3] San Joaquin County. 2016. San Joaquin County General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed December 30, 2024.
[4] City of Stockton. 2018b. Envision Stockton 2040 General Plan Update and Utility Master Plan Supplements Draft EIR. Available: https://www.stocktonca.gov/business/planning___engineering/general_plan.php#collapse1910b1. Accessed December 30, 2024.
[5] California Geological Survey. 2002. California Geomorphic Provinces. 2002.
[6] A geomorphic province is an area that possesses similar bedrock, structure, history, and age. California has 11 geomorphic provinces (CGS 2002).
[7] California Geological Survey . 2002. California Geomorphic Provinces. Note 36. Available: https://www.conservation.ca.gov/cgs/documents/publications/cgs-notes/CGS-Note-36.pdf. Accessed December 23, 2024.
[8] San Joaquin County. 2016. San Joaquin County General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed December 30, 2024.
[9] City of Stockton. 2018b. Envision Stockton 2040 General Plan Update and Utility Master Plan Supplements Draft EIR. Available: https://www.stocktonca.gov/business/planning___engineering/general_plan.php#collapse1910b1. Accessed December 30, 2024.

Surface geology in the project areas is Pliocene to Holocene in age (Figure 4.6-1 and Figure 4.6-2, Table 4.6-1). Current geologic mapping at a scale of 1:100,000[10] classifies surface deposits within the project areas as Quaternary [Holocene] alluvium (Qha), Quaternary alluvium (Qa), Quaternary dune sand (Qds), Modesto Formation (Qm), Riverbank Formation (Qr), Turlock Lake Formation (Qtl), and Laguna Formation (Pl). These geologic unit are all alluvial (i.e., river or stream) in origin. Mapping unit abbreviations, descriptions, and chronometric age assignments are shown in Table 4.6-1.[11][12]Additional geologic mapping that covers the southern portion of the Place of Use, but falls outside the district project areas, is also shown on Figure 4.6-1and Figure 4.6-2[13][14][15].

Table 4.6-1 Summary of Geologic Mapping Units in the Project Area

Mapping Unit	Age/Unit Category[1]	Description	Project Location (by District)
Quaternary [Holocene] alluvium (Qha)	Holocene	Alluvium on fans, terraces, basins	North San Joaquin Water Conservation District; Stockton East Water District;
Quaternary alluvium (Qa)	Latest Pleistocene to Holocene	Unweathered, undivided alluvium	North San Joaquin Water Conservation District
Quaternary dune sand (Qds)	Latest Pleistocene to Holocene	Well-sorted, fine- to medium-grained eolian sand	North San Joaquin Water Conservation District;
Modesto Formation, Upper Member, undivided alluvium (Qm2)	Late Pleistocene	Upper member, undivided alluvium	City of Stockton; North San Joaquin Water Conservation District; Stockton East Water District
Modesto Formation, Upper Member, fine-grained (Qm2b)	Late Pleistocene	Upper member, fine-grained	North San Joaquin Water Conservation District
Modesto Formation, Lower Member, undivided alluvium (Qm1)	Late Pleistocene	Lower member, undivided alluvium	North San Joaquin Water Conservation District
Modesto Formation, Lower Member, fine-grained (Qm1b)	Late Pleistocene	Lower member, fine-grained	Stockton East Water District; Woodbridge Irrigation District
Riverbank Formation, Undivided (Qr)	Middle/Late Pleistocene	Undivided, arkosic alluvium	North San Joaquin Water Conservation District
Riverbank Formation, Upper Unit (Qr3)	Middle/Late Pleistocene	Upper Unit, arkosic alluvium	North San Joaquin Water Conservation District; Stockton East Water District
Riverbank Formation, Middle Unit (Qr2)	Middle/Late Pleistocene	Middle Unit, arkosic alluvium	North San Joaquin Water Conservation District; Stockton East Water District
Riverbank Formation, Lower Unit (Qr1)	Middle/Late Pleistocene	Lower Unit, arkosic alluvium	North San Joaquin Water Conservation District
Turlock Lake Formation (Qtl)	Early Pleistocene	arkosic alluvium	North San Joaquin Water Conservation District; Stockton East Water District

[10] Dawson. 2009. *Preliminary Geologic Map of the Lodi 30'x60' Quadrangle, California.*
[11] *Ibid*
[12] Meyer and Rosenthal. 2008. *A Geoarchaeological Overview and Assessment of Caltrans District 3.* April 2008.
[13] Delattre et al. 2023. *Geologic and Geophysical Maps of the Stockton 30' x 60' Quadrangle, California*. 2023.
[14] Gutierrez and Holland. 2018. *Preliminary Geologic Map of the Valley Springs SW 7.5' Quadrangle, Calaveras, San Joaquin, and Stanislaus Counties, California*. 2018.
[15] Wills et al. 2022. *Preliminary Geologic Map of the Oakdale 30' x 60' Quadrangle, California*. 2022.

Mapping Unit	Age/Unit Category[1]	Description	Project Location (by District)
Laguna Formation (Pl)	Pliocene	Cobble gravel, sand, and silt	North San Joaquin Water Conservation District

Notes: Mapping units and descriptions from Dawson (2009[16]).

[1]Age/Unit Categories use those by Meyer and Rosenthal (2008[17]), with updates, for Northern California and are defined, relative to international unit category and chronometric age standards in Table 4.6-2.

Each geologic mapping unit type identified within the project area is described below.

- **Quaternary [Holocene] alluvium (Qha).** These undivided, alluvial deposits are Holocene in age and occur as fans or terraces or in basins. They are composed of sand, gravel and silt and are poorly to moderately sorted.
- **Quaternary alluvium (Qa).** These undivided, alluvial deposits are latest Pleistocene to Holocene in age and occur as flat, relatively undissected fan, terrace, basin deposits, and in small, active streams.
- **Quaternary dune sand (Qds).** Dune sand deposits in this area are latest Pleistocene to Holocene in age and consist of very well-sorted, fine- to medium-grained eolian sand.
- **Modesto Formation (Qm).** The Modesto Formation is Late Pleistocene in age and comprises arkosic alluvium that form low terraces, high floodplains, and fans along the Cosumnes and Mokelumne Rivers. The Modesto Formation contains several members, distinguishable by sedimentology and topography. The Upper Member (Qm2) sits topographically higher than the Lower Member (Qm1). Within Qm2 are fine-grained facies (Qm2b) that occurs in flood basins, lower fans, and interdistributary fan areas. Within Qm1b are fine-grained facies with similar properties and distribution to Qm2b, albeit at lower topographic positions.
- **Riverbank Formation (Qr).** The Riverbank Formation is Middle to Late Pleistocene in age and comprises arkosic alluvium that forms terraces and fans along the Cosumnes and Mokelumne Rivers but at higher topographic positions than the Modesto Formation. The Riverbank Formation is divided into an Upper unit (Qr3), Middle unit (Qr2), and Lower unit (Qr1), that correspond to different terrace deposits and increase in age relative to increased topographic position (i.e., the oldest unit, Qr1occurs at higher elevations than the younger units).
- **Turlock Lake Formation (Qtl).** The Turlock Lake Formation is Early Pleistocene in age and comprises arkosic alluvium that forms terraces along the Mokelumne River.
- **Laguna Formation (Pl).** The Laguna Formation is Pliocene in age and consists of cobble gravel, sand, and minor silt alluvium originating from mixed metamorphic, granitic, and volcanic sources.

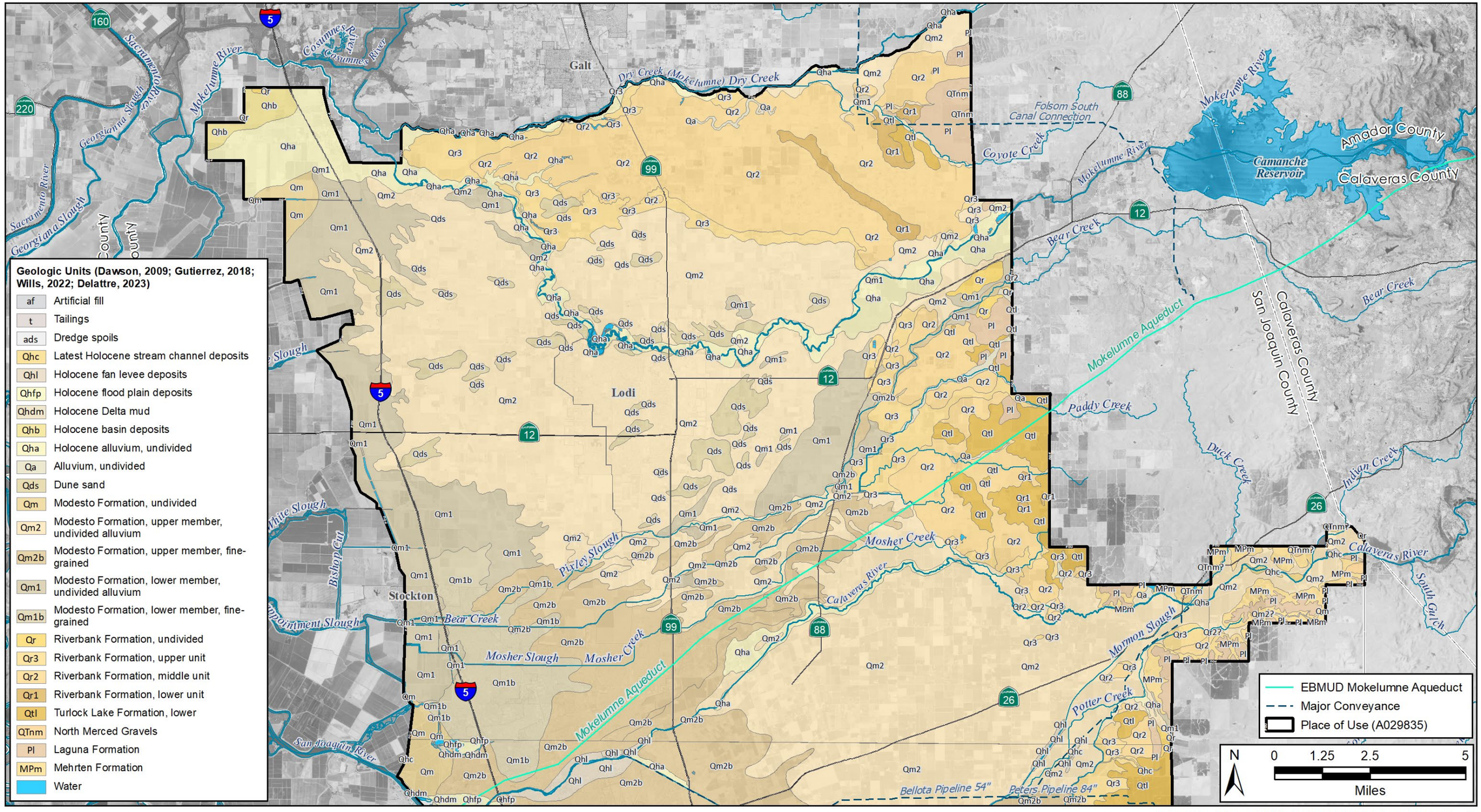
Table 4.6-2[18][19][20][21] uses internationally recognized chronostratigraphic categories (e.g., periods, epochs, and ages) that are supported by Global Stratotype Section and Point (GSSP) data ratified by the International Commission on Stratigraphy.[22][23]

[16] Dawson. 2009. *Preliminary Geologic Map of the Lodi 30'x60' Quadrangle, California.*
[17] Meyer and Rosenthal. 2008. *A Geoarchaeological Overview and Assessment of Caltrans District 3.* April 2008.
[18] Cohen et al. 2013. *The ICS International Chronostratigraphic Chart*. September 2013.
[19] Cohen et al. 2024. *International Chronostratigraphic Chart*. December 2024.
[20] Meyer and Rosenthal. 2008. *A Geoarchaeological Overview and Assessment of Caltrans District 3.* April 2008.
[21] Walker et al. 2018. *Formal ratification of the subdivision of the Holocene Series/Epoch (Quaternary System/Period): two new Global Boundary Stratotype Sections and Points (GSSPs) and three new stages/subseries*. September 30, 2018.
[22] *Ibid*
[23] *Ibid*

Table 4.6-2 Geologic Unit Categories

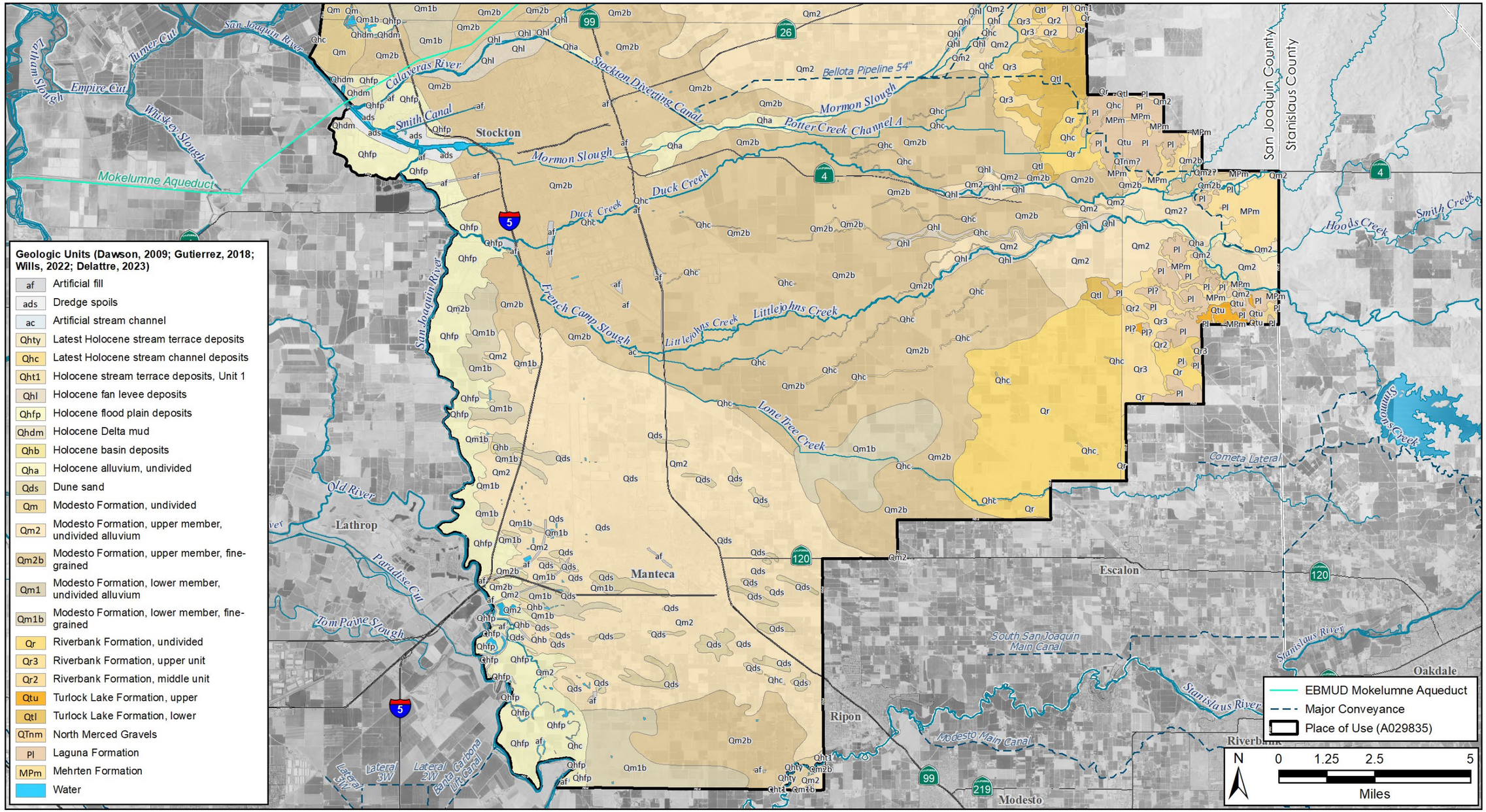
Geologic Unit Category	Internationally Accepted Geologic Unit Category Name	Internationally Accepted Chronometric Age Range
Pre-Pleistocene (> 2.58 Ma)	Pliocene and older	>2.58 Ma
Early Pleistocene (2.58 Ma to 22 ka)	Gelasian/Calabrian/Chibanian	2.58 Ma to 129 ka
Latest Pleistocene (22.0 to 11.7 ka)	Upper Pleistocene	129 ka to 11.7 ka
Early Holocene (11.7 to 7.0 ka)	Greenlandian	11.7 ka to 8236 ka
Middle Holocene (7.0 to 4.0 ka)	Northgrippian	8236 ka to 4250 ka
Late Holocene (4.0 ka to 150 cal BP)	Meghalayan	4250 ka to Present
Latest Holocene (2.0 ka to 150 cal BP)	Meghalayan	---
Historical to Modern (150 cal BP to present)	Meghalayan	---

Figure 4.6-1 Geologic Units within the Place of Use – North



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Figure 4.6-2 Geologic Units within the Place of Use – South



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Project Area

The following is a discussion of the geologic setting within each of the MICUP district project areas.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The NSJWCD area within the Place of Use is located within the San Joaquin Valley portion of the Great Valley geomorphic province. Surface geology in the NSJWCD area is Pliocene to Holocene in age (Figure 4.6-3 through Figure 4.6-6, Table 4.6-3). As shown in Table 4.6-3, current geologic mapping at a scale of 1:100,000[24] classifies surface deposits within the NSJWCD area as Quaternary [Holocene] alluvium (Qha), Quaternary alluvium (Qa), Quaternary dune sand (Qds), Modesto Formation (Qm), Riverbank Formation (Qr), Turlock Lake Formation (Qtl), and Laguna Formation (Pl). These geologic units are all alluvial (i.e., river or stream) and wind-blown (dune sand) in origin.

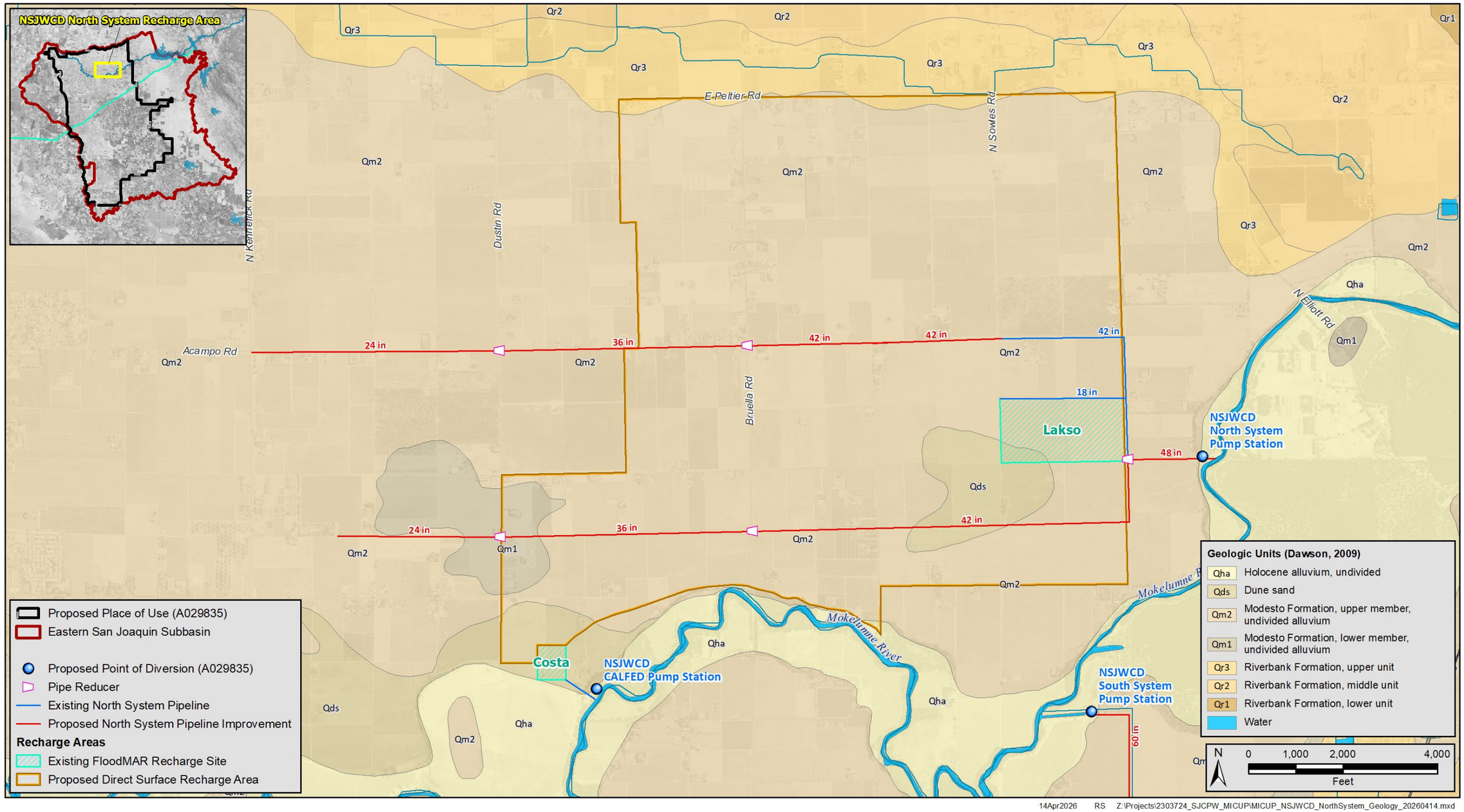
Table 4.6-3 Summary of Geologic Mapping Units in the North San Joaquin Water Conservation District

Mapping Unit	Age	Description
Quaternary [Holocene] alluvium (Qha)	Holocene	Alluvium on fans, terraces, basins
Quaternary alluvium (Qa)	Latest Pleistocene to Holocene	Unweathered, undivided alluvium
Quaternary dune sand (Qds)	Latest Pleistocene to Holocene	Well-sorted, fine- to medium-grained eolian sand
Modesto Formation, Upper Member, undivided alluvium (Qm2)	Late Pleistocene	Upper member, undivided alluvium
Modesto Formation, Upper Member, fine-grained (Qm2b)	Late Pleistocene	Upper member, fine-grained
Modesto Formation, Lower Member, undivided alluvium (Qm1)	Late Pleistocene	Lower member, undivided alluvium
Riverbank Formation, Undivided (Qr)	Middle/Late Pleistocene	Undivided, arkosic alluvium
Riverbank Formation, Upper Unit (Qr3)	Middle/Late Pleistocene	Upper Unit, arkosic alluvium
Riverbank Formation, Middle Unit (Qr2)	Middle/Late Pleistocene	Middle Unit, arkosic alluvium
Riverbank Formation, Lower Unit (Qr1)	Middle/Late Pleistocene	Lower Unit, arkosic alluvium
Turlock Lake Formation (Qtl)	Early Pleistocene	arkosic alluvium
Laguna Formation (Pl)	Pliocene	Cobble gravel, sand, and silt

[24] Dawson. 2009. *Preliminary Geologic Map of the Lodi 30'x60' Quadrangle, California.*

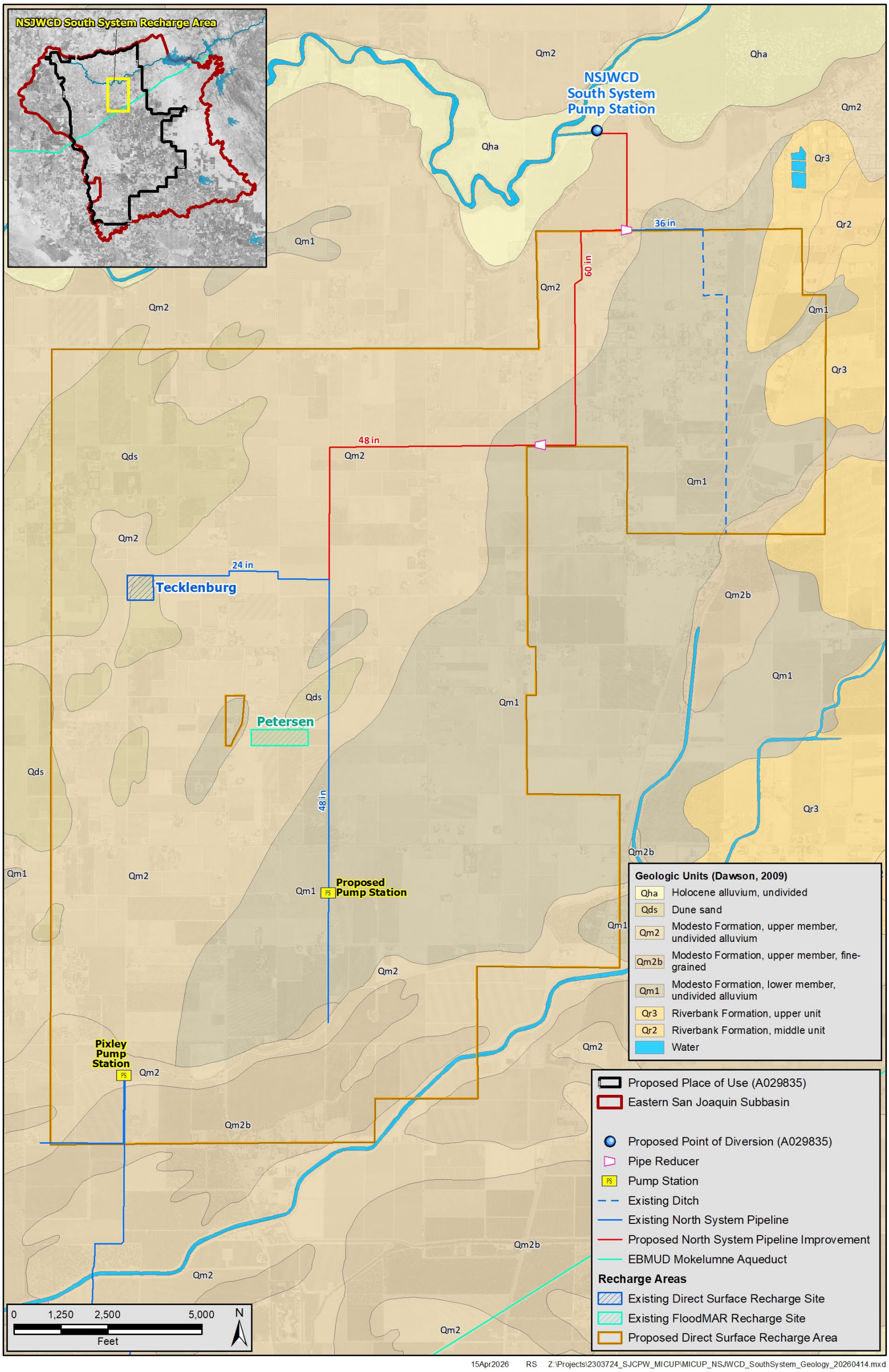
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Figure 4.6-3 Geologic Units within NSJWCD North System Recharge Area



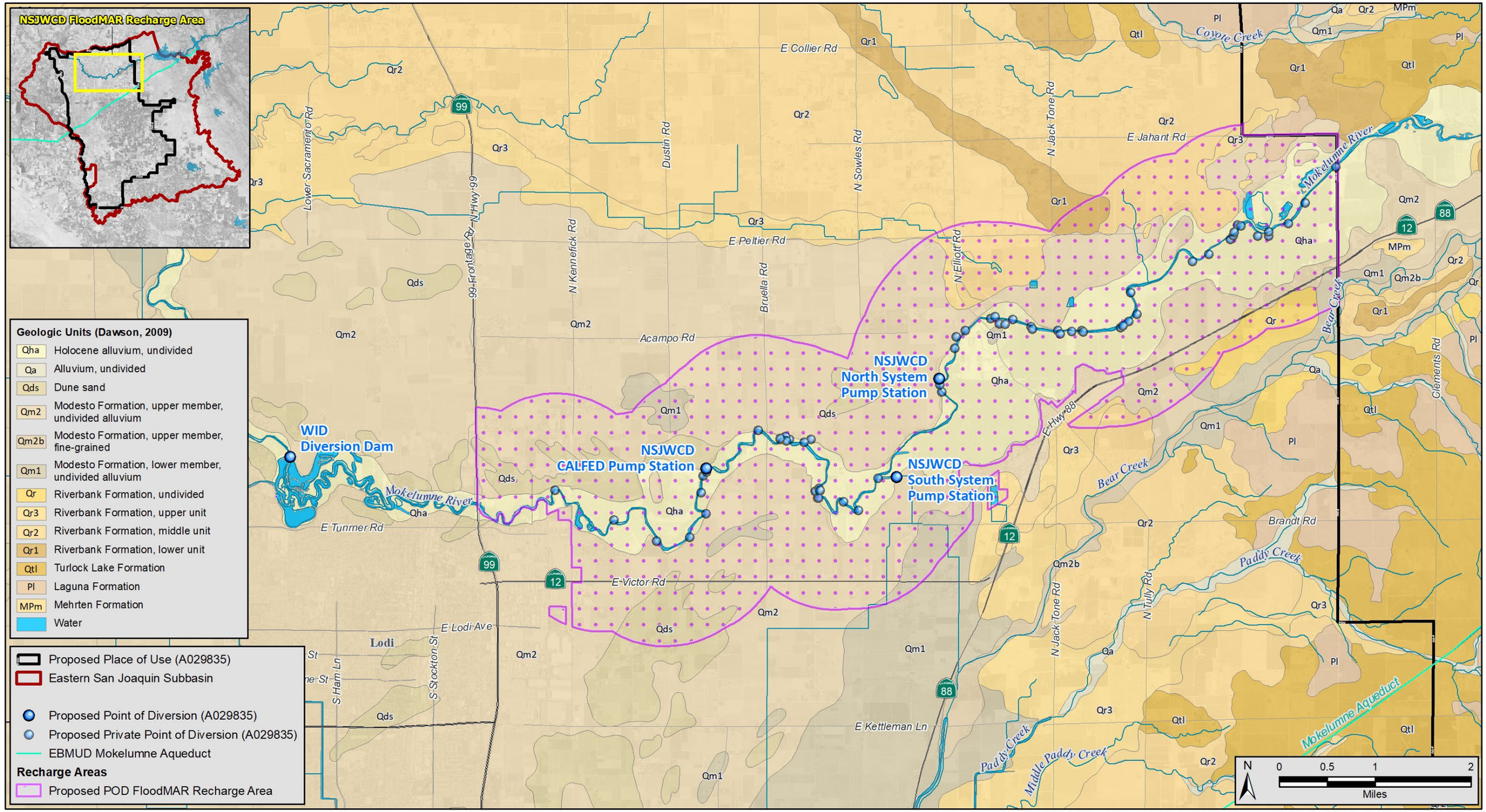
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Figure 4.6-4 Geologic Units within NSJWCD South System Recharge Area



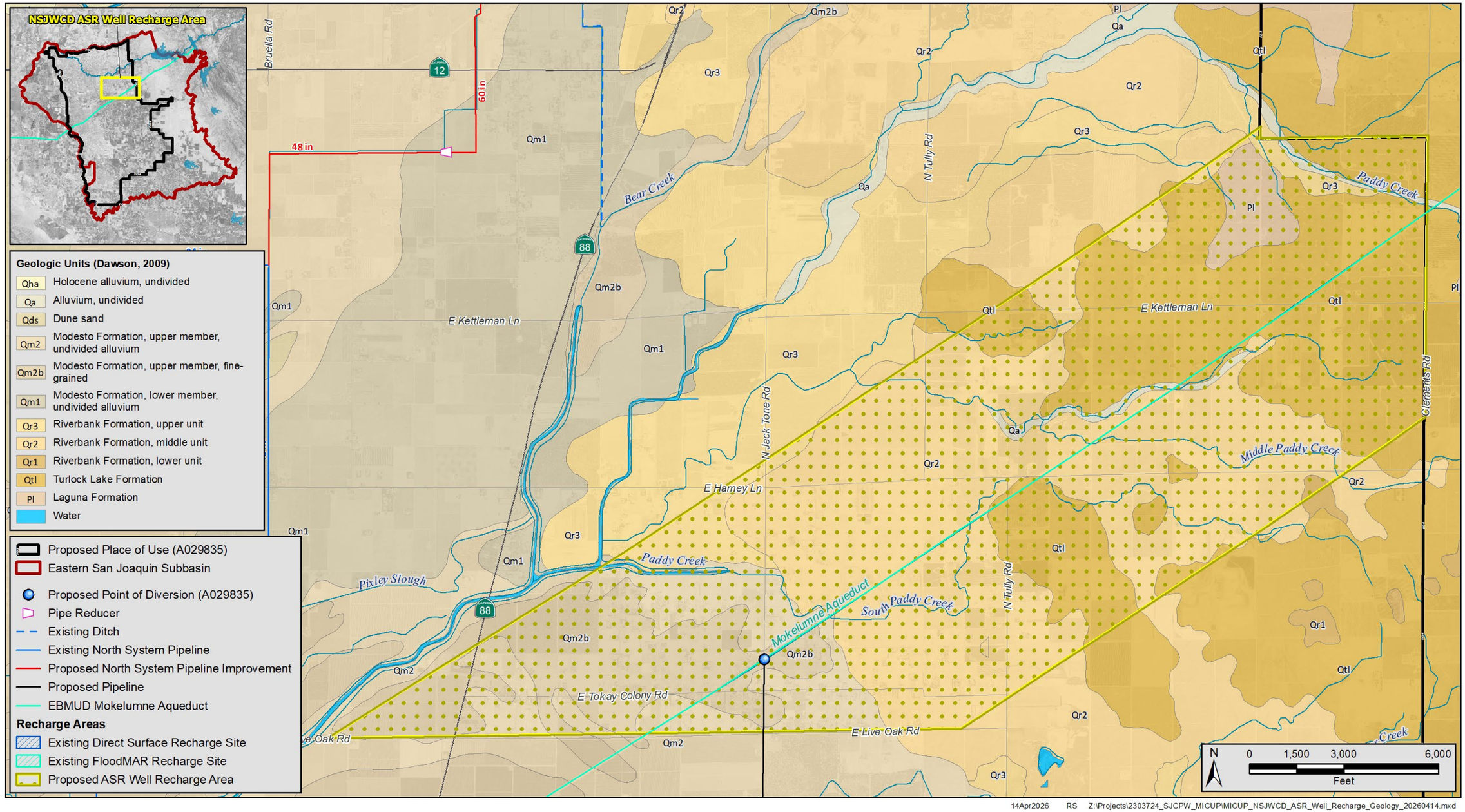
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Figure 4.6-5 Geologic Units within NSJWCD Flood-MAR Recharge Area



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Figure 4.6-6 Geologic Units within NSJWCD ASR Well Recharge Area



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STOCKTON EAST WATER DISTRICT

The SEWD area within the Place of Use is located within the San Joaquin Valley portion of the Great Valley geomorphic province. Surface geology in SEWD area is Pliocene to Holocene in age (Figure 4.6-7 and Table 4.6-4). As shown on Table 4.6-4, current geologic mapping at a scale of 1:100,000[25] classifies surface deposits within SEWD area as Quaternary [Holocene] alluvium (Qha), Quaternary alluvium (Qa), Quaternary dune sand (Qds), Modesto Formation (Qm), Riverbank Formation (Qr), Turlock Lake Formation (Qtl), and Laguna Formation (Pl). These geologic units are alluvial (i.e., river or stream) in origin.

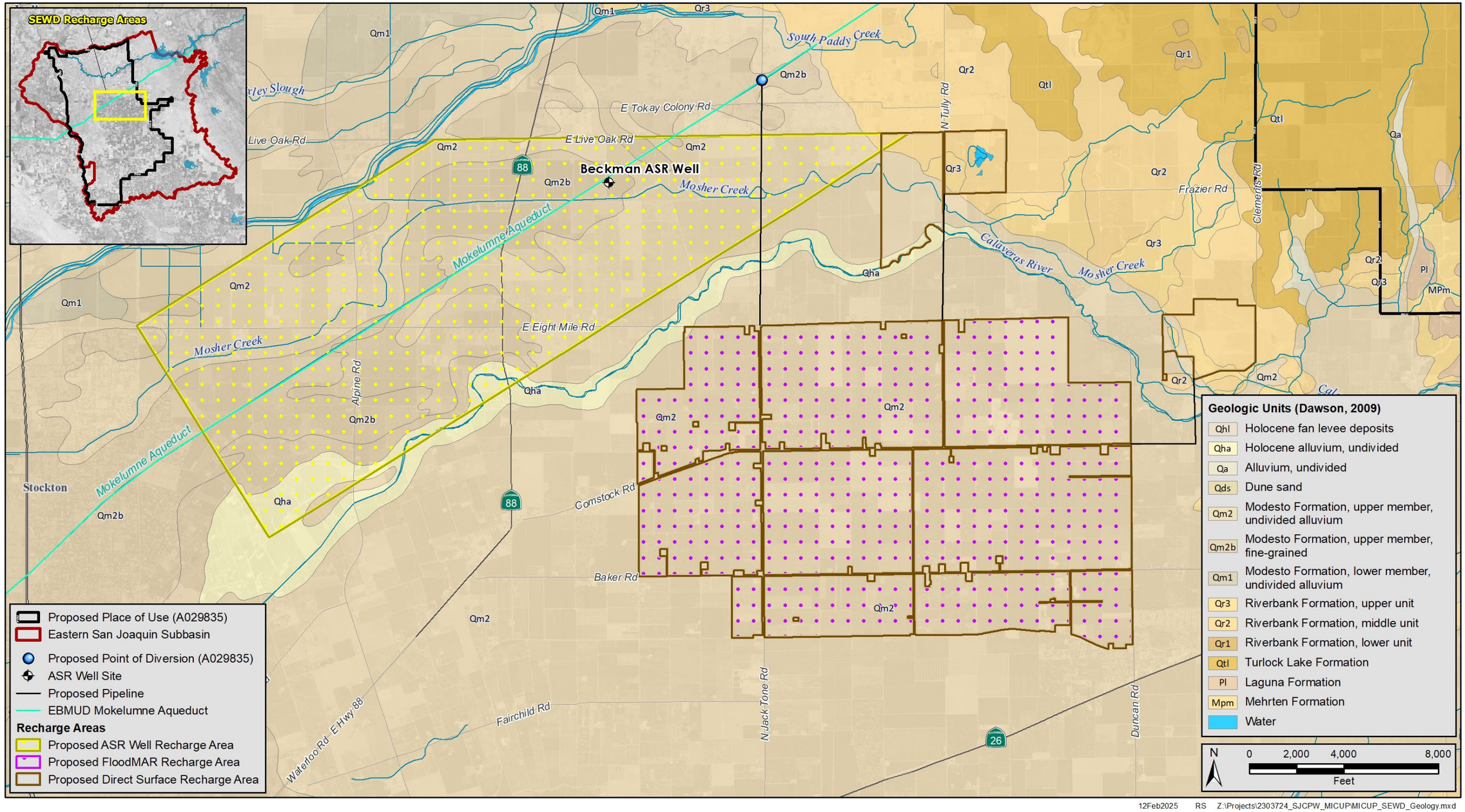
Table 4.6-4 Summary of Geologic Mapping Units in the Stockton East Water District

Mapping Unit	Age	Description
Holocene alluvium, undivided (Qha)	Holocene	Alluvium, undivided
Modesto Formation, Upper Member, undivided alluvium (Qm2)	Late Pleistocene	Upper member, undivided alluvium
Modesto Formation, Upper Member, fine-grained (Qm2b)	Late Pleistocene	Upper member, fine-grained
Riverbank Formation, Upper Unit (Qr3)	Middle/Late Pleistocene	Upper Unit, arkosic alluvium
Riverbank Formation, Middle Unit (Qr2)	Middle/Late Pleistocene	Middle Unit, arkosic alluvium

[25] Dawson. 2009. *Preliminary Geologic Map of the Lodi 30'x60' Quadrangle, California.*

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Figure 4.6-7 Geologic Units within SEWD Recharge Areas



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CITY OF STOCKTON

The City of Stockton area within the Place of Use is located within the San Joaquin Valley portion of the Great Valley geomorphic province. Surface geology in the City of Stockton area is Late Pleistocene in age (Figure 4.6-8, Table 4.6-5). As shown on Table 4.6-5, current geologic mapping at a scale of 1:100,000[26] classifies surface deposits within the City of Stockton area as the Modesto Formation (Qm), which is alluvial (i.e., river or stream) in origin.

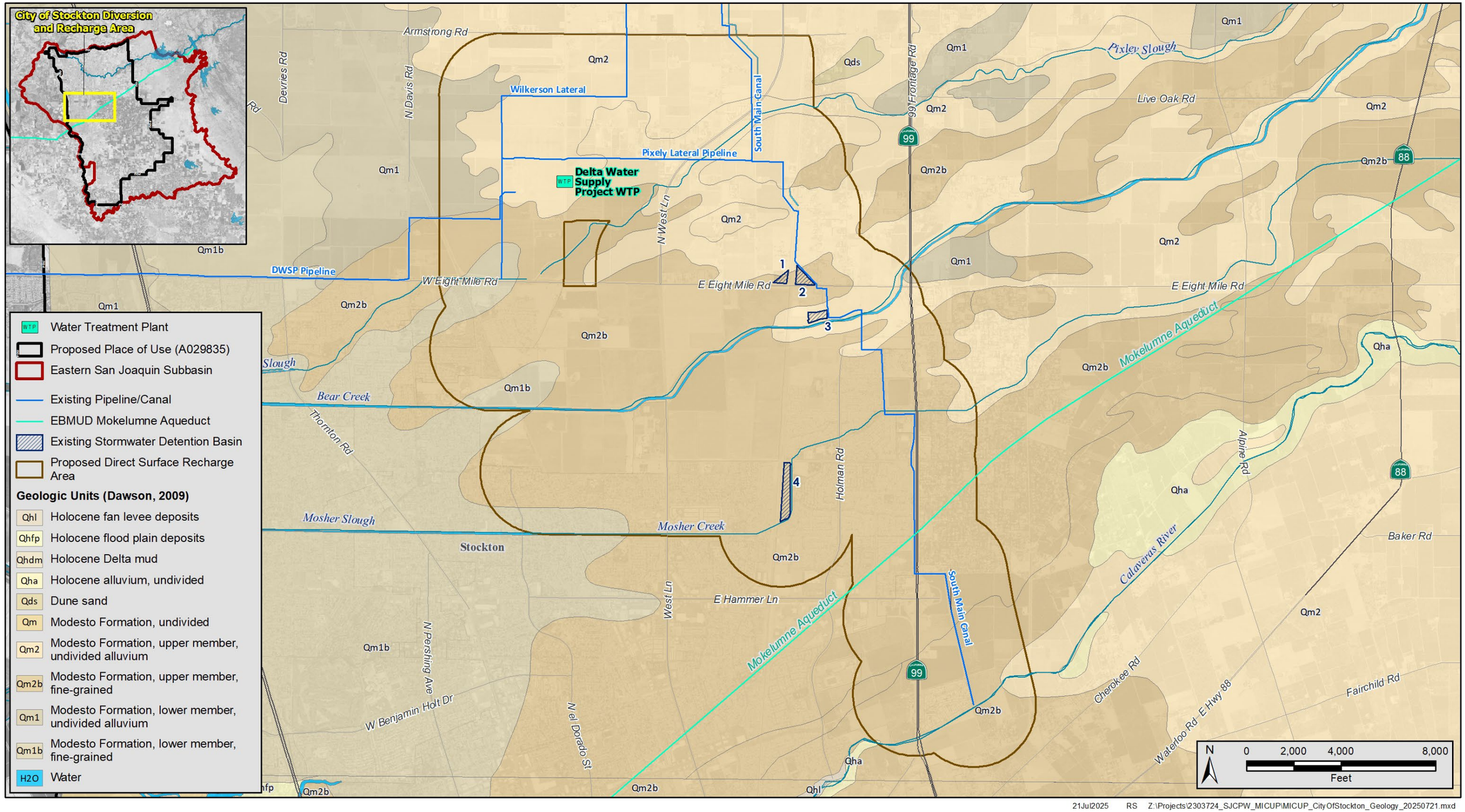
Table 4.6-5 Summary of Geologic Mapping Units in the City of Stockton

Mapping Unit	Age	Description
Modesto Formation, Upper Member, undivided alluvium (Qm2)	Late Pleistocene	Upper member, undivided alluvium
Modesto Formation, Upper Member, fine-grained (Qm2b)	Late Pleistocene	Upper Member, fine-grained
Modesto Formation, Lower Member, undivided alluvium (Qm1)	Late Pleistocene	Lower Member, undivided alluvium
Modesto Formation, Lower Member, fine-grained (Qm1b)	Late Pleistocene	Lower Member, fine-grained

[26] Dawson. 2009. *Preliminary Geologic Map of the Lodi 30'x60' Quadrangle, California.*

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Figure 4.6-8 Geologic Units within the City of Stockton Diversion and Recharge Area



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Soils

Soil Types and Properties

Corrosive soils are a geologic hazard, because they react with concrete and ferrous metals, which can cause damage to foundations and buried pipelines. Expansive soils are a geologic hazard, because an increase in soil volume can exert forces on structures and, thus, damage building foundations, walls, and floors. In general, areas are susceptible to differential settlement if underlain by compressible sediments, such as poorly engineered artificial fill or loose unconsolidated alluvial sediments. When these soils dry out and shrink, structural damage can occur.

San Joaquin County

Different soil types exist within San Joaquin County that are closely associated with alluvial action and deposition. Sand to gravel soils have been deposited along waterways and the ancient course of the San Joaquin River. Areas between waterways are rich in fine grained clays and silts. Silt and clay soils are fertile and support agriculture within San Joaquin County for a wide variety of crops.[27]

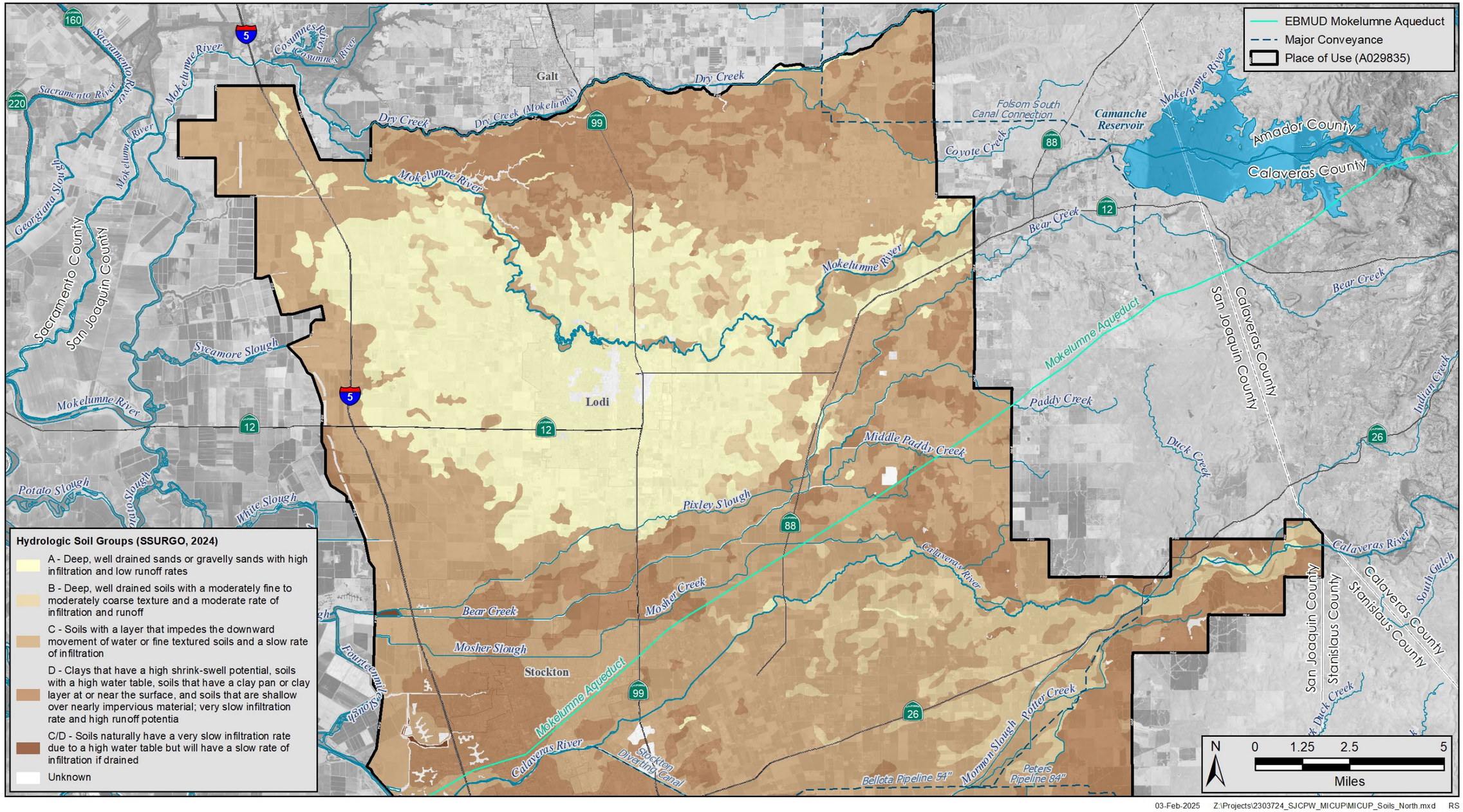
The Natural Resources Conservation Service (NRCS) Web Soil Survey documents over 80 different soil series within the Place of Use for MICUP.[28] Due to the amount of soil series to show within the Place of Use, Figure 4.6-9 and Figure 4.6-10 instead illustrate the hydrologic soil groups contained within the Place of Use. Hydrologic soil groups are broken down by the following definitions of soils[29]:

- Group A soils consist of deep, well drained sands or gravelly sands with high infiltration and low runoff rates.
- Group B soils consist of deep well drained soils with a moderately fine to moderately coarse texture and a moderate rate of infiltration and runoff.
- Group C consists of soils with a layer that impedes the downward movement of water or fine textured soils and a slow rate of infiltration.
- Group D consists of soils with a very slow infiltration rate and high runoff potential. This group is composed of clays that have a high shrink-swell potential, soils with a high water table, soils that have a clay pan or clay layer at or near the surface, and soils that are shallow over nearly impervious material.
- Group A/D soils naturally have a very slow infiltration rate due to a high water table but will have high infiltration and low runoff rates if drained.
- Group B/D soils naturally have a very slow infiltration rate due to a high water table but will have a moderate rate of infiltration and runoff if drained.
- Group C/D soils naturally have a very slow infiltration rate due to a high water table but will have a slow rate of infiltration if drained.

[27] San Joaquin County. 2016. San Joaquin County General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed December 30, 2024.
[28] Natural Resources Conservation Service. 2024. Web Soil Survey. Available: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed December 30, 2024.
[29] Soil Survey Geographic Database. 2024. Hydrologic Soil Class. Available: https://www.arcgis.com/home/item.html?id=c149fe0c6fa74430a500d83a92efd4b2. Accessed February 2025.

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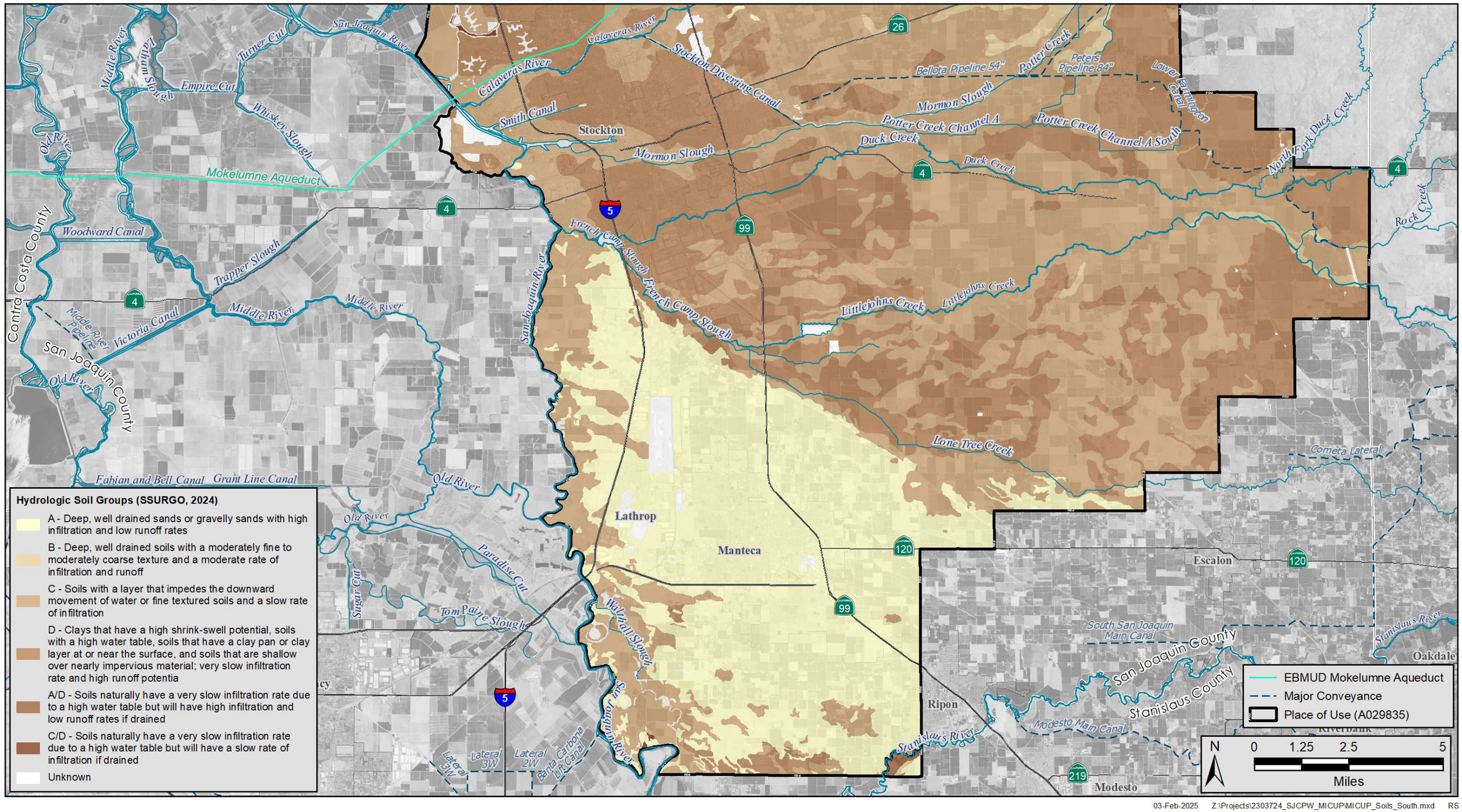
Figure 4.6-9 Hydrologic Soil Groups within the Place of Use - North



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Figure 4.6-10 Hydrologic Soil Groups within the Place of Use – South



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Project Area

The NRCS Web Soil Survey documents 54 soil series within the NSJWCD, SEWD, and City of Stockton areas, as shown in Table 4.6-6[30]. NRCS data was overlayed with project areas in GIS. Additionally, hydrologic soil groups illustrated on Figure 4.6-9 and Figure 4.6-10 were overlayed (and assigned) to the various soil series. Four of the mapped series are not strictly soils; they consist of dumps, gravel/pits, urban land, and water. Overall, the project area is characterized by a combination of sandy loam, clay loam, and silty loam, formed on top of Quaternary (Pliocene to Holocene) gravelly and sandy alluvium. The Tokay fine sandy loam unit is most widely found in the project area (Table 4.6-6). The Tokay soils are very deep and well-drained, and typically, the surface layer and subsoil are moderately coarse textured.[31] Other soil series in the project area have a low runoff capacity, are somewhat poorly to well drained, and have a low to moderate susceptibility to wind or water driven erosion.[32]

Table 4.6-6 Soil Series in the Project Area

Hydrologic Soil Group	Map Unit Symbol	Map Unit Name	Water District
A	101	Acampo sandy loam, 0 to 2 percent slopes	City of Stockton, NSJWCD
C	107	Archerdale clay loam, 0 to 2 percent slopes	NSJWCD, SEWD
C	110	Boggiano clay loam, 0 to 2 percent slopes	SEWD
C	111	Bruella sandy loam, 0 to 2 percent slopes	NSJWCD
C	112	Bruella sandy loam, hard substratum, 0 to 2 percent slopes	NSJWCD
B	128	Cogna loam, 0 to 2 percent slopes, overwash	SEWD
C	129	Cogna loam, 0 to 2 percent slopes	NSJWCD
C	130	Columbia fine sandy loam, drained, 0 to 2 percent slopes, MLRA 17	NSJWCD, SEWD
C	131	Columbia fine sandy loam, partially drained, 0 to 2 percent slopes, occasionally flooded	NSJWCD
A	132	Columbia fine sandy loam, channeled, partially drained, 0 to 2 percent slopes, frequently flooded	NSJWCD
C	134	Cometa sandy loam, 2 to 5 percent slopes	NSJWCD
C	149	Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16	NSJWCD, City of Stockton
N/A	150	Dumps	NSJWCD
C	153	Egbert silty clay loam, partially drained, 0 to 2 percent slopes, MLRA 16	NSJWCD
C	157	Exeter sandy loam, 0 to 2 percent slopes	NSJWCD
C	158	Finrod clay loam, 0 to 2 percent slopes	NSJWCD, SEWD, City of Stockton
D	160	Galt clay, 0 to 1 percent slopes, MLRA 17	NSJWCD, SEWD, City of Stockton
D	161	Galt clay, 0 to 4 percent slopes, MLRA 17	NSJWCD
C	170	Hicksville loam, 0 to 2 percent slopes, occasionally flooded	NSJWCD

[30] *Ibid*
[31] Natural Resources Conservation Service. 1992. Soil Survey of San Joaquin County, California. Available: https://archive.org/details/usda-general-soil-map-soil-survey-of-san-joaquin-county-california. Accessed December 30, 2024.
[32] *Ibid*

Hydrologic Soil Group	Map Unit Symbol	Map Unit Name	Water District
C	171	Hicksville loam, bedrock substratum, 2 to 5 percent slopes, occasionally flooded	NSJWCD
C	173	Hollenbeck silty clay, 0 to 2 percent slopes	NSJWCD, SEWD, City of Stockton
A	175	Honcut sandy loam, 0 to 2 percent slopes	SEWD
D	180	Jacktone clay, 0 to 2 percent slopes	NSJWCD, SEWD, City of Stockton
D	181	Jacktone-Urban land complex, 0 to 2 percent slopes	City of Stockton
D	185	Kaseberg fine sandy loam, 2 to 15 percent slopes	NSJWCD
B	189	Kingdon fine sandy loam, 0 to 2 percent slopes	NSJWCD
C	200	Montpellier-Cometa complex, 5 to 8 percent slopes	NSJWCD
A	214	Pits, gravel	NSJWCD
C	216	Ramoth sandy loam, 5 to 8 percent slopes	NSJWCD
C	217	Ramoth sandy loam, 8 to 15 percent slopes	NSJWCD
C	218	Ramoth sandy loam, 15 to 30 percent slopes	NSJWCD
D	220	Redding gravelly loam, 0 to 8 percent slopes, dry	NSJWCD
D	221	Redding gravelly loam, 1 to 30 percent slopes, dry, MLRA 17	NSJWCD
C	226	Rioblancho clay loam, drained, 0 to 2 percent slopes	City of Stockton
C	228	Rocklin sandy loam, 2 to 5 percent slopes	NSJWCD, SEWD
C	229	Rocklin fine sandy loam, 0 to 2 percent slopes	NSJWCD
D	236	San Joaquin sandy loam, 0 to 2 percent slopes	NSJWCD, SEWD
D	237	San Joaquin sandy loam, 2 to 5 percent slopes	NSJWCD, SEWD
D	238	San Joaquin loam, 0 to 2 percent slopes	NSJWCD
C	240	San Joaquin loam, thick surface, 0 to 2 percent slopes	NSJWCD
D	241	San Joaquin complex, 0 to 1 percent slopes	NSJWCD, SEWD
D	242	San Joaquin-Urban land complex, 0 to 2 percent slopes	NSJWCD
C	248	Stockton fine sandy loam, 0 to 2 percent slopes, overwashed	SEWD, City of Stockton
C	249	Stockton silty clay loam, 0 to 2 percent slopes, overwashed	City of Stockton
C	250	Stockton clay, 0 to 2 percent slopes	NSJWCD, SEWD, City of Stockton
C	251	Stockton-Urban land complex, 0 to 2 percent slopes	City of Stockton
A	256	Tokay fine sandy loam, 0 to 2 percent slopes	NSJWCD, City of Stockton
A	257	Tokay-Urban land complex, 0 to 2 percent slopes	NSJWCD
A	259	Tujunga loamy sand, 0 to 2 percent slopes	NSJWCD
N/A	260	Urban land	City of Stockton
C	270	Vignolo silt loam, 0 to 2 percent slopes	SEWD
C	271	Vignolo silty clay loam, 0 to 2 percent slopes	SEWD, City of Stockton
B	272	Vina fine sandy loam, 0 to 2 percent slopes, MLRA 17	NSJWCD
N/A	W	Water	NSJWCD, SEWD, City of Stockton

As follows is a discussion of soils within the project area for each of the MICUP Partner Agencies.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The NRCS Web Soil Survey documents 43 soil series within the NSJWCD area, as shown in Table 4.6-7[33] and Figure 4.6-11 through Figure 4.6-14. Four of these are not strictly soils; they consist of dumps, gravel/pits, urban land, and water. Overall, the NSJWCD area is characterized by a combination of sandy loam, clay loam, and silty loam, formed on top of Quaternary (Pliocene to Holocene) gravelly and sandy alluvium. The Tokay fine sandy loam unit is most predominant in the NSJWCD area (Table 4.6-7). The Tokay soils are very deep and well-drained, and typically, the surface layer and subsoil are moderately coarse textured.[34] Other soil series in the NSJWCD area have a low runoff capacity, are somewhat poorly to well drained, and have a low to moderate susceptibility to wind or water driven erosion.[35]

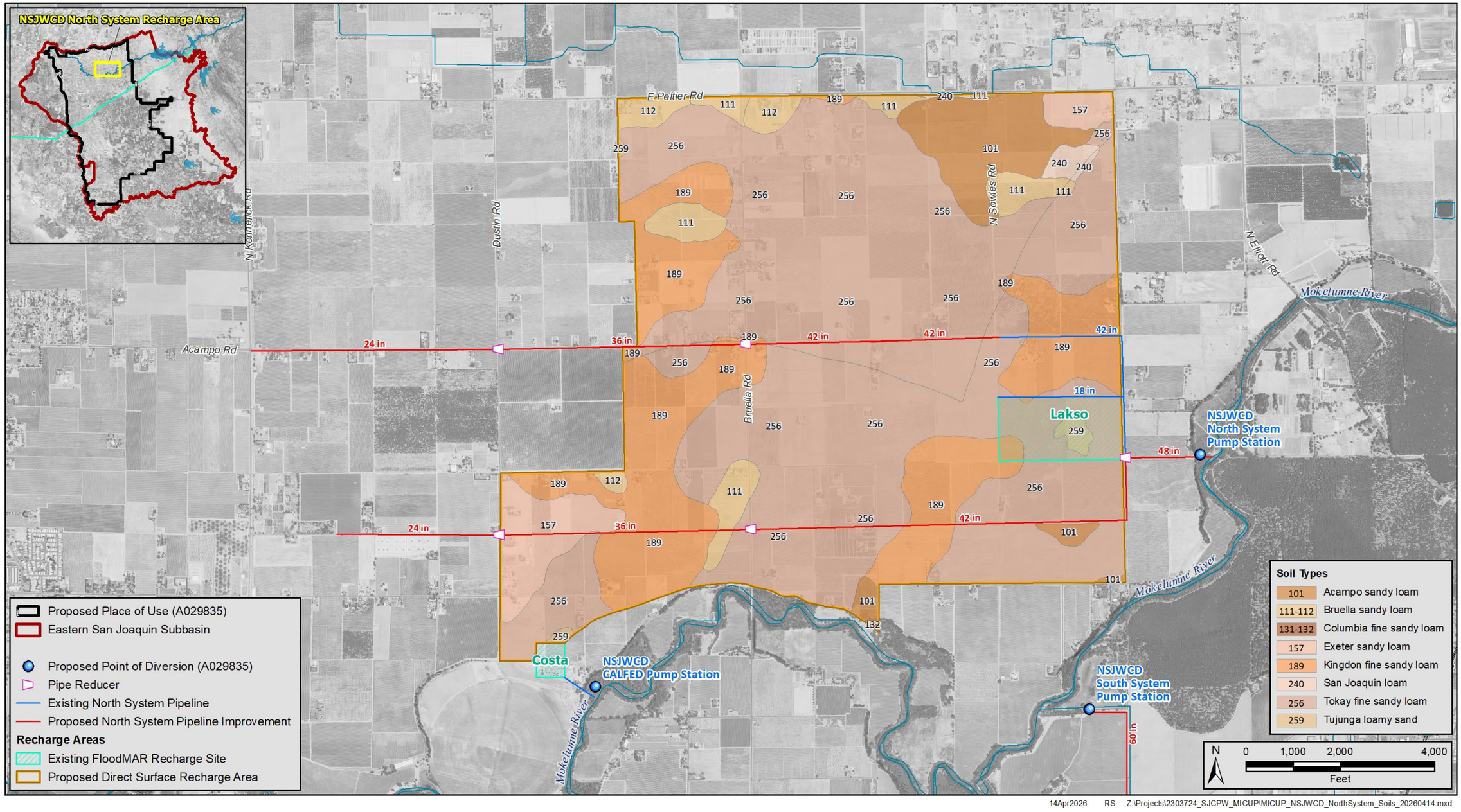
Table 4.6-7 Soil Series in the Northern San Joaquin Water Conservation District

Hydrologic Soil Group	Map Unit Symbol	Map Unit Name
A	101	Acampo sandy loam, 0 to 2 percent slopes
C	107	Archerdale clay loam, 0 to 2 percent slopes
C	111	Bruella sandy loam, 0 to 2 percent slopes
C	112	Bruella sandy loam, hard substratum, 0 to 2 percent slopes
C	129	Cogna loam, 0 to 2 percent slopes
C	130	Columbia fine sandy loam, drained, 0 to 2 percent slopes, MLRA 17
C	131	Columbia fine sandy loam, partially drained, 0 to 2 percent slopes, occasionally flooded
A	132	Columbia fine sandy loam, channeled, partially drained, 0 to 2 percent slopes, frequently flooded
C	134	Cometa sandy loam, 2 to 5 percent slopes
C	149	Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16
N/A	150	Dumps
C	153	Egbert silty clay loam, partially drained, 0 to 2 percent slopes, MLRA 16
C	157	Exeter sandy loam, 0 to 2 percent slopes
C	158	Finrod clay loam, 0 to 2 percent slopes
D	160	Galt clay, 0 to 1 percent slopes, MLRA 17
D	161	Galt clay, 0 to 4 percent slopes, MLRA 17
C	170	Hicksville loam, 0 to 2 percent slopes, occasionally flooded
C	171	Hicksville loam, bedrock substratum, 2 to 5 percent slopes, occasionally flooded
C	173	Hollenbeck silty clay, 0 to 2 percent slopes
D	180	Jacktone clay, 0 to 2 percent slopes
D	185	Kaseberg fine sandy loam, 2 to 15 percent slopes
B	189	Kingdon fine sandy loam, 0 to 2 percent slopes
C	200	Montpellier-Cometa complex, 5 to 8 percent slopes

[33] Natural Resources Conservation Service. 2024. Web Soil Survey. Available: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed December 30, 2024.
[34] Natural Resources Conservation Service. 1992. Soil Survey of San Joaquin County, California. Available: https://archive.org/details/usda-general-soil-map-soil-survey-of-san-joaquin-county-california. Accessed December 30, 2024.
[35] *Ibid*

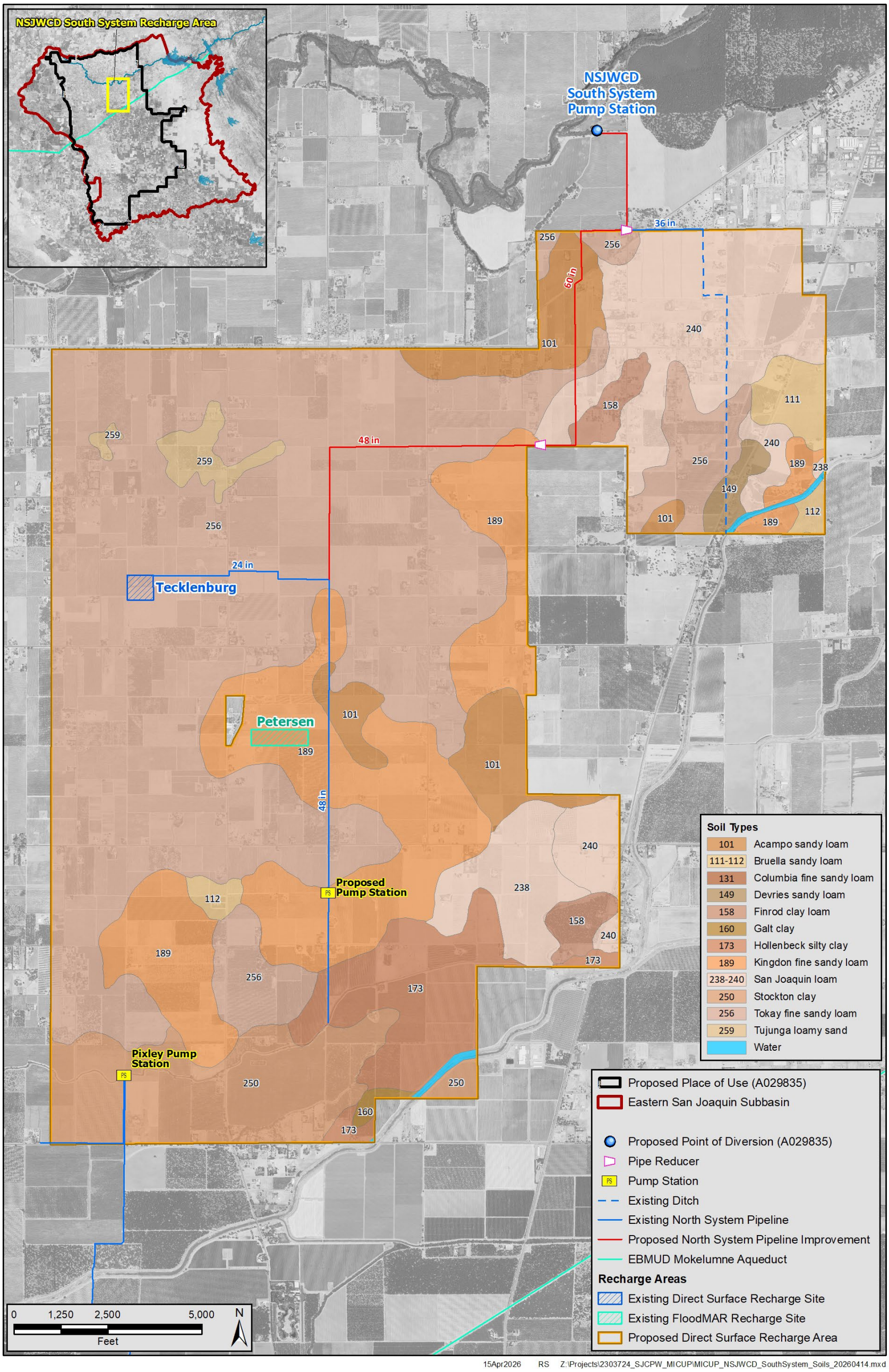
Hydrologic Soil Group	Map Unit Symbol	Map Unit Name
A	214	Pits, gravel
C	216	Ramoth sandy loam, 5 to 8 percent slopes
C	217	Ramoth sandy loam, 8 to 15 percent slopes
C	218	Ramoth sandy loam, 15 to 30 percent slopes
D	220	Redding gravelly loam, 0 to 8 percent slopes, dry
D	221	Redding gravelly loam, 1 to 30 percent slopes, dry, MLRA 17
C	228	Rocklin sandy loam, 2 to 5 percent slopes
C	229	Rocklin fine sandy loam, 0 to 2 percent slopes
D	236	San Joaquin sandy loam, 0 to 2 percent slopes
D	237	San Joaquin sandy loam, 2 to 5 percent slopes
D	238	San Joaquin loam, 0 to 2 percent slopes
C	240	San Joaquin loam, thick surface, 0 to 2 percent slopes
D	241	San Joaquin complex, 0 to 1 percent slopes
D	242	San Joaquin-Urban land complex, 0 to 2 percent slopes
C	250	Stockton clay, 0 to 2 percent slopes
A	256	Tokay fine sandy loam, 0 to 2 percent slopes
A	257	Tokay-Urban land complex, 0 to 2 percent slopes
A	259	Tujunga loamy sand, 0 to 2 percent slopes
B	272	Vina fine sandy loam, 0 to 2 percent slopes, MLRA 17
N/A	W	Water

Figure 4.6-11 Soils within NSJWCD North System Recharge Area



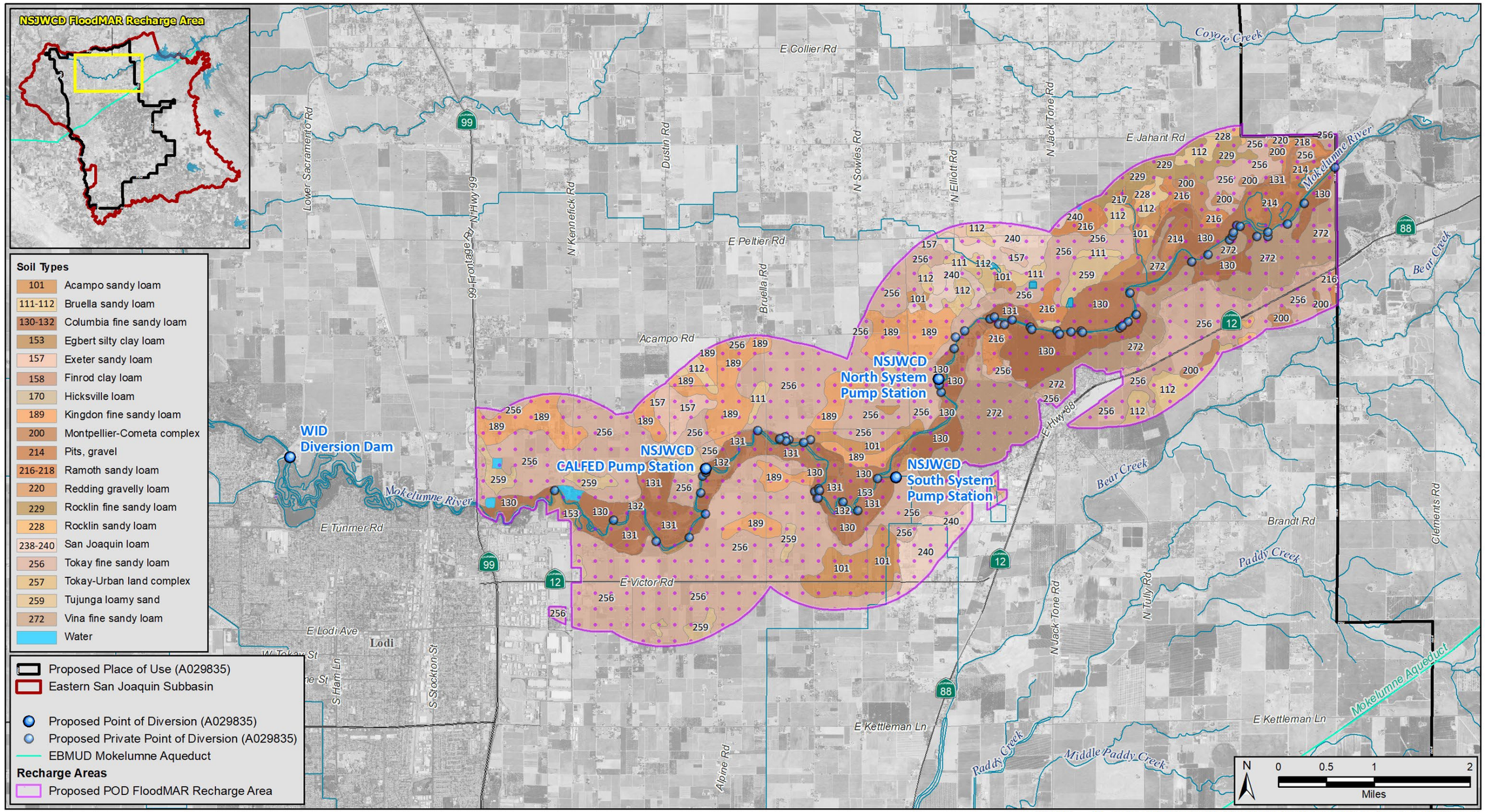
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Figure 4.6-12 Soils within NSJWCD South System Recharge Area



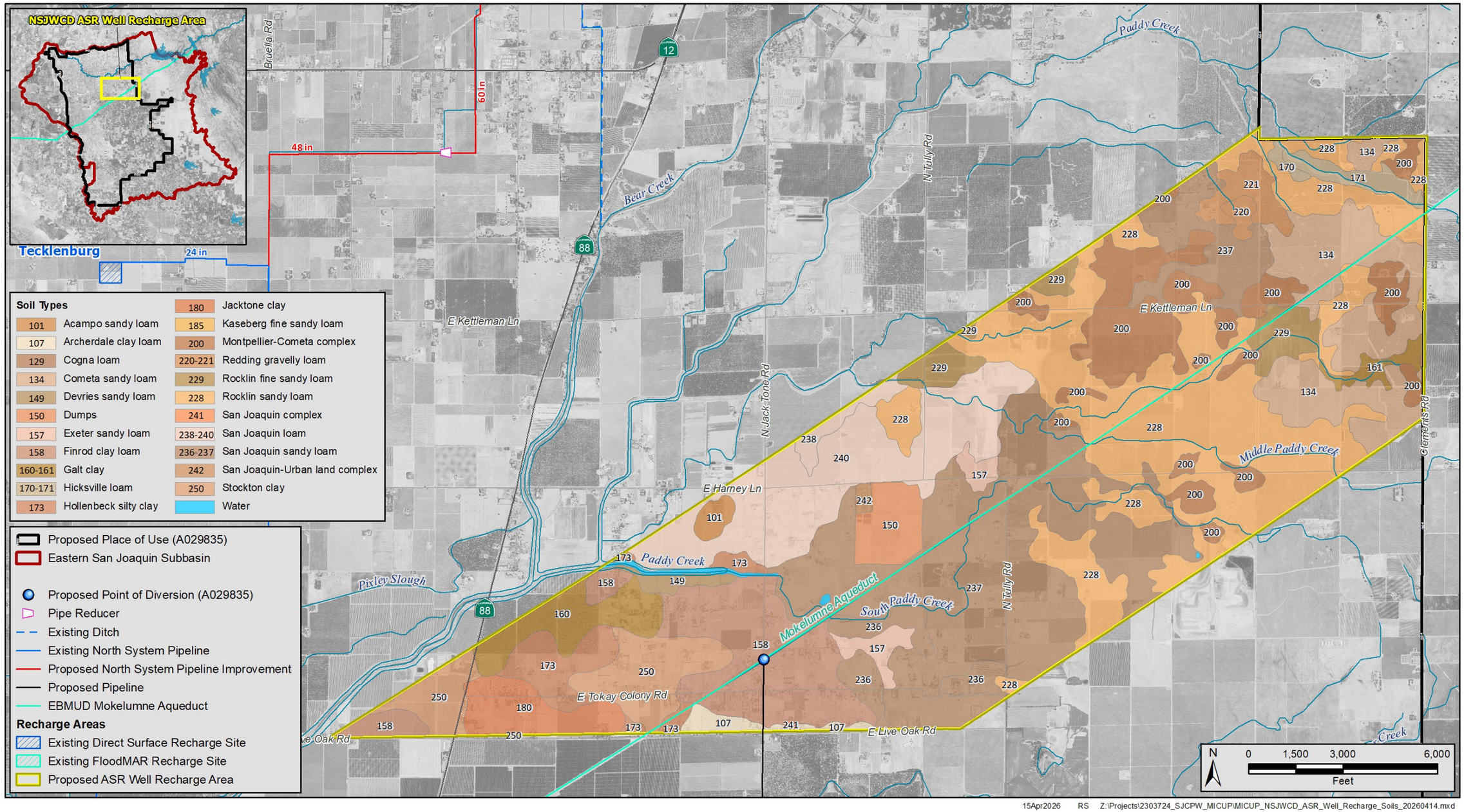
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Figure 4.6-13 Soils within NSJWCD Flood-MAR Recharge Area



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Figure 4.6-14 Soils within NSJWCD ASR Well Recharge Area



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STOCKTON EAST WATER DISTRICT

The NRCS Web Soil Survey documents 19 soil series within the project area within SEWD, as shown in Table 4.6-8[36] and Figure 4.6-15. One of these is not strictly soils; it consists of water. Overall, the SEWD area is characterized by a combination of sandy loam, clay loam, and silty loam, formed on top of Quaternary (Pliocene to Holocene) gravelly and sandy alluvium. The Stockton clay unit is most predominant in the SEWD area followed by the Cogna loam unit and Archerdale clay loam unit. The Stockton clay unit is somewhat poorly drained while the Cogna loam and Archerdale clay loam are well-drained.[37] Other soil series in the SEWD area have a low runoff capacity, are somewhat poorly to well drained, and have a low to moderate susceptibility to wind or water driven erosion.[38]

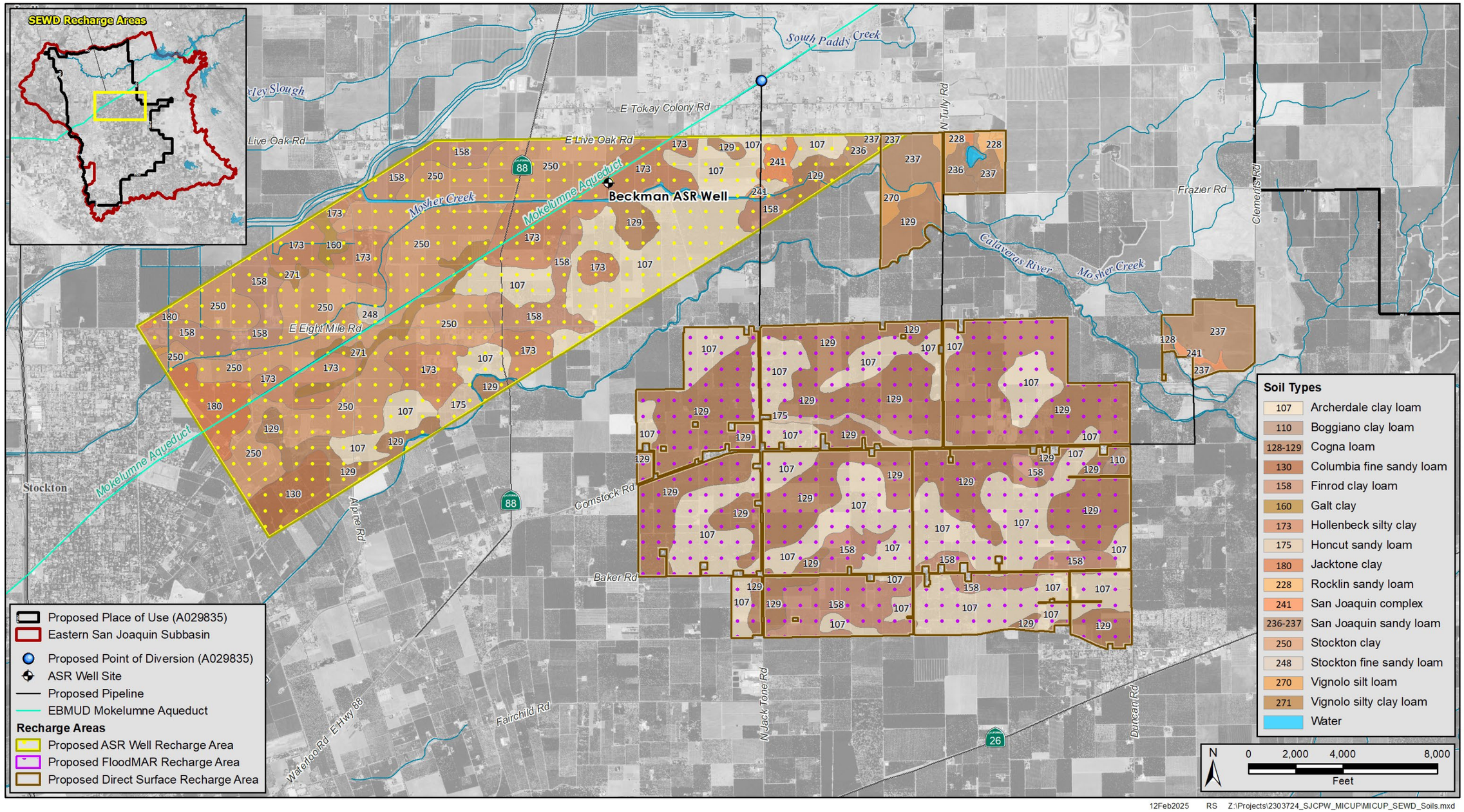
Table 4.6-8 Soil Series in the Stockton East Water District

Hydrologic Soil Group	Map Unit Symbol	Map Unit Name
C	107	Archerdale clay loam, 0 to 2 percent slopes
C	110	Boggiano clay loam, 0 to 2 percent slopes
B	128	Cogna loam, 0 to 2 percent slopes, overwash
C	129	Cogna loam, 0 to 2 percent slopes
C	130	Columbia fine sandy loam, drained, 0 to 2 percent slopes, MLRA 17
C	158	Finrod clay loam, 0 to 2 percent slopes
D	160	Galt clay, 0 to 1 percent slopes, MLRA 17
C	173	Hollenbeck silty clay, 0 to 2 percent slopes
A	175	Honcut sandy loam, 0 to 2 percent slopes
D	180	Jacktone clay, 0 to 2 percent slopes
C	228	Rocklin sandy loam, 2 to 5 percent slopes
D	236	San Joaquin sandy loam, 0 to 2 percent slopes
D	237	San Joaquin sandy loam, 2 to 5 percent slopes
D	241	San Joaquin complex, 0 to 1 percent slopes
C	248	Stockton fine sandy loam, 0 to 2 percent slopes, overwashed
C	250	Stockton clay, 0 to 2 percent slopes
C	270	Vignolo silt loam, 0 to 2 percent slopes
C	271	Vignolo silty clay loam, 0 to 2 percent slopes
N/A	W	Water

[36] Natural Resources Conservation Service. 2024. Web Soil Survey. Available: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed December 30, 2024.
[37] Natural Resources Conservation Service. 1992. Soil Survey of San Joaquin County, California. Available: https://archive.org/details/usda-general-soil-map-soil-survey-of-san-joaquin-county-california. Accessed December 30, 2024.
[38] *Ibid*

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Figure 4.6-15 Soils within SEWD Recharge Areas



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CITY OF STOCKTON

The NRCS Web Soil Survey documents 16 soil series within the City of Stockton area as shown in Table 4.6-9[39] and Figure 4.6-16. Two of these are not strictly soils; consisting of urban land and water. Overall, the City of Stockton area is characterized by a combination of sandy loam and clay loam, silt clay, and clay. The Rioblancho clay loam is most predominant in the City of Stockton area, closely followed by the Stockton clay unit. The Rioblancho clay loam and Stockton clay units are somewhat poorly drained and are moderately deep to a hardpan.[40] Also found in the City of Stockton area is Jacktone clay, which is poorly drained and shallow, with high run-off and shrink-swell potential. Other soil series in the City of Stockton area have a low runoff capacity, are somewhat poorly too well drained, and have a low to moderate susceptibility to wind or water driven erosion.[41]

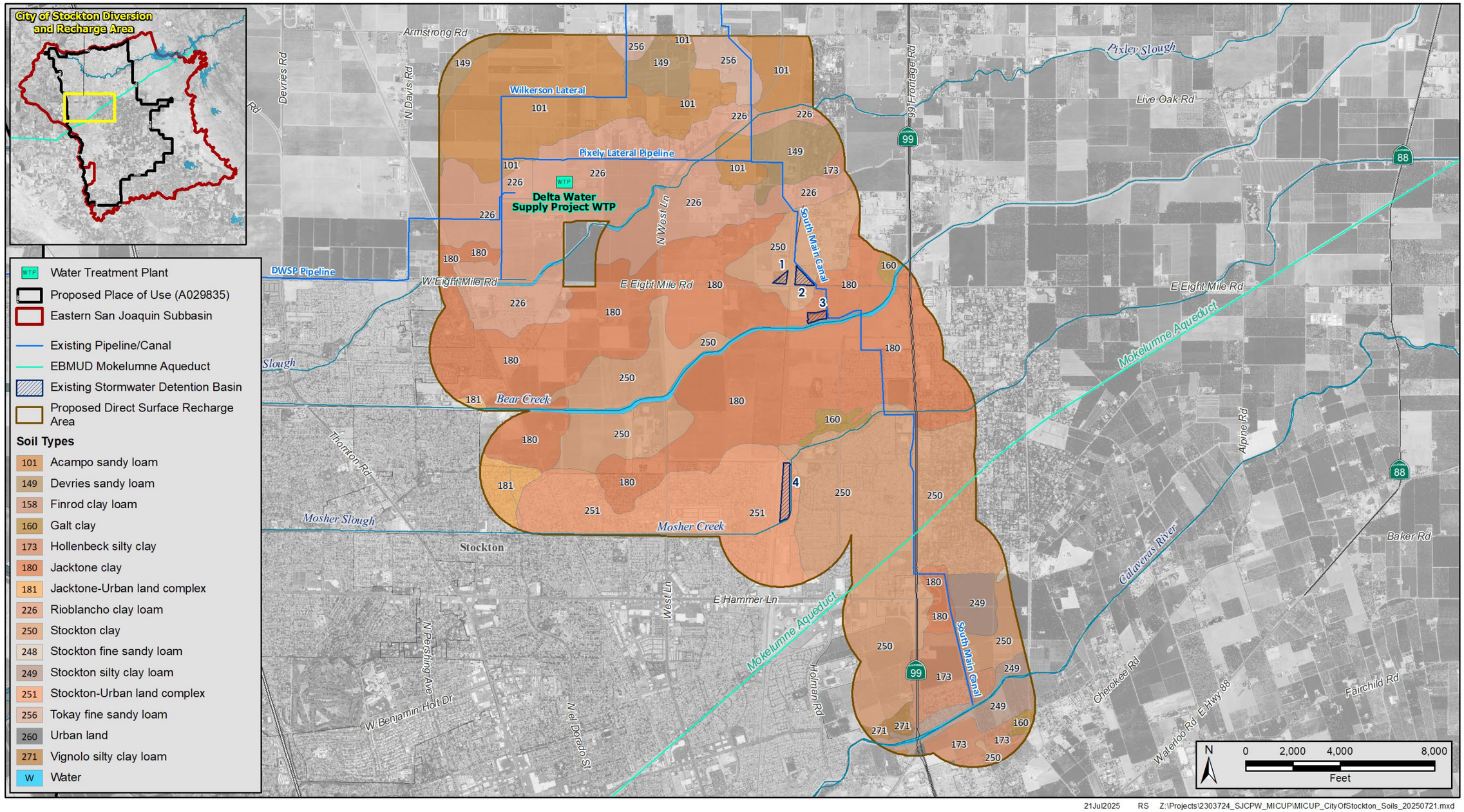
Table 4.6-9 Soil Series in the City of Stockton

Hydrologic Soil Group	Map Unit Symbol	Map Unit Name
A	101	Acampo sandy loam, 0 to 2 percent slopes
C	149	Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16
C	158	Finrod clay loam, 0 to 2 percent slopes
D	160	Galt clay, 0 to 1 percent slopes, MLRA 17
C	173	Hollenbeck silty clay, 0 to 2 percent slopes
D	180	Jacktone clay, 0 to 2 percent slopes
D	181	Jacktone-Urban land complex, 0 to 2 percent slopes
C	226	Rioblancho clay loam, drained, 0 to 2 percent slopes
C	248	Stockton fine sandy loam, 0 to 2 percent slopes, overwashed
C	249	Stockton silty clay loam, 0 to 2 percent slopes, overwashed
C	250	Stockton clay, 0 to 2 percent slopes
C	251	Stockton-Urban land complex, 0 to 2 percent slopes
A	256	Tokay fine sandy loam, 0 to 2 percent slopes
N/A	260	Urban land
C	271	Vignolo silty clay loam, 0 to 2 percent slopes
N/A	W	Water

[39] Natural Resources Conservation Service . 2024. Web Soil Survey. Available: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed December 30, 2024.
[40] Natural Resources Conservation Service . 1992. Soil Survey of San Joaquin County, California. Available: https://archive.org/details/usda-general-soil-map-soil-survey-of-san-joaquin-county-california. Accessed December 30, 2024.
[41] *Ibid*

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Figure 4.6-16 Soils in the City of Stockton Diversion and Recharge Area



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Seismicity

San Joaquin County

San Joaquin County is in a region that lies between two areas of seismic activity: the San Francisco Bay Area and the Sierra Nevada foothills. The active faults associated with the San Andreas Fault System of the greater San Francisco Bay Area lie west of the County line, with the Marsh Creek-Greenville active fault located immediately west of the southern tip of the County.[42] Other active faults associated with the San Andreas Fault System include the Concord, Calaveras, Hayward, and the San Andreas faults (see Table 4.6-10[43][44][45]). These faults can cause ground shaking that could be felt within the County. The Working Group on California Earthquake Probabilities, a collaborative effort involving the USGS, the CGS, and the Southern California Earthquake Center, estimates that the 30-year probability of a magnitude 6.7 or greater earthquake striking the nearby San Francisco Bay area is 63 percent.[46] The Hayward Fault, a major earthquake fault in the San Francisco Bay region, is located roughly 40 miles to the west-southwest of the project area. Recent seismological research concluded that the average earthquake recurrence interval on this fault is approximately 138 years and the forecasted probability of a large seismic event through the year 2036 is roughly 31 percent.

To the east lies a regional shear zone associated with the Sierra Nevada foothills known as the Foothills Fault System. The Foothills Fault System consists of a complex collection of fault segments that have not been classified as active. For this reason, these faults are unlikely to cause ground shaking that could be felt within the County.

Figure 4.6-17 illustrates these various fault zones in relation to the project area. As shown on Figure 4.6-17, there are no active faults located within San Joaquin County.[47]

[42] An active fault is defined by the State of California as a fault that has had surface displacement within Holocene time (approximately the last 11,000 years). A potentially active fault is defined as a fault that has shown evidence of surface displacement during the Quaternary (last 1.6 million years), unless direct geologic evidence demonstrates inactivity for all of the Holocene or longer. This definition does not mean that faults lacking evidence of surface displacement are necessarily inactive.
[43] San Joaquin County. 2016. San Joaquin County General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed December 30, 2024.
[44] United States Geological Survey. 2008. Working Group on California Earthquake Probabilities (WG02), Fact Sheet 2008-2037, Forecasting California's Earthquakes – What Can We Expect in the Next 30 Years?, Available: http://pubs.usgs.gov/fs/2008/3027/fs2008-3027.pdf. Accessed December 31, 2024.
[45] California Geologic Survey. 2024. Fault Activity Map of California. Available: https://maps.conservation.ca.gov/cgs/fam/. Accessed December 31, 2024.
[46] United States Geological Survey. 2008. Working Group on California Earthquake Probabilities (WG02), Fact Sheet 2008-2037, Forecasting California's Earthquakes – What Can We Expect in the Next 30 Years?, Available: http://pubs.usgs.gov/fs/2008/3027/fs2008-3027.pdf. Accessed December 31, 2024.
[47] San Joaquin County. 2016. San Joaquin County General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed December 31, 2024.

Table 4.6-10 Active Faults in the Vicinity of the Project Area

Fault	Distance and Direction from Project Area	Recency of Movement[1]	Future Earthquake Probability (Percent)[2]	Historic Seismicity	Maximum Moment Magnitude Earthquake (Mw)[3]
Greenville	23 miles west	Historic	3	M 5.6 in 1980	6.9
Calaveras	36 miles west	Historic	7	M 5.6-M 6.4 in 1891 M 6.2 in 1984	6.8
Hayward	38 miles southwest	Historic	31	M 6.8 in 1868 Many <M 4.5	7.1
Mt. Diablo Thrust	30 miles west	Historic	3	Historic active creep	6.6
Concord-Green Valley	40 miles west	Historic	3	1955 – active creep	6.2
San Andreas (Peninsula Section)	70 miles west	Historic	21	M 7.1 in 1989 M 7.8 in 1906 M 7.0 in 1838 Many <M 6	7.9
Foothills Fault System (Sierra Nevada)	20 miles east	Potentially Active	N/A	N/A	6.5

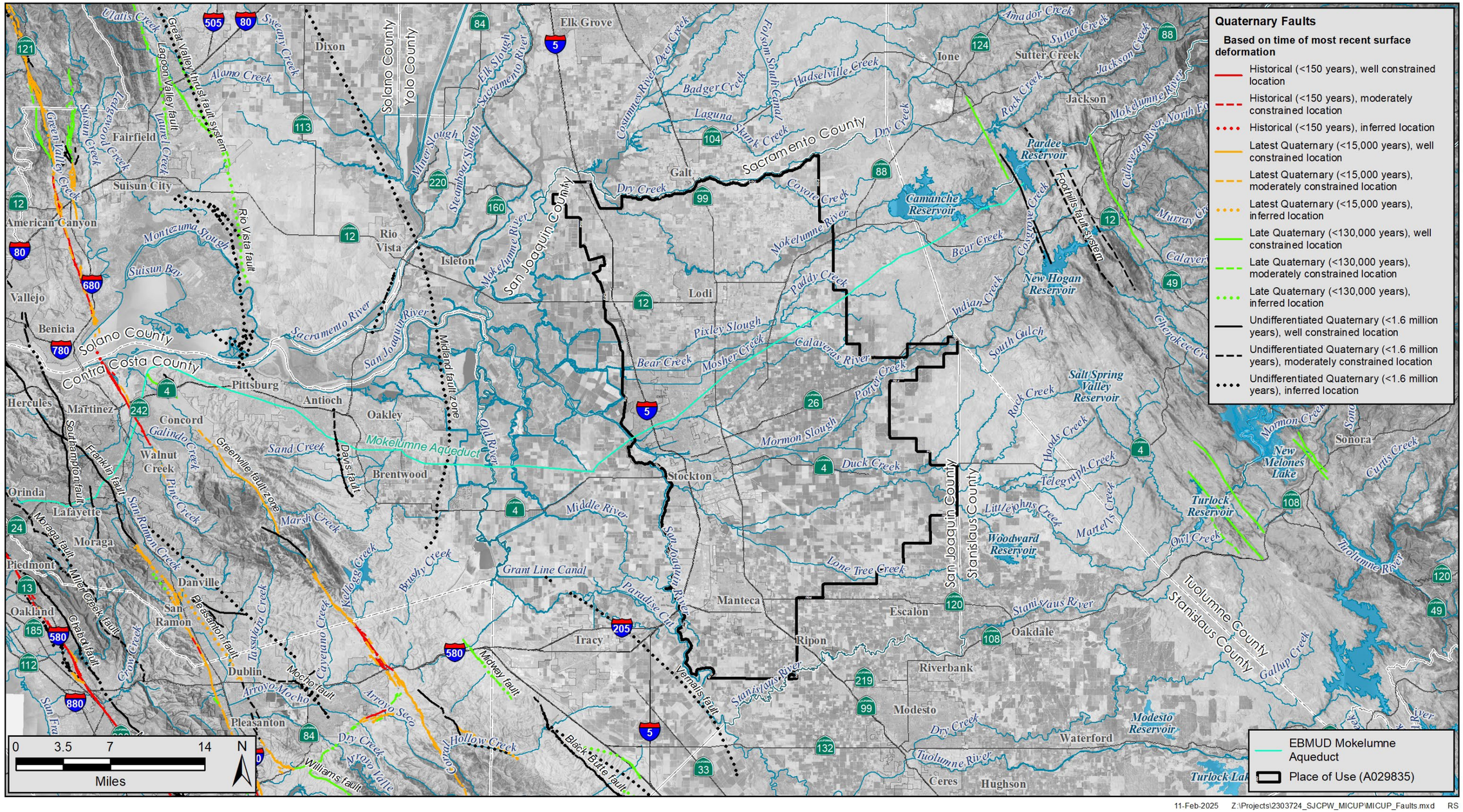
Notes:

1. Historic refers to the post-colonial era (after 1775), the Holocene is from 11,000 years ago to present.
2. Probability of one or more earthquakes of magnitude 6.7 or greater in the next 30 years from the Working Group on California Earthquake Probabilities (2008). The Working Group estimates the probability of a "background" earthquake not from one of the seven major faults studied to be 9 percent.
3. The Maximum Moment Magnitude Earthquake is derived from the joint CDMG/USGS Probabilistic Seismic Hazard Assessment for the State of California.

Few subsurface faults have been mapped in the northern part of the San Joaquin Valley, and the largest of these subsurface faults is the Stockton Fault. The Stockton Fault is a south-dipping reverse fault that trends east-west across the project area. The fault is not exposed at the surface and its location has been estimated from drilling logs. It appears to have a complex history and may have experienced as much as 1,100 meters of displacement. However, it is not a recently active fault, with most of the reported activity occurring in the Oligocene and early Miocene (i.e., approx. 10 to 30 million years before present). Furthermore, the Stockton Fault has not been classified as an "active" fault by the CGS.[48]

[48] City of Stockton. 2018b. Envision Stockton 2040 General Plan Update and Utility Master Plan Supplements Draft EIR. Available: https://www.stocktonca.gov/business/planning___engineering/general_plan.php#collapse1910b1. Accessed December 30, 2024.

Figure 4.6-17 Faults within the Place of Use Vicinity



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Project Area

The Greenville fault zone is the closest active fault zone to all three MICUP Partner Agency areas and located over 28 to 45 miles to the west-southwest of these areas.[49] [50]

Seismic Hazards

Seismic hazards are generally classified under two categories: primary seismic hazards (surface fault rupture and ground shaking) and secondary seismic hazards (liquefaction and other types of seismically induced ground failure, along with seismically induced landslides). Periodic earthquakes and associated secondary seismic hazards can be expected to occur to some degree in the project area through the lifetime of the proposed project.

The following discussion defines various seismic hazards and identifies the respective seismic hazard areas for the project area.

Surface Rupture

Seismically-induced ground rupture is defined as the physical displacement of surface deposits in response to an earthquake's seismic waves. The magnitude, sense, and nature of fault rupture can vary for different faults or even along different segments of the same fault. Ground rupture is considered more likely along active faults, and surface expression of fault rupture is typically observed and is expected on or within close proximity to a causative fault.

PROJECT AREA

The MICUP project area is neither located within, nor crosses, a fault-rupture hazard zone as delineated by the Alquist-Priolo Earthquake Fault Zoning Act (CGS 2017a).[51] The Greenville fault zone is the closest active fault zone to the MICUP project area and lies to the west-southwest.[52.] For this reason, the risk of surface fault rupture within the project area is considered low.

Ground Shaking

Areas most susceptible to intense ground shaking are those located closest to an earthquake-generating fault, and areas underlain by thick, loosely unconsolidated and saturated sediments. Ground movement during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material.

While the earthquake magnitude is a measure of the energy released in an earthquake, intensity is a measure of the ground shaking effects at a particular location. Areas underlain by bedrock typically experience less severe ground shaking than those underlain by loose, unconsolidated materials. Unconsolidated materials, even when located relatively distant from faults, can intensify ground shaking.

[49] GEI Consultants. 2024. Project Area Faults.
[50] City of Lodi. 2009. Lodi General Plan Draft Environmental Impact Report. Available: https://www.lodi.gov/191/Plan-Documents. Accessed December 31, 2024.
[51] California Geological Survey. 2017a. CGS Seismic Hazards Program: Alquist-Priolo Fault Hazard Zones. Updated April 11, 2022. Available: https://maps-cnra-cadoc.opendata.arcgis.com/datasets/cadoc::cgs-seismic-hazards-program-alquist-priolo-fault-hazard-zones/explore?location=37.842364%2C-121.304533%2C10.73. Accessed December 31, 2024.
[52] GEI Consultants. 2024. Project Area Faults.

The Modified Mercalli Intensity Scale assigns an intensity value based on the observed effects of ground-shaking produced by an earthquake. Unlike measures of earthquake magnitude and peak ground acceleration (PGA), the Modified Mercalli Intensity Scale is qualitative in nature in that it is based on actual observed effects rather than measured values. Similar to PGA, Modified Mercalli values for an earthquake at any one place can vary depending on the earthquake's magnitude, the distance from its epicenter, the focus of its energy, and the type of geologic material. The Modified Mercalli values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X can cause moderate to significant structural damage (Table 4.6-11[53]). Because the Modified Mercalli scale is a measure of ground shaking effects, intensity values can be correlated to a range of average PGA values.

Table 4.6-11 Modified Mercalli Intensity Scale

Intensity Value	Intensity Description	Average Peak Ground Acceleration[1]
I	Not felt except by a very few persons under especially favorable circumstances.	< 0.0017 g
II	Felt only by a few persons at rest, especially on upper floors on buildings. Delicately suspended objects may swing.	0.0017-0.014 g
III	Felt noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly, vibration similar to a passing truck. Duration estimated.	0.014-0039 g
IV	During the day felt indoors by many, outdoors by few. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.	0.035-0.092 g
V	Felt by nearly everyone, many awakened. Some dishes and windows broken; a few instances of cracked plaster; unstable objects overturned. Disturbances of trees, poles may be noticed. Pendulum clocks may stop.	0.092-0.18 g
VI	Felt by all, many frightened and run outdoors. Some heavy furniture moved; and fallen plaster or damaged chimneys. Damage slight.	0.18-0.34 g
VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.	0.34-0.65 g
VIII	Damage slight in specially designed structures; considerable in ordinary substantial buildings, with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.	0.65 - 1.24g
IX	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb; great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.	>1.24 g
X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations; ground badly cracked. Rails bent. Landslides considerable from riverbanks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.	>1.24 g
XI	Few, if any, (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.	>1.24 g

[53] United States Geological Survey. 2024. Modified Mercalli Intensity Scale. Available: https://www.usgs.gov/programs/earthquake-hazards/modified-mercalli-intensity-scale. Accessed December 31, 2024.

Intensity Value	Intensity Description	Average Peak Ground Acceleration[1]
XII	Damage total. Practically all works of construction are damaged greatly or destroyed. Waves seen on ground surface. Lines of sight and level are distorted. Objects are thrown upward into the air.	>1.24 g

[1] Value is expressed as a fraction of the acceleration due to gravity (g). Gravity (g) is 9.8 meters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

PROJECT AREA

An earthquake of moderate to high magnitude generated within the nearby San Francisco Bay area could cause substantial ground shaking in the MICUP project area. The degree of shaking would depend on the magnitude of the event, the duration of the event, and the distance to the zone of rupture (i.e., hypocenter).

The Greenville fault zone is the closest active fault zone to the MCUP project area and lies over 45 miles to the west-southwest[54]. The maximum probable forecasted earthquake on the Greenville Fault is estimated to be magnitude 6.0. However, the largest historic earthquake on this fault was a Richter magnitude 5.6, comparable to a 6 Modified Mercalli, that occurred in 1980[55]. That earthquake produced a peak ground acceleration of 0.15g in the community of Brentwood, located approximately over 30 miles southwest of project area.

Liquefaction

Liquefaction is a transformation of soil from a solid to a liquefied state during which saturated soil temporarily loses strength resulting from the buildup of excess pore water pressure, especially during earthquake-induced cyclic loading. Soil susceptible to liquefaction includes loose to medium dense sand and gravel, low-plasticity silt, and some low-plasticity clay deposits. Four kinds of ground failure commonly result from liquefaction: lateral spread, flow failure, ground oscillation, and loss of bearing strength. Lateral spreading is the horizontal displacement of surficial blocks of sediments resulting from liquefaction in a subsurface layer that occurs on slopes ranging between 0.3 and 3 percent and commonly displaces the surface by several meters to tens of meters. Flow failures occur on slopes greater than 3 percent and are primarily liquefied soil or blocks of intact material riding on a liquefied subsurface zone. Ground oscillation occurs on gentle slopes when liquefaction occurs at depth and no lateral displacement takes place. Soil units that are not liquefied may pull apart from each other and oscillate on the liquefied zone. The loss of bearing pressure can occur beneath a structure when the underlying soil loses strength and liquefies. When this occurs, the structure can settle, tip, or even become buoyant and “float” upwards. Liquefaction and associated failures could damage foundations, roads, underground cables, and pipelines and disrupt utility service.

PROJECT AREA

The CGS has not mapped seismically induced liquefaction hazard zones in the MICUP project area.[56]

[54] GEI Consultants. 2024. Project Area Faults.
[55] San Joaquin County. 2014. San Joaquin County General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed January 2, 2025.
[56] California Geological Survey. 2017b. CGS Seismic Hazards Program: Liquefaction Zones. Available: https://gis.data.ca.gov/datasets/cadoc::cgs-seismic-hazards-program-liquefaction-zones-1/explore?location=38.148233%2C-120.650395%2C9.52. Accessed December 31, 2024.

Subsidence

Several processes contribute to land subsidence in the regional area and include, in order of decreasing magnitude: aquifer compaction by overdraft, hydrocompaction, petroleum reservoir compaction due to oil and gas withdrawal, and subsidence caused by tectonic forces. Inelastic compaction or land subsidence occurs in the fine-grained beds of the aquifer system. Clays and silts, although not very permeable, are typically highly porous. In many of these fine-grained layers, pore spaces are supported by water at the time of deposition. This water is essentially groundwater storage, although the majority of it is a component of inelastic storage, therefore it is not reusable. During over-pumping conditions (also called overdraft), groundwater is pumped from pore spaces between grains of sand and gravel. Once the aquifer system is pumped beyond the sustainable yield, the lowered water pressure in the sand and gravel causes slow drainage of water from the clay and silt beds. The subsequent release of water and water pressure from the clay and silt beds result in compaction (the beds become thinner) as clay particles supported by water in pore spaces rearrange and collapse. Groundwater cannot re-enter the clay structure after the collapse. This condition represents a permanent loss of water storage volume in the clay layers. The effects of compaction are also seen as a lowering of the land surface, otherwise known as land subsidence.

PROJECT AREA

There are no areas of land subsidence in the MICUP project area.[57]

Landslides and Slope Stability

Slope failures, commonly referred to as landslides, include many phenomena that involve the downslope displacement and movement of material, either triggered by static (i.e., gravity) or dynamic (i.e., earthquake) forces. A slope failure is a mass of rock, soil, and debris displaced downslope by sliding, flowing, or falling. Exposed rock slopes undergo rockfalls, rockslides, or rock avalanches, while soil slopes experience shallow soil slides, rapid debris flows, and deep-seated rotational slides. Landslides may occur on slopes of 15 percent or less; however, the probability is greater on steeper slopes that exhibit old landslide features such as scarps, slanted vegetation, and transverse ridges. Landslide-susceptible areas are characterized by steep slopes and downslope creep of surface materials. Debris flows consist of a loose mass of rocks and other granular material that, if saturated and present on a steep slope, can move downslope. The rate of rock and soil movement can vary from a slow creep over many years to a sudden mass movement. Landslides occur throughout the state of California, but the density of incidents increases in zones of active faulting.[58]

Slope stability can depend on a number of complex variables. The geology, structure, and amount of groundwater in the slope affect slope failure potential, as do external processes (i.e., climate, topography, slope geometry, and human activity). The factors that contribute to slope movements include those that decrease the resistance in the slope materials and those that increase the stresses on the slope. Slope failure under static forces occurs when those forces initiating failure overcome the forces resisting slope movement. For example, a soil slope may be considered stable until it becomes saturated with water (e.g., during heavy rains or due to a broken pipe or sewer line). Under saturated conditions, the water pressure in the individual pores within the soil

[57] United States Geological Survey. 2024. Areas of Land Subsidence in California. Available: https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html. Accessed December 31, 2024.
[58] *Ibid*

increases, reducing the strength of the soil. Cutting into the slope and removing the lower portion, or slope toe, can reduce or eliminate the slope support, thereby increasing stress on the slope.[59]

Earthquake motions can induce substantial horizontal and vertical dynamic stresses in slopes that can trigger failure. Earthquake-induced landslides can occur in areas with steep slopes that are susceptible to strong ground motion during an earthquake.

PROJECT AREA

Due to the generally flat topography and lack of steep slopes throughout the project area, the probability of earthquake-induced landslides is very low. Furthermore, there are no mapped landslide hazard zones in the MICUP project area or the immediate vicinity.[60]

Geologic Hazards and Areas

Erosion

Erosion is the wearing away of soil and rock by processes such as mechanical or chemical weathering, mass wasting, and the action of water and wind. Excessive soil erosion can eventually damage infrastructure such as foundations, equipment, pipelines, and roadways. In general, granular soils with relatively low cohesion and soils located on steep topography have a higher potential for erosion.[61]

PROJECT AREA

Flat areas within the project area are not highly susceptible to erosion by water, and soils in the area tend to be permeable due to the lack of development; nonetheless, surface water runoff in areas with slopes such as along channels may be susceptible to mild erosion by water. Further, all waterways are susceptible to erosion along their banks and linings. The entire MICUP project area is susceptible to wind erosion when groundcover is not present.

Expansive Soils

Expansive soils possess a shrink-swell characteristic that can result in structural damage over a long period of time. Expansive soils are largely comprised of silicate clays, which expand in volume when water is absorbed and shrink when dried. Highly expansive soils can cause damage to foundations and roads and other infrastructure.[62]

PROJECT AREA

As shown on Table 4.6-6 through Table 4.6-9, the NSJWCD, SEWD, and City of Stockton areas all contain some clay soils. The clay content within these MICUP project area soils may be susceptible to shrinkage or swelling.

[59] California Geological Survey. 2017b. CGS Seismic Hazards Program: Liquefaction Zones. Available: https://gis.data.ca.gov/datasets/cadoc::cgs-seismic-hazards-program-liquefaction-zones-1/explore?location=38.148233%2C-120.650395%2C9.52. Accessed December 31, 2024.
[60] California Department of Conservation. 2024. Landslide Inventory. Available: https://maps.conservation.ca.gov/cgs/lsi/app/. Accessed December 31, 2024.
[61] Natural Resources Conservation Service. 2004. Understanding Soil Risks and Hazards. Available: https://www.nrcs.usda.gov/sites/default/files/2022-10/soil-risks-and-hazards.pdf. Accessed January 6, 2025.
[62] Natural Resources Conservation Service. 2004. Understanding Soil Risks and Hazards. Available: https://www.nrcs.usda.gov/sites/default/files/2022-10/soil-risks-and-hazards.pdf. Accessed January 6, 2025.

Paleontological Resources

Definitions

Paleontological Resources – Paleontological resources are the fossilized remains or impressions of plants and animals, including vertebrates (animals with backbones; mammals, birds, fish, etc.), invertebrates (animals without backbones; starfish, clams, coral, etc.), and microscopic plants and animals (microfossils). Paleontological resources are valuable, nonrenewable, scientific resources used to document the existence of extinct life forms and to reconstruct the environments in which they lived.[63]

PALEONTOLOGICAL SENSITIVITY

The Society of Vertebrate Paleontology (SVP) has established four categories of potential for rock units to contain paleontological resources: high, low, undetermined and no potential (Table 4.6-12)[64]. This scheme is based on the fact that the probability of the presence of paleontological resources is directly associated with the rock units (e.g., geologic formations) themselves, which may occur over geographic areas larger than those of the proposed project. As discussed in the SVP[65], it is the mapped "limits of the entire rock unit, both areal and stratigraphic" that "define the extent of paleontological resources."

Rock units in which vertebrate or significant invertebrate, plant, or trace fossils have been previously found are considered to have a high potential for producing additional fossils. Rock units for which sparse information is available concerning fossil content, geologic age, and depositional setting are considered to have undetermined potential. Rock units from which few or poorly preserved fossils have been recovered, or only in rare circumstances, are considered to have low potential. Finally, some rock units will have no potential to yield fossils, for example high-grade metamorphic rocks or plutonic igneous rocks. All vertebrate fossils are typically considered to have potential scientific value and so any rock units that contain them are considered to have high potential. Table 4.6-12 defines the paleontological sensitivity ratings.

UNIQUE GEOLOGIC FEATURES

Unique geologic features are generally defined as those that are unique (i.e., rare and/or singular) in the broad field of geology. These may include certain minerals, type locations (i.e., locations where a geologic unit was first described/named), a representative of an important geologic principle, something notable/unique to the history of geology, a distinctive section that is used repeatedly for teaching or instruction, or units/outcrops that contribute to important natural habitats and/or ecology. There are no unique geologic features within the MICUP project area or vicinity.

[63] Society of Vertebrate Paleontology. 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. 2010.
[64] *Ibid*
[65] *Ibid*

Table 4.6-12 Paleontological Sensitivity Ratings

Sensitivity/Potential	Definition
High	Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e. g., ashes or tephras), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.). Paleontological potential consists of both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.
Undetermined	Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.
Low	Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e. g. basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
No	Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources.

Paleontological Resource Sensitivity in Project Area

To assess the paleontological sensitivities of the geologic mapping units (i.e., rock units) identified in the project area, research into the previous fossil finds from each unit was conducted, using available online databases including the Paleobiology Database (PBDB)[66] and the University of California Museum of Paleontology (UCMP) [67]; no field work was performed. In addition, the Sierra College Natural History Museum (SCNHM) and California State University-Chico (CSU-Chico) were contacted to determine whether either institution had information regarding paleontological resources from either the Place of Use or geologic units within the Place of Use. These institutions

[66] Paleobiology Database. 2024. *https://paleobiodb.org/#/*. February 5, 2025.
[67] University of California Museum of Paleontology. 2024. *https://ucmpdb.berkeley.edu/.* December 21, 2025.

indicated that using the UCMP database to search within San Joaquin County and the various formational units within the Place of Use would be the best course of action.[68][69][70]

It should be noted that the sensitivities assigned below correspond to surface-mapped geology. Depending on the construction-related depths of impact of any component-specific work in the project area, these sensitivities could change, for example increase with depth. This is because with depth, geologic unit ages tend to increase and the unit itself may change (e.g., transition from the Modesto Formation to the underlying Riverbank Formation). Grading, trenching, or other forms of downward cutting during construction have the potential to destroy fossils that are buried and thus not visible at the surface.

In general, geologic units containing alluvial sediments older than the Middle Holocene (which is all the units except for the dune sand [Qds]) have at least some potential to yield paleontological resources, especially where they are fine- to medium-grained; these sediments represent lower energy depositional environments which may have buried once living organisms. As such, all the geologic units in the project area, excluding the dune sands (Qds), the Laguna Formation (Pl), and Holocene alluvium (Qha), are considered to have a high potential to contain paleontological resources. Dune sands are unlikely to contain fossils within them, though dunes may mantle fossil-bearing units. The Laguna Formation, though ostensibly well-suited to contain fossils, based on composition (it is a terrestrial alluvium with some fine-grained facies), has not previously yielded fossils. And, though the Laguna Formation can resemble other units in the region (e.g., Modesto, Riverbank, and Turlock formations), where it is definitively identified, it can be considered to have low paleontological sensitivity. The unnamed Quaternary unit, Holocene alluvium (Qha), is unlikely to be old enough at the surface (i.e., 5,000 years or older) to contain fossils, though paleontological potential in the unit likely increases with depth (Table 4.6-13[71][72][73][74]).

Geologic units within the project areas that have yielded paleontological resources include the Modesto, Riverbank, and Turlock Lake formations. These units contain abundant vertebrate, invertebrate, and plant fossils, in multiple counties, including San Joaquin. Fossil taxa include mammoth, mastodon, bison, horse, camel, ground sloth, carnivorans (e.g., cat, dog, and weasel), rodents, birds, fish, and reptiles. UCMP collections also contain fossils from Pleistocene alluvial sediments within San Joaquin County that are not assigned to a specific geologic unit. These fossils could be from named geologic units, like the Modesto or Riverbank, but at the time of field collection, only general stratigraphic notes were made, and no formational unit assignments were applied.

[68] University of California, Museum of Paleontology. 2025. Email; personal correspondence. February 4, 2025.
[69] Sierra College Natural History Museum. 2025. Email; personal correspondence. February 5, 2025.
[70] California State University – Chico. 2025. Email; personal correspondence. February 4, 2025.
[71] Dawson. 2009. *Preliminary Geologic Map of the Lodi 30'x60' Quadrangle, California.*
[72] Meyer and Rosenthal. 2008. *A Geoarchaeological Overview and Assessment of Caltrans District 3.* April 2008
[73] Paleobiology Database. 2025. *https://paleobiodb.org/#/*. February 5, 2025.
[74] University of California Museum of Paleontology. 2024. *https://ucmpdb.berkeley.edu/.* December 21, 2024.

Table 4.6-13 Paleontological Sensitivity of Geologic Mapping Units in the Project Area

Paleontological Sensitivity	Mapping Unit	Age/Unit Category*	Description	Project Location (by District)
Low at surface, increasing with depth	Quaternary [Holocene] alluvium (Qha)	Holocene	Alluvium on fans, terraces, basins	North San Joaquin Water Conservation District; Stockton East Water District;
High	Quaternary alluvium (Qa)	Latest Pleistocene to Holocene	Unweathered, undivided alluvium	North San Joaquin Water Conservation District
No	Quaternary dune sand (Qds)	Latest Pleistocene to Holocene	Well-sorted, fine- to medium-grained eolian sand	North San Joaquin Water Conservation District
High	Modesto Formation, Upper Member, undivided alluvium (Qm2)	Late Pleistocene	Upper member, undivided alluvium	City of Stockton; North San Joaquin Water Conservation District; Stockton East Water District
High	Modesto Formation, Upper Member, fine-grained (Qm2b)	Late Pleistocene	Upper member, fine-grained	North San Joaquin Water Conservation District
High	Modesto Formation, Lower Member, undivided alluvium (Qm1)	Late Pleistocene	Lower member, undivided alluvium	North San Joaquin Water Conservation District
High	Modesto Formation, Lower Member, fine-grained (Qm1b)	Late Pleistocene	Lower member, fine-grained	Stockton East Water District; Woodbridge Irrigation District
High	Riverbank Formation, Undivided (Qr)	Middle/Late Pleistocene	Undivided, arkosic alluvium	North San Joaquin Water Conservation District
High	Riverbank Formation, Upper Unit (Qr3)	Middle/Late Pleistocene	Upper Unit, arkosic alluvium	North San Joaquin Water Conservation District; Stockton East Water District
High	Riverbank Formation, Middle Unit (Qr2)	Middle/Late Pleistocene	Middle Unit, arkosic alluvium	North San Joaquin Water Conservation District; Stockton East Water District
High	Riverbank Formation, Lower Unit (Qr1)	Middle/Late Pleistocene	Lower Unit, arkosic alluvium	North San Joaquin Water Conservation District
High	Turlock Lake Formation (Qtl)	Early Pleistocene	arkosic alluvium	North San Joaquin Water Conservation District; Stockton East Water District
Low	Laguna Formation (Pl)	Pliocene	Cobble gravel, sand, and silt	North San Joaquin Water Conservation District

UNNAMED QUATERNARY UNITS (QHA, QA, QDS)

Quaternary alluvium (Qha and Qa) in the MICUP project area has the potential to yield paleontological resources, as they are temporally and lithologically suitable for fossil preservation, if they are old enough[75]. Fossils may have already been recovered from these units over the years, but because the sediments have relatively non-diagnostic physical appearance, field provenience information may have not been collected, or mis-attributed. Qha sediments are considered to have low paleontological sensitivity at the surface, but sensitivities increase with depth. Qa sediments, which may be Pleistocene in age at the surface, are considered to have high paleontological sensitivity wherever they occur within the project area.

Quaternary dune sand (Qds) in the project area has the potential to mantle older units (e.g., the Modesto) that may yield paleontological resources; no fossils have been recovered from dune sands to date. Eolian sands are lithologically unsuitable for fossil preservation[76], and so they are considered to have no paleontological sensitivity wherever they occur within the project area.

MODESTO FORMATION (QM)

The Modesto Formation is fossiliferous and has high paleontological sensitivity. For example, in San Joaquin County, mammoth, horse, and carnivoran fossils from the Mormon Slough were collected in the 1950s[77]. Though it is unclear where exactly along the slough the fossils originate, their presence suggests a high potential for uncovering more within Modesto Formation sediments during construction-related activities in the project area. The Modesto Formation has yielded similar fossils, including ground sloth, camel, and bison from Fresno, Stanislaus, and Yolo counties[78]. It is unclear from the literature whether each member within the Modesto Formation has or has not yielded fossils, though based on lithology alone, the fine-grained members are likely to have higher potential. But, since these distinctions cannot be made at this time, the entire Modesto Formation is considered to have high paleontological sensitivity wherever it occurs.

RIVERBANK FORMATION (QR)

The Riverbank Formation has produced numerous vertebrate fossils and has high paleontological sensitivity[79]. Though the Riverbank Formation has not yielded fossils from San Joaquin County, hundreds of specimens have been recovered from sites in Fresno, Madera, Sacramento, and Stanislaus counties. Much of the fossil material recovered from the Riverbank Formation has come from Sacramento County, especially gravel pits and during construction projects[8081]. It is unclear from the literature or database searches whether each member within the Riverbank Formation has or has not yielded fossils. But, since these distinctions cannot be made at this time, the entire Riverbank Formation is considered to have high paleontological sensitivity wherever it occurs.

[75] Society of Vertebrate Paleontology. 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. 2010.
[76] *Ibid*
[77] University of California Museum of Paleontology. 2024. *https://ucmpdb.berkeley.edu/.* December 21, 2025.
[78] *Ibid*
[79] *Ibid*
[80] Hilton et al. 2000. A Late Pleistocene biota from the Arco Arena site, Sacramento, California. April 15, 2000.
[81] Shlemon et al. 2000. *Quaternary Geology of the Sacramento Area*. March 25, 2000.

TURLOCK LAKE FORMATION (QTL)

The Turlock Formation is fossiliferous and has high paleontological sensitivity[82]. One major source of fossils from the formation is the Fairmead Landfill site in Madera County[83][84], which has produced critical data for understanding the Middle to Late Irvingtonian (ca. 780,000) land mammal age in central California.

LAGUNA FORMATION (PL)

The Laguna Formation has thus far not yielded fossils, despite prior development/excavation within it[85]. However, because of its terrestrial setting, sedimentary nature, alluvial composition, and relative indistinguishability, in some cases, from younger units (e.g., Turlock Lake, Riverbank, and Modesto), it may yet yield fossils. As such, the Laguna Formation is assigned a low paleontological sensitivity, rather than no sensitivity.

4.6.3 Regulatory Framework

Federal Regulations

Clean Water Act

The federal Clean Water Act (CWA) and subsequent amendments, under the enforcement authority of the U.S. Environmental Protection Agency (USEPA), was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The purpose of the CWA is to protect and maintain the quality and integrity of the nation's waters by requiring states to develop and implement State water plans and policies. The CWA gave the USEPA the authority to implement pollution control programs such as setting wastewater standards for industry. In California, implementation and enforcement of the National Pollutant Discharge Elimination System (NPDES) program is conducted through the California State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs). The MICUP project area is within the Central Valley Regional Water Quality Control Board (CVRWQCB).

National Pollutant Discharge Elimination System Permit

The NPDES permit system was established in the CWA to regulate municipal and industrial point discharges to surface waters of the U.S. Each NPDES permit for point discharges contains limits on allowable concentrations of pollutants contained in discharges. Section 402 of the CWA contain general requirements regarding NPDES permits. The CWA was amended in 1987 to require NPDES permits for non-point source (i.e., stormwater) pollutants in discharges. Stormwater sources are diffuse and originate over a wide area rather than from a definable point. The goal of NPDES stormwater regulations is to improve the quality of stormwater discharged to receiving waters to the "maximum extent practicable" through the use of structural and nonstructural Best Management Practices (BMPs). BMPs can include the development and implementation of various practices including educational measures (workshops informing public of what impacts results when household chemicals are dumped into storm drains), regulatory measures (local authority of

[82] University of California Museum of Paleontology. 2024. *https://ucmpdb.berkeley.edu/.* December 21, 2025.
[83] Dundas et al. 1996. *The Fairmead Landfill Locality (Pleistocene, Irvingtonian), Madera County, California: preliminary report and significance*. September 13, 1996.
[84] Dundas et al. 2013. *The mid-Irvingtonian Fairmead Landfill fossil site, Madera County Paleontology Collection, and Fossil Discover Center of Madera County, California*. May 2013.
[85] *Ibid*

drainage facility design), public policy measures, and structural measures (filter strips, grass swales and detention ponds). As noted above in the CWA, the USEPA has delegated the authority for regulating NPDES permits to the State-level in California (see more detailed description, below).

Earthquake Hazards Reduction Act

In October 1977, the U.S. Congress passed the Earthquake Hazards Reduction Act to reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards reduction program. To accomplish this goal, the act established the National Earthquake Hazards Reduction Program (NEHRP). This program was substantially amended in November 1990 by the National Earthquake Hazards Reduction Program Act (NEHRPA), which refined the description of agency responsibilities, program goals, and objectives.

The mission of NEHRP includes improved understanding, characterization, and prediction of hazards and vulnerabilities, improved building codes and land use practices, risk reduction through post-earthquake investigations and education, development and improvement of design and construction techniques, improved mitigation capacity, and accelerated application of research results. The NEHRPA designates FEMA as the lead Federal agency of the program and assigns several planning, coordinating, and reporting responsibilities. Other NEHRPA agencies include the National Institute of Standards and Technology, National Science Foundation, and the USGS.

Society of Vertebrate Paleontology Guidelines

The SVP, a national scientific organization of professional vertebrate paleontologists, has established standard guidelines that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, specimen preparation, analysis, and curation.[86] Most practicing professional paleontologists in the nation adhere to the SVP's assessment, mitigation, and monitoring requirements, as specifically spelled out in its standard guidelines.

State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) (California PRC Sections 2621–2630) was passed in 1972 to reduce the hazard of surface faulting to structures designed for human occupancy. The main purpose of the law is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. The law addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. The Alquist-Priolo Act requires the State Geologist to establish regulatory zones known as Earthquake Fault Zones around the surface traces of active faults and to issue appropriate maps. An active fault, for the purposes of the Alquist-Priolo Act, is one that has ruptured in the last 11,000 years. The maps are distributed to all affected cities, counties, and State agencies for their use in planning efforts. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, cities and counties must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

[86] Society of Vertebrate Paleontology (SVP). 2010. Assessment and Mitigation of Adverse Impacts to Nonrenewable Palaeontologic Resources—Standard Guidelines. Society of Vertebrate Paleontology News Bulletin, v. 163, pages 22–27.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act of 1990 (PRC Sections 2690–2699.6) addresses earthquake hazards from non-surface fault rupture, including liquefaction and seismically induced landslides. This act established a mapping program for areas that have the potential for liquefaction, landslide, strong ground shaking, or other earthquake and geologic hazards. This act also specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites, and mitigation measures are incorporated into plans to reduce hazards associated with seismicity and unstable soils.

National Pollutant Discharge Elimination System and Storm Water Pollution Prevention Plans

Construction associated with the proposed project would disturb more than one acre of land surface. The proposed project would, therefore, be subject to the *NPDES General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order 2009-0009-DWQ, NPDES No. CAS000002; as amended by Orders 2010-0014-DWQ and 2012-006-DWQ). The Construction General Permit (CGP) regulates discharges of pollutants in stormwater associated with construction activity. from construction sites that disturb one acre or more of land surface, or that are part of a common plan of development or sale that disturbs more than one acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines.

The CGP requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving waters risk level reflects the risk to the receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

- Effluent standards;
- Good site management “housekeeping;”
- Non-stormwater management;
- Erosion and sediment controls;
- Run-on and runoff controls;
- Inspection, maintenance, and repair; or
- Monitoring and reporting requirements.

The CGP requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific BMPs designed to prevent sediment and pollutants from contacting stormwater from moving offsite into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the CGP.

The SWPPP must be prepared before the construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as vehicle and equipment washing and fueling. The CGP also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following construction).

Public Resources Code Section 5097.5

PRC Section 5097.5 defines a misdemeanor as any unauthorized disturbance or removal of a historic or prehistoric ruin, burial ground, or archaeological or vertebrate paleontological site on public lands, without the express permission of the public agency having jurisdiction over the lands. This protection includes fossilized footprints, inscriptions, or other archaeological, paleontological, or historical features on public land.

California Building Code Chapter 18, Division 1 Section 1803.2 and 1804.5

The California Building Code (CBC), Chapter 18, Division 1 Section 1803.2 mandates that special foundation design consideration be employed if the Soil Expansion Index is 20 or greater in accordance with information shown in Table 4.6-14[87].

Table 4.6-14 California Building Code Expansive Soils Classification

Expansion Index	Potential Expansion
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

The methodology and scope for a geotechnical investigation are described in CBC Section 1803, and requires an assessment of a variety of factors, such as slope stability, soil strength, adequacy of load-bearing soils, the presence of compressible or expansive soils, and the potential for liquefaction. The required content of the geotechnical report includes recommendations for foundation type and design criteria. These recommendations can include foundation design provisions that are intended to mitigate the effects of expansive soils, liquefaction, and differential settlement. In general, mitigation can be accomplished through a combination of ground-modification techniques (i.e., stone columns, reinforcing nail and anchors, deep soil mixing, etc.),

[87] GEI Consultants, Inc. 2025. *International Conference of Building Officials Table 18-1-B*. 1994.

selection of an appropriate foundation type and configuration, and use of appropriate building/foundation structural systems.

The International Building Code replaced earlier regional building codes, including the Uniform Building Code, in 2000 and established consistent construction guidelines for the nation. In 2006, the International Building Code was incorporated into the CBC (Cal. Code Regs., Title 24), and currently applies to all structures being constructed in California. The national model codes are therefore incorporated by reference into the building codes of local municipalities. The CBC includes building design and construction criteria that take into consideration the State's seismic conditions.

California Building Standards Code

Title 24, Part 2 of the California Building Standards Code contains specific requirements for construction with respect to earthquakes and seismic hazards intended to be protective of public health. Chapter 16, Section 1613, Earthquake Loads of the Code deals with structural design and requires that every structure, and portion thereof, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions.

Regional and Local Regulations

General Plans

General Plans for San Joaquin County (2016) and the cities of Stockton (2018) and Lodi (2009) provide some guidance for avoiding or mitigation impacts to paleontological resources, should they be encountered, during project activities.

SAN JOAQUIN COUNTY

The San Joaquin County General Plan[88] did not originally include guidance for paleontological resources. Instead, within their chapter on Administration and Implementation (Part 4), Natural and Cultural Resources Elements (NCR) are presented, along with update recommendations. The following mentions paleontological resources:

NCR-N: Historic and Cultural Resource Preservation Regulations.

- The County shall update the Development Title to include archaeological, paleontological, and historic resource regulations, which will specify procedures to be followed in the event that significant resources are discovered during the development process.

This would implement policy NCR-6.5, of which the Community Development Department would be responsible, sometime between 2017 and 2022.

CITY OF STOCKTON

The City of Stockton's *Envision Stockton 2040 General Plan* (adopted December 4, 2018) outlines several policy actions as part of its Land Use planning, some of which overlap with cultural resource (i.e., archaeological) considerations[89].

[88] San Joaquin County. 2016. San Joaquin County General Plan. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed January 7, 2025.
[89] City of Stockton. 2018a. Envision Stockton 2040 General Plan. Available: https://www.stocktonca.gov/business/planning___engineering/general_plan.php#collapse1910b1. Accessed January 7, 2025.

Goal LU-5: Protected Resources

- **Policy LU-5.2:** Protect natural resource areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other cultural/historic resources from encroachment or destruction by incompatible development.
  - **Action LU-5.2D:** Require the following tasks by a qualified archaeologist or paleontologist prior to project approval:
    - Conduct a record search at the Central California Information Center located at California State University Stanislaus, the University of California Museum of Paleontology at Berkeley, and other appropriate historical or archaeological repositories.
    - Conduct field surveys where appropriate.
    - Prepare technical reports, where appropriate, meeting California Office of Historic Preservation or other appropriate standards.
    - Where development cannot avoid an archaeological or paleontological deposit, prepare a treatment plan in accordance with appropriate standards, such as the Secretary of the Interior's Standards for Treatment of Archaeological Sites.
  - **Action LU-5.2G:** Comply with appropriate State and federal standards to evaluate and mitigate impacts to cultural resources, including tribal, historic, archaeological, and paleontological resources.

CITY OF LODI

The following policies in the City of Lodi General Plan[90] are applicable to the proposed project:

- **Policy S-G2:** Prevent loss of lives, injury, illness, and property damage due to flooding, hazardous materials, seismic and geological hazards, and fire.
  - **Action S-P22:** Require soils reports for new projects and use the information to determine appropriate permitting requirements, if deemed necessary.

The City of Lodi's General Plan (adopted April 7, 2010)[91] mentions paleontological resources within one of its Conservation (Chapter 7) Implementing Policies related to Cultural Resources.

- C-P18: In the event that archaeological/paleontological resources are discovered during site excavation, the City shall require that grading and construction work on the project site be suspended until the significance of the features can be determined by a qualified archaeologist/paleontologist. The City will require that a qualified archaeologist/paleontologist make recommendations for measures necessary to protect any site determined to contain or constitute an historical resource, a unique archaeological resource, or a unique paleontological resource or to undertake data recovery, excavation, analysis, and curation of archaeological/paleontologist materials. City staff shall consider such recommendations and implement them where they are feasible in light of project design as previously approved by the City.

[90] *Ibid*
[91] City of Lodi. 2010. Lodi General Plan. Available: https://www.lodi.gov/191/Plan-Documents. Accessed January 7, 2025.

San Joaquin County Local Hazard Mitigation Plan

The San Joaquin County Local Hazard Mitigation Plan (HMP) provides strategies for the County and other local jurisdictions to identify and implement mitigation actions for reducing damages from various natural and technological disasters, including seismic and geologic hazards. The Local HMP develops an ongoing process for mitigating damage before and after a disaster (refer to Section 4.8, *Hazards and Hazardous Materials*, for more detailed information).[92]

4.6.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 CEQA Guidelines Appendix G significance criteria questions related to Geology and Soils.

Would the proposed project:

a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    1. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?
    2. Strong seismic ground shaking?
    3. Seismic-related ground failure, including liquefaction?
    4. Landslides?
b) Result in substantial soil erosion or the loss of topsoil?
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirectly risks to life or property?
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?
f) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Approach to Analysis

Geologic/Soil Hazards

This environmental analysis of the potential impacts related to geology and soils is based on a review of literature and database research (geologic, seismic, and soils reports and maps), as well as applicable federal and State regulations and the San Joaquin County, City of Stockton, and City of Lodi General Plans.

[92] San Joaquin County. 2023. San Joaquin County Local Hazard Mitigation Plan. Available: https://www.sjgov.org/docs/default-source/office-of-emergency-services-documents/lhmp/documents/2022-lhmp-10.18.22-version.pdf?sfvrsn=b7a69798_5. Accessed January 20, 2025.

Project components facilitated by MICUP would be governed by the various laws, regulations, and policies summarized above in Section 4.6.3, "Regulatory Framework." This analysis assumes that the proposed project would comply with applicable federal, State, and local laws and regulations, and local and State agencies would be expected to continue to enforce applicable requirements to the extent that they do so now.

After considering compliance with the relevant regulatory requirements, the environmental analysis identifies if the defined significance thresholds are exceeded, and therefore, a significant impact would occur. For those impacts considered to be significant, mitigation measures are proposed to the extent feasible to reduce the identified impacts.

Paleontological Resources

Evaluations of potential paleontological impacts of the proposed project are based on review of available documentation regarding paleontological sensitivity, including primary literature and online fossil databases available from the PBDB and the UCMP.

All vertebrate, invertebrate, and plant fossils are generally categorized as being of potentially significant scientific value.[93] The potential for construction-related activities to damage or destroy paleontologically-sensitive rock units would depend on the paleontological sensitivity of the affected sediments and the volume of sediment disturbed.

EIR Scoping Comments Consideration

No Environmental Impact Report (EIR) scoping comments were received in response to the EIR NOP related to geology, soils, or paleontological resources.

Specific Thresholds of Significance

For purposes of this analysis, the following thresholds are used to evaluate the significance of geology, soils, and paleontological resources impacts resulting from implementation of the proposed project.

- Place structures on or within the State designated zone of a known earthquake fault.
- Place structures where seismic ground shaking of a strong level or greater according to the Mercalli Scale could occur.
- Place structures on soils prone to any level of liquefaction.
- Place structures on slopes greater than 15 percent or soils susceptible to failure as defined by the USGS.
- Place structures in areas without impervious surfaces or vegetation, or on slopes greater than 15 percent.
- Place structures on a geologic unit or soil that is unstable or that could become unstable.
- Place structures on expansive soil that has an expansion index greater than 20 as defined in Table 18-1-B of the Uniform Building Code (1994).
- Place septic tanks or alternative wastewater disposal systems on soils incapable of supporting the use.
- Physically damage or destroy paleontological resources.

[93] Society of Vertebrate Paleontology (SVP). 2010. Assessment and Mitigation of Adverse Impacts to Nonrenewable Palaeontologic Resources—Standard Guidelines. Society of Vertebrate Paleontology News Bulletin, v. 163, pages 22–27.

Impact Evaluation

Earthquake Fault Rupture Risk

Significance Criterion a1:	Would the proposed project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

Impact GEO-1 MICUP PROJECT COMPONENTS AND FACILITIES WOULD NOT BE LOCATED WITHIN AN ALQUIST PRIOLO EARTHQUAKE FAULT ZONE, AND THEREFORE, THE PROPOSED PROJECT WOULD NOT BE SUBJECT TO EFFECTS INVOLVING RUPTURE OF A KNOWN EARTHQUAKE FAULT. THERE WOULD BE NO IMPACT.

Construction

Impacts related to risks associated with hazards involving fault rupture are limited to operational impacts. No respective construction impacts would occur.

Operation

All Districts

The MICUP project area (including all three Partner Agency areas and the overall Place of Use) does not contain fault-rupture hazard zone as delineated by the most recent Alquist-Priolo Earthquake Fault Zoning Act (Figure 4.6-17). Therefore, persons and property associated with MICUP operation would not be directly or indirectly subject to effects involving rupture of a known earthquake fault, and no operational impacts would occur.

Mitigation Measures

No mitigation is required.

Level of Significance

No Impact

Seismic-related or Unstable Geologic Unit Risk

Significance Criterion a2, a3, & a4:	Would the proposed project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving: 1. strong seismic ground shaking? 2. seismic-related ground failure, including liquefaction? 3. landslides?
Significance Criterion b:	Would the proposed project be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?
Significance Criterion d:	Would the proposed project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirectly risks to life or property?

Impact GEO-2 MICUP PROJECT COMPONENTS AND FACILITIES COULD EXPOSE PEOPLE OR STRUCTURES TO A RISK OF LOSS, INJURY, OR DEATH FROM SEISMIC EVENTS AND/OR COULD RESULT IN RISK DUE TO PLACEMENT ON UNSTABLE GEOLOGIC UNITS, INCLUDING EXPANSIVE SOILS. HOWEVER, PROJECT COMPONENTS WOULD BE DESIGNED USING RESULTS OF DETAILED GEOTECHNICAL ENGINEERING STUDIES CONDUCTED FOR THE PROJECT COMPONENTS AND FACILITIES, AS REQUIRED UNDER THE CALIFORNIA BUILDING CODE, WHICH WOULD REDUCE POTENTIAL IMPACTS ASSOCIATED WITH RISKS ASSOCIATED WITH SEISMIC AND GEOLOGIC HAZARDS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

Construction

Impacts related to risks associated with seismic-related hazards and location on an unstable geologic unit or soil are limited to operational impacts. No respective construction impacts would occur.

Operation

North San Joaquin Water Conservation District

NSJWCD's diversion of up to approximately 84,500 acre-feet per year (AFY) for MICUP would not directly result in the exposure of people or structures to substantial adverse effects involving seismic hazards or geologic hazards. In addition, diversions would not cause on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

The NSJWCD area is located in a region that lies between two areas of seismic activity and although no faults traverse through the project area, project components and facilities would be susceptible to ground shaking in the event of a local earthquake. Potential ground shaking could result in structural damage to proposed components and facilities, which in turn could affect operation of related systems. The proposed components and facilities are non-habitable; however, maintenance activities would require employees on-site at various times. Therefore, structural and mechanical failure of proposed components onset by seismic ground shaking could potentially threaten the safety of on-site workers.

Due to the generally flat topography throughout the NSJWCD area, and lack of steep slopes, the probability of landslides is very low. Furthermore, there are no mapped landslide hazard zones in the NSJWCD area or in its immediate vicinity. In addition, there are no areas of land subsidence in the NSJWCD area, and the CGS has not mapped any seismically-induced liquefaction hazard zones in the NSJWCD area. The NSJWCD area does contain soils that may exhibit expansive properties. Although there are no recorded or mapped areas containing geologic hazard zones, the specific soil properties of a site can vary on a small scale and may include undetermined areas that exhibit unstable soil properties. The presence of geologic hazards could decrease the structural stability of the proposed MICUP components, which could result in structural or operational failure of the facilities and/or threaten workers on-site during maintenance activities.

Dedicated surface-based recharge, such as recharge basins in the NSJWCD area, would involve the placement of water into an area of land, where it would infiltrate down into the underlying aquifer. The soils within these recharge areas, specifically, would undergo alternating wetting and drying cycles. As discussed above in Section 4.6.2, *Environmental Setting*, the clay content of onsite soils may be susceptible to shrinkage or swelling. The wetting of soil within these sites may cause expansion, but there would be no physical structures within the site that would result in operational failure.

All structural elements of the MICUP components would undergo appropriate design-level geotechnical studies prior to final design and consultation as required by the CBC. The geotechnical engineer, as a registered professional with the State of California, is required to comply with the CBC and local codes while applying standard engineering practice and the appropriate standard of care required for projects in San Joaquin County.

The design-level geotechnical studies of the MICUP components would identify potential seismic and geologic hazards at each site. The design would include recommendations to reduce risk from seismic and geologic hazards to a less-than-significant level. Therefore, operational impacts associated with seismic and soil hazards would be less than significant.

Stockton East Water District

Upon completion of all project components, SEWD would have the capacity to recharge approximately 111,600 AFY for MICUP during December to October, depending upon water availability. This recharge would not directly expose people or structures to substantial adverse effects involving seismic hazards or geologic hazards. In addition, diversions would not cause on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

SEWD is in a region between two areas of seismic activity and although no faults traverse through the project area, project components and facilities would be susceptible to ground shaking in the event of a local earthquake. Potential ground shaking could result in structural damage to proposed components and facilities, which in turn could affect operation of related systems. The proposed components and facilities are non-habitable; however, maintenance activities would require employees on-site at various times. Therefore, structural and mechanical failure of proposed components onset by seismic ground shaking could potentially threaten the safety of on-site workers.

Due to the generally flat topography throughout the SEWD area, and lack of steep slopes, the probability of landslides is very low. Furthermore, there are no mapped landslide hazard zones in the SEWD area or in its immediate vicinity. In addition, there are no areas of land subsidence in the SEWD area, and the CGS has not mapped any seismically-induced liquefaction hazard zones in SEWD

area. The SEWD area does contain soils that may exhibit expansive properties. Although there are no recorded or mapped areas containing geologic hazard zones, the specific soil properties of a site can vary on a small scale and may include undetermined areas that exhibit unstable soil properties. The presence of geologic hazards could decrease the structural stability of the proposed MICUP components, which could result in structural or operational failure of the facilities and/or threaten workers on-site during maintenance activities.

Dedicated surface-based recharge, such as recharge basins in the SEWD area, would involve the placement of water into an area of land, where it would infiltrate down into the underlying aquifer. The soils within these recharge areas, specifically, would undergo alternating wetting and drying cycles. As discussed above in Section 4.6.2, *Environmental Setting*, the clay content of onsite soils may be susceptible to shrinkage or swelling. The wetting of soil within these sites may cause expansion, but there would be no physical structures within the site that would result in operational failure.

All structural elements of the MICUP components would undergo appropriate design-level geotechnical studies prior to final design and consultation as required by the CBC. The geotechnical engineer, as a registered professional with the State of California, is required to comply with the CBC and local codes while applying standard engineering practice and the appropriate standard of care required for projects in San Joaquin County.

The design-level geotechnical studies of the MICUP components would identify potential seismic and geologic hazards at each site. The design would include recommendations to reduce risk from seismic and geologic hazards to a less-than-significant level. Therefore, operational impacts associated with seismic and soil hazards would be less than significant.

City of Stockton

Upon completion of all project components, the City of Stockton would be able to recharge approximately 29,610AFY for MICUP. This recharge would not directly expose people or structures to substantial adverse effects involving seismic hazards or geologic hazards. In addition, diversions would not cause on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

The City of Stockton area is located in a region that lies between two areas of seismic activity and although no faults traverse through the project area, project components and facilities would be susceptible to ground shaking in the event of a local earthquake. Potential ground shaking could result in structural damage to proposed components and facilities, which in turn could affect operation of related systems. The proposed components and facilities are non-habitable; however, maintenance activities would require employees on-site at various times. Therefore, structural and mechanical failure of proposed components onset by seismic ground shaking could potentially threaten the safety of on-site workers.

Due to the generally flat topography throughout the City of Stockton, and lack of steep slopes, the probability of landslides is very low. Furthermore, there are no mapped landslide hazard zones in the City of Stockton area or in its immediate vicinity. In addition, there are no areas of land subsidence in the City of Stockton area and the CGS has not mapped any seismically-induced liquefaction hazard zones in the City of Stockton area. The City of Stockton area does contain soils that may exhibit expansive properties. Although there are no recorded or mapped areas containing geologic hazard zones, the specific soil properties of a site can vary on a small scale and may include undetermined areas that exhibit unstable soil properties. The presence of geologic hazards could decrease the structural stability of the proposed MICUP components, which could result in

structural or operational failure of the facilities and/or threaten workers on-site during maintenance activities.

The City would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at the DWTP and existing stormwater basins. All existing facilities utilized by MICUP have already undergone design-level geotechnical studies in accordance with the CBC to minimize potential seismic and geologic hazards that could risk facility operations or workers on-site during maintenance activities. Therefore, operational impacts associated with seismic and soil hazards during the use of existing facilities would be less than significant.

However, under MICUP, the City would operate new areas of surface-based recharge, such as recharge basins, which would involve the placement of water into an area of land, where it would infiltrate down into the underlying aquifer. The soils within these recharge areas, specifically, would undergo alternating wetting and drying cycles. As discussed above in Section 4.6.2, *Environmental Setting*, the clay content of onsite soils may be susceptible to shrinkage or swelling. The wetting of soil within these sites may cause expansion, but there would be no physical structures within the site that would result in operational failure.

All structural elements of new MICUP components would undergo appropriate design-level geotechnical studies prior to final design and consultation as required by the CBC. The geotechnical engineer, as a registered professional with the State of California, is required to comply with the CBC and local codes while applying standard engineering practice and the appropriate standard of care required for projects in San Joaquin County.

The design-level geotechnical studies of the MICUP components would identify potential seismic and geologic hazards at each site. The design would include recommendations to reduce risk from seismic and geologic hazards to a less-than-significant level. Therefore, operational impacts associated with seismic and soil hazards would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less than Significant

Soil Erosion or Topsoil Loss

Significance Criterion c:	Would the proposed project result in substantial soil erosion or the loss of topsoil?

Impact GEO-3 MICUP PROJECT COMPONENTS AND FACILITIES WOULD INCLUDE GROUND DISTURBING ACTIVITIES, SUCH AS EXCAVATION AND GRADING, THAT WOULD RESULT IN LOOSE OR EXPOSED SOIL. DISTURBED SOIL COULD BE ERODED BY WIND OR RAIN DURING A STORM EVENT, WHICH COULD RESULT IN THE LOSS OF TOPSOIL. IN ADDITION, DURING PERIODS OF NON-RECHARGE, THE RECHARGE BASINS WOULD BE SUBJECT TO WIND EROSION. ADHERENCE TO EXISTING REGULATORY REQUIREMENTS WOULD REDUCE IMPACTS FOR PROJECTS OVER 1 ACRE. PROJECTS LESS THAN 1 ACRE COULD RESULT IN SIGNIFICANT EROSION. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION.

Construction

MICUP construction activities would involve earthmoving, excavation, stockpiling, and grading for many project components, all of which could loosen and expose soils to erosion processes, such as stormwater runoff, particularly during the winter months, which in turn could result in soil erosion, loss of topsoil, and sedimentation.

To prevent water and wind erosion during the construction period, a SWPPP would be developed and implemented for the proposed project as required for all projects that disturb more than one acre, as described in Section 4.6.3, *Regulatory Framework*, and described in greater detail in Chapter 4.9, *Hydrology and Water Quality: Surface Water* and Chapter 4.10, *Hydrology and Water Quality: Groundwater*. The CGP requires the preparation and implementation of a SWPPP that would specify BMPs to prevent construction pollutants, including eroded soils (such as topsoil), from moving off-site and provide erosion control measures to protect the topsoil. BMPs could include but would not be limited to scheduling activities to minimize soil disturbance during rain events; using silt fencing, straw bale barriers, fiber rolls, storm drain inlet protection, and hydraulic mulch; preserving vegetation; hydroseeding; and using soil binders.

North San Joaquin Water Conservation District

As described in Table 4.6-7 and illustrated in Figure 4.6-11 through Figure 4.6-14, soils within the NSJWCD area are susceptible to erosion. Within the NSJWCD area, construction activities that could result in soil erosion include vegetation removal, stockpiling soil, excavation for new and enhanced pipelines and recharge basins, drilling ASR wells, and grading of recharge basins and Flood-MAR facilities.

With adherence to GCP requirements, a SWPPP and associated BMPs would be implemented to minimize potential soil erosion and loss of topsoil from construction of project components that disturb more than 1 acre. Project components that disturb less than 1 acre would not be required to comply with the GCP or implement a SWPPP and thus would have potential to result in substantial erosion or loss of topsoil. Therefore, construction impacts would be potentially significant.

However, the implementation of Mitigation Measure GEO-1 would require that an Erosion Control Plan be prepared and BMPs be implemented. Implementation of the BMPs detailed in the Erosion Control Plan based on site-specific conditions and activities would prevent and control erosion and loss of topsoil. Therefore, construction impacts would be less than significant with mitigation.

Stockton East Water District

As described in Table 4.6-8 and illustrated in Figure 4.6-15, soils within the SEWD area are susceptible to erosion. Within the SEWD area, construction activities that could result in soil erosion include vegetation removal, stockpiling soil, excavation for new pipelines, grading for Mosher Creek recharge basins and pump stations, and West Linden Flood-MAR and dry wells, drilling ASR and dry wells, and grading of the Mosher Creek recharge basins and West Linden Flood-MAR.

With adherence to CGP requirements, a SWPPP and associated BMPs would be implemented to minimize potential soil erosion and loss of topsoil from construction of project components that disturb more than 1 acre. Project components that disturb less than 1 acre would not be required to comply with the CGP or implement a SWPPP and thus would have potential to result in substantial erosion or loss of topsoil. Therefore, construction impacts would be potentially significant.

However, the implementation of Mitigation Measure GEO-1 would require that an Erosion Control Plan be prepared, and BMPs be implemented. Implementation of the BMPs detailed in the Erosion Control Plan based on site-specific conditions and activities would prevent and control erosion and loss of topsoil. Therefore, construction impacts would be less than significant with mitigation.

City of Stockton

As described in Table 4.6-9 and illustrated in Figure 4.6-16, soils within the City of Stockton area are susceptible to erosion. Within the City of Stockton area, construction activities that could result in soil erosion include vegetation removal, stockpiling soil, and excavation and grading of recharge basins, dry wells, and new pipelines.

With adherence to CGP requirements, a SWPPP and associated BMPs would be implemented to minimize potential soil erosion and loss of topsoil from construction of project components that disturb more than 1 acre. Project components that disturb less than 1 acre would not be required to comply with the CGP or implement a SWPPP and thus would have potential to result in substantial erosion or loss of topsoil. Therefore, construction impacts would be potentially significant.

However, the implementation of Mitigation Measure GEO-1 would require that an Erosion Control Plan be prepared and BMPs be implemented. Implementation of the BMPs detailed in the Erosion Control Plan based on site-specific conditions and activities would prevent and control erosion and loss of topsoil. Therefore, construction impacts would be less than significant with mitigation.

Operation

Upon completion of all project components, the three MICUP Partner Agencies would be able to divert and recharge new water supplies during high flow conditions. Diversions during high flows on the Mokelumne River would reduce channel erosion or scour. Thus, MICUP diversion activities would not result in substantial soil erosion or the loss of topsoil. No impact related to MICUP water right coordination and use would occur.

The remainder of this operational impact discussion evaluates maintenance activities for each MICUP Partner Agency.

North San Joaquin Water Conservation District

Operation of the proposed pump stations, ASR wells, and pipelines would not create conditions contributing to wind erosion since these structures would not contain exposed soil. Maintenance activities of these project components would not result in any new ground disturbance which could

result in soil erosion or loss of topsoil. Recharge basins would contain water during operations, which would inhibit erosion; however, during periods of non-recharge, recharge basins would contain exposed soil devoid of vegetation that is subject to wind erosion. Agricultural land uses, such as annual farming, grazing, or fallowing, could be allowed within the basins when the basins are not needed for water recharge or water management purposes, subject to site conditions and operational criteria of NSJWCD. Plant cover in the basins would minimize wind erosion. Therefore, operational impacts would be less than significant.

Stockton East Water District

Operation and maintenance of ASR wells, dry wells, and pipelines would not contribute to wind erosion as these structures would not contain exposed soil. Maintenance activities of these project components would not result in any new ground disturbance that could result in soil erosion or loss of topsoil. During operation, the recharge basins would contain water, which would inhibit wind erosion; however, during periods of non-recharge, the recharge basins would be subject to wind erosion. Agricultural land uses, such as annual farming, grazing, or fallowing, could be allowed within the basins when the basins are not needed for water recharge or water management purposes, subject to site conditions and operational criteria of SEWD. Plant cover in the basins would minimize wind erosion. Recharge basins also would require regular sediment removal, vegetation management, and debris clearing to maintain their efficiency and recharge rate and prevent blockages. Adherence to these conditions would ensure that potential soil erosion and loss of topsoil impacts would be minimized to less-than-significant level.

City of Stockton

Operation of the dry wells and pipelines would not contribute to wind erosion since these structures would not contain exposed soil. Maintenance activities of these project components would not result in any new ground disturbance which could result in soil erosion or loss of topsoil. During operation of the groundwater recharge basins, the recharge basins would contain water, which would inhibit wind erosion; however, during periods of non-recharge, the recharge basins would be subject to wind erosion. Agricultural land uses, such as annual farming, grazing, or fallowing, could be allowed within the basins when the basins are not needed for water recharge or water management purposes, subject to site conditions and operational criteria of the City of Stockton. Plant cover in the basins would minimize wind erosion. Recharge basins also would require regular sediment removal, vegetation management, and debris clearing to maintain their efficiency and recharge rate and prevent blockages. Adherence to these conditions would ensure that potential soil erosion and loss of topsoil impacts would be minimized to less-than-significant level.

Mitigation Measures

GEO-1 Prepare and Implement an Erosion Control Plan for Project Components Disturbing Less-than-1-Acre During Construction.

Prior to and during construction activities, the agency implementing the project component shall prepare and implement an Erosion Control Plan to prevent and control pollution by minimizing and controlling erosion and runoff. A copy of the Erosion Control Plan shall be kept with the construction crew and modified as necessary to suit specific site conditions. The Erosion Control Plan shall identify the activities that may cause erosion or sedimentation during storms or strong wind events, and BMPs that will be employed to control erosion during both construction and operation.

Techniques that will be identified and implemented to reduce erosion and sedimentation may include but would not be limited to silt fences, staked straw bales/wattles, silt/sediment traps, geofabric, water bars, soil stabilizers, and re-seeding with native species and mulching to revegetate disturbed areas. If suitable vegetation cannot reasonably be expected to become established, non-erodible material will be used for such stabilization.

Level of Significance

Less than Significant with Mitigation

Soils Incapable of Supporting Alternative Wastewater Disposal Systems

Significance Criterion e:	Would the proposed plan have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

Impact GEO-4 MICUP PROJECT COMPONENTS AND FACILITIES WOULD NOT REQUIRE THE USE OF SEPTIC TANKS OR ALTERNATIVE WASTEWATER DISPOSAL SYSTEMS. THERE WOULD BE NO IMPACT.

Construction

Impacts related to the soil capability of supporting the use of alternative wastewater disposal systems are limited to operation. No construction impacts would occur.

Operation

All Districts

Operation and maintenance of proposed project components and infrastructure within all three MICUP Partner Agency areas would not include the use of septic wastewater disposal systems of any kind. Therefore, no operational impact would occur related to the ability of soils to support the use of septic systems or alternative wastewater disposal systems.

Mitigation Measures

No mitigation is required.

Level of Significance

No Impact

Effects on Unique Paleontological Resources or Geologic Features

Significance Criterion f:	Would the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Impact GEO 5 MICUP PROJECT COMPONENTS AND INFRASTRUCTURE HAVE THE POTENTIAL TO IMPACT PALEONTOLOGICAL RESOURCES DURING GROUND-DISTURBING ACTIVITIES. HOWEVER, WITH THE PREPARATION AND IMPLEMENTATION OF A PALEONTOLOGICAL MITIGATION AND MONITORING PLAN, IMPACTS WOULD BE REDUCED TO LESS-THAN-SIGNIFICANT LEVELS. IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION INCORPORATED.

Construction

Construction and ground-disturbing activities that occur in sediments with high paleontological sensitivity have the potential to significantly impact paleontological resources (Table 4.6-13). However, since previously disturbed or fill sediments are not considered paleontologically sensitive, ground-disturbance within either would not impact resources.

North San Joaquin Water Conservation District

Within the NSJWCD area, construction activities that have the potential to significantly impact paleontological resources or unique geologic features include excavations for new and enhanced pipelines, recharge basins, Flood-MAR facilities, and drilling ASR wells (if their diameter is 2 feet or wider). In general, narrow-diameter borings do not have the potential to produce scientifically significant paleontological resources, though damage to fossils may occur. The potential construction impact would be considered potentially significant if these ground-disturbing activities occur in previously undisturbed sediments with high paleontological sensitivity.

However, the implementation of Mitigation Measure GEO-2 would reduce this impact to a less-than-significant level because construction workers would be trained to recognize paleontological resources, monitoring would occur in areas of high sensitivity, and significant paleontological resources discovered during construction would be recovered and be curated in a designated fossil repository. Therefore, construction impacts would be less than significant with mitigation.

Stockton East Water District

Within the SEWD area, construction activities that have the potential to significantly impact paleontological resources or unique geologic features include excavations for new pipelines, Mosher Creek recharge facilities, West Linden recharge facilities, and drilling ASR and dry wells (if their diameter is 2 feet or wider). In general, narrow-diameter borings do not have the potential to produce scientifically significant paleontological resources, though damage to fossils may occur. The potential construction impact would be considered potentially significant if these ground-disturbing activities occur in previously undisturbed sediments with high paleontological sensitivity.

However, the implementation of Mitigation Measure GEO-2 would reduce this impact to a less-than-significant level because construction workers would be trained to recognize paleontological resources, monitoring would occur in areas of high sensitivity, and significant paleontological resources discovered during construction would be recovered and be curated in a designated fossil repository. Therefore, construction impacts would be less than significant with mitigation.

City of Stockton

Within the City of Stockton area, construction activities that have the potential to significantly impact paleontological resources or unique geologic features include excavations for new pipelines, recharge basins, and dry wells (if their diameter is 2 feet or wider). The potential construction impact would be considered potentially significant if these ground-disturbing activities occur in previously undisturbed sediments with high paleontological sensitivity.

However, implementation of Mitigation Measure GEO-2 would reduce this impact to a less-than-significant level because construction workers would be trained to recognize paleontological resources, monitoring would occur in areas of high sensitivity, and significant paleontological resources discovered during construction would be recovered and be curated in a designated fossil repository. Therefore, construction impacts would be less than significant with mitigation.

Operation

All Districts

Operation and maintenance of facilities within all three MICUP Partner Agency areas would not involve activities requiring excavation or other disturbance below the ground surface within previously undisturbed sediments. No operational impacts would occur related to paleontological resources.

Mitigation Measures

GEO-2 Prepare and Implement a Paleontological Mitigation and Monitoring Plan

Prior to the start of excavation activities (defined as construction work conducted below surface soils) within high-sensitivity geologic units (i.e., Quaternary alluvium [Qa], Modesto Formation [Qm], Riverbank Formation [Qr], and Turlock Lake Formation [Qt]) and 5 feet or more below the ground surface within unnamed Holocene alluvium (Qha), the lead agency shall retain a qualified paleontologist as defined by the SVP Impact Mitigation Guidelines Revision Committee (SVP 2010:10) to prepare a Paleontological Mitigation and Monitoring Plan (PMMP). This plan shall identify the areas mapped as high paleontological sensitivity, outline the procedures for construction staff Worker Environmental Awareness Program (WEAP) training, paleontological monitoring extent and duration, salvage and preparation of fossils, curation, monitoring and salvage report, and paleontological staff qualifications. The requirements of such a plan are discussed further below.

WORKER ENVIRONMENTAL AWARENESS PROGRAM

The lead agency shall require paleontological resources awareness training, as part of an overall WEAP, for all construction personnel, conducted by a Qualified Professional Paleontologist (QPP) who meets the SVP Professional Qualifications Standards (SVP 2010:10). The training shall be conducted before personnel begin any stages of project construction requiring ground disturbing activities in areas not previously disturbed by construction. The WEAP training shall include information on the physical appearance of fossils that may be encountered and the procedures for notifying paleontological staff should fossils be discovered by construction personnel.

PALEONTOLOGICAL MONITORING

Previously undisturbed areas identified in the PMMP as having high paleontological sensitivity (refer to the units enumerated above) will be monitored on a full-time basis by a Qualified Paleontological Resource Monitor (SVP 2010) during ground-disturbing activity. If no fossils are observed during the first 50 percent of excavations, which would indicate that the likelihood of uncovering significant paleontological resources from a particular excavation site is lower, paleontological monitoring may be reduced to weekly spot-checking, or eliminated entirely, based on the expert opinion of (i.e., at the discretion of) the QPP (SVP 2010:6).

SALVAGE OF FOSSILS

If fossils are discovered, the lead agency shall require the Qualified Paleontological Resource Monitor to recover, or salvage, them. Typically, fossils can be safely salvaged by a single paleontologist so as not to disrupt construction activity. In some cases, larger fossils (such as complete skeletons or large mammals) require more extensive excavation and longer salvage periods. In the latter case, the Qualified Paleontological Resource Monitor shall have the authority to temporarily re-direct, divert, or halt construction activity in the immediate area to ensure that fossils can be removed in a safe and timely manner.

PREPARATION AND CURATION OF RECOVERED FOSSILS

Once salvaged, the lead agency shall require the QPP to identify fossils to the lowest possible taxonomic level (e.g., genus and/or species) and to skeletal element, prepare fossils to a curation-ready condition, and curate fossils in a scientific institution with a permanent paleontological collection. All curated fossils shall be accompanied by field notes, photographs, maps, and other relevant data.

FINAL MONITORING AND SALVAGE REPORT

Once ground-disturbing activities are complete and fossils have been curated (if applicable), the lead agency shall require the QPP to prepare a final monitoring and salvage report describing the results of the monitoring program. The report shall include discussion of the locations, durations, and methods of the monitoring, stratigraphic sections, any recovered fossils, the scientific significance of those fossils, and where the fossils were curated.

Level of Significance

Less than Significant with Mitigation

4.6.5 Cumulative Impacts

The geographic scope of cumulative impacts related to geology, soils, and seismicity is limited to areas within and adjacent to the project area. Geologic and soils-related impacts are generally site-specific and depend on local geologic and soil conditions and the potential for a project to create an adverse effect that could result in impacts related to geology and soils. For paleontological resources, the significance of potential finds is considered within and adjacent to the project area as well as in the context of California.

The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1, *Cumulative Plans and Larger-scale Projects List*, which lists the relevant plans and larger-scale projects considered in conjunction with the proposed project (refer

to Chapter 4.0, *Environmental Impact Analysis*). Cumulative geology, soil, and seismicity impacts could occur if the project and cumulative projects identified in Table 4-1 involve concurrent activities that would: directly or indirectly cause substantial adverse effects, including the risk of loss, injury or death involving rupture of a known earthquake fault, strong seismic ground shaking, seismic-related ground failure, or landslides; result in substantial soil erosion or loss of topsoil; be located on an unstable geologic unit or soil, or that would become unstable as a result of a project, and potentially result in on-or off-site landslides, lateral spreading, subsidence, liquefaction, or collapse; be located on expansive soil; have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems; or destroy a unique paleontological resource site or unique geologic feature.

Geology, Seismicity, and Soils

Construction

Significant cumulative impacts related to geology and soils could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative and larger-scale projects identified in Table 4-1 to substantially increase risk that people or the environment would be exposed to seismic or geologic hazards. The cumulative or larger-scale projects that could be geographically adjacent or overlap components of the proposed project include the following cumulative projects: PA-2000217, PA-2200021, PA-2000218, PA-2200070; PA-2100014, PA-2200198; PA-2200277, PA-2200278, PA-2300162; Delta Water Treatment Plant Campus Improvement Project; Flood-MAR Projects; Interstate 5 Commerce Center Project; Stormwater Capture and Recharge; Mokelumne Aqueduct Relining Project; EBMUD Larger Conjunctive Use Project; Mokelumne Aqueduct Resiliency Project; Capital Improvement Plan; and the Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan (GSP) 2024 Update.

If the projects are constructed at the same time, the erosion effects during could be cumulatively significant. However, the CGP would require each project to prepare and implement a SWPPP (if over 1 acre in size) or water pollution control plan for projects that disturb less than one acre of land. The SWPPPs and water pollution control plans would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for erosion impacts would be reduced. The CGP has been developed to address cumulative conditions arising from construction throughout the State and is intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels and would not be cumulatively considerable (less than significant).

Operation

Seismically-induced groundshaking, liquefaction and lateral spreading, landslides, and expansive soils could cause structural damage or pipeline leaks or ruptures. The CBC, described in Section 4.6.2, *Regulatory Framework*, has been established to address and reduce the potential for such impacts to occur. The proposed project and cumulative projects would be required to comply with applicable provisions of these laws and regulations. Through compliance with these requirements,

the potential for impacts would be reduced. Therefore, based on compliance with these requirements, the incremental impacts of the proposed project combined with impacts of other projects in the area would not cause a significant cumulative impact to the risk of loss, injury or death related to seismic or geologic hazards. The proposed project's contribution to cumulative effects would not be cumulatively considerable, and this impact would be less than significant.

Paleontological Resources

Construction

Fossil discoveries resulting from excavation and earthmoving activities associated with development are occurring with increasing frequency throughout California. The value or importance of different fossil groups varies depending on the age and depositional environment of the rock unit that contains the fossils, their rarity, the extent to which they have already been identified and documented, and the ability to recover similar materials under more controlled conditions, such as part of a research project. The heritage contained in each fossil represents a non-renewable resource. If an organism has a fossil record (i.e., is preserved), that record is represented by a finite number of specimens. That number decreases with every specimen destroyed by weathering, erosion, of human actions.

Geologic units within the project area that have yielded paleontological resources include the Modesto, Riverbank, and Turlock Lake formations. These units contain abundant vertebrates fossils, in multiple counties, including San Joaquin. In addition, Quaternary (Holocene) alluvium, though low sensitivity at the surface, could contain fossils at depth (and become high sensitivity), which has been arbitrarily defined as 5 feet and below. Thus, construction activities could result in cumulative impacts to fossils within those formations should those activities increase the chances for increased erosion to fossil-bearing strata or unlawful collection. However, the proposed project would include mitigation (Mitigation Measure GEO-2) to reduce such impacts to paleontological resources. Therefore, the proposed project's contribution to cumulative impacts to paleontological resources would be less than cumulatively considerable with implementation of mitigation measures.

Operation

Once the proposed project and the cumulative projects have completed construction within fossil-bearing units, there would be no further potential to encounter paleontological resources, as long as the aforementioned erosion and unlawful collection be controlled. There would be no potential cumulative impacts associated with paleontological resources during project operation.

Mitigation Measures

Mitigation Measure GEO-2.

Overall Level of Cumulative Significance

Less than Significant with Mitigation

4.7 Greenhouse Gas Emissions and Energy

4.7.1 Introduction

This section describes existing greenhouse gas (GHG) emissions and sources and energy use Statewide, regionally, and within the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas), as well as the relevant regulatory framework. This section also analyzes possible impacts related to greenhouse gas (GHG) emissions and energy use from the implementation of the proposed project.

Information included in this section is based on GHG emissions data from the United States Environmental Protection Agency (USEPA), California Air Resources Board (CARB), San Joaquin County, City of Stockton, and City of Lodi as well as the project-related construction information included in Chapter 3.0, *Project Description,* and project-specific GHG emissions modeling results, which is included as Appendix G to this EIR.

4.7.2 Environmental Setting

Greenhouse Gas Emissions

Greenhouse Effect, Global Warming, and Climate Change

Most of the energy that affects the Earth's climate comes from the sun. Some solar radiation is absorbed by the Earth's surface, and a smaller portion of this radiation is reflected by the atmosphere back toward space. As the Earth absorbs high frequency solar radiation, its surface gains heat and then re-radiates lower frequency infrared radiation back into the atmosphere.

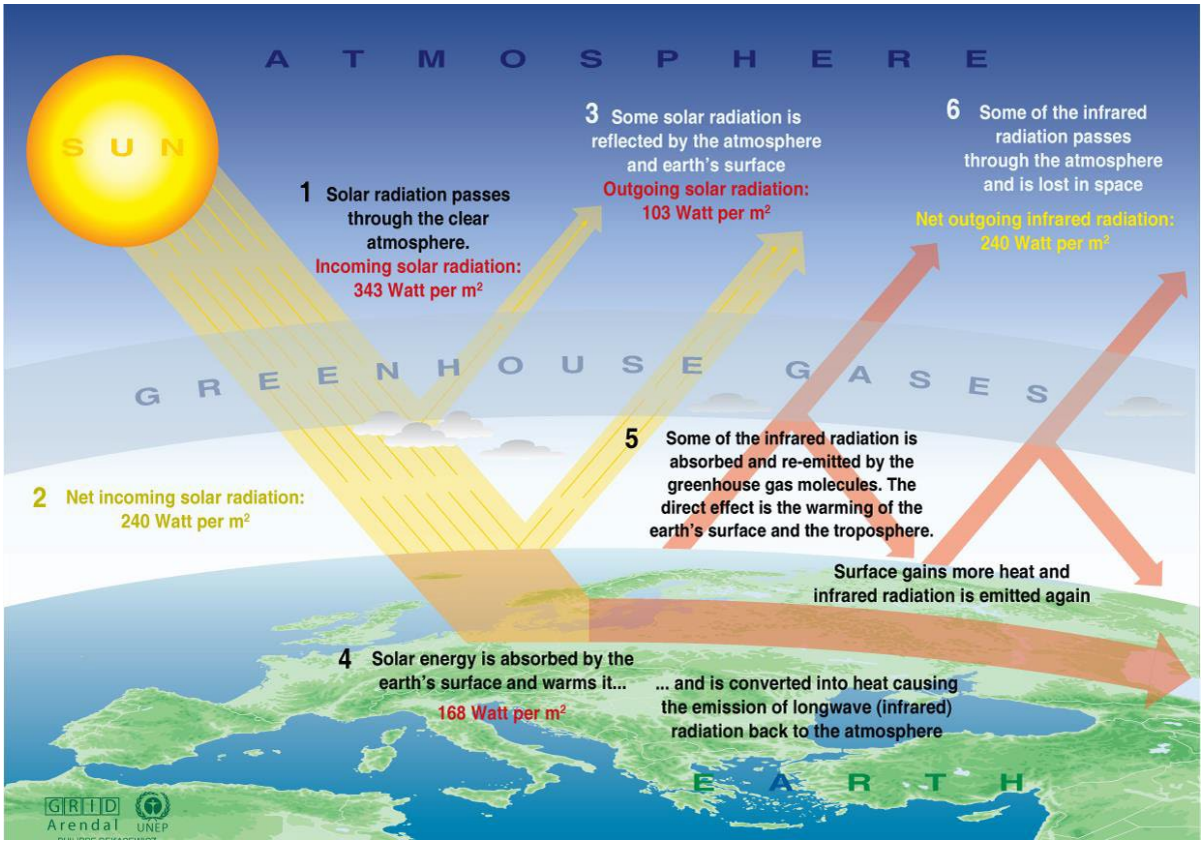
Most solar radiation passes through gases in the atmosphere classified as GHGs; however, infrared radiation is selectively absorbed by GHGs. GHGs in the atmosphere play a critical role in maintaining the balance between the Earth's absorbed and radiated energy, the Earth's radiation budget, by trapping some of the infrared radiation emitted from the Earth's surface that otherwise would have escaped to space (see Figure 4.7-1). Radiative forcing is the difference between the incoming energy and outgoing energy. Specifically, GHGs affect the radiative forcing of the atmosphere, which in turn affects the Earth's average surface temperature. This phenomenon, the greenhouse effect, keeps the Earth's atmosphere near the surface warmer than it would be otherwise and allows successful habitation by humans and other forms of life.

Combustion of fossil fuels and deforestation release carbon into the atmosphere that historically has been stored underground in sediments or in surface vegetation, thereby exchanging carbon from the geosphere and biosphere to the atmosphere in the carbon cycle. With the accelerated increase in fossil fuel combustion and deforestation since the Industrial Revolution of the 19th century, concentrations of GHGs in the atmosphere have increased exponentially. Such emissions of GHGs in excess of natural ambient concentrations contribute to the enhancement of the natural greenhouse effect. This enhanced greenhouse effect has contributed to global warming, an increased rate of warming of the Earth's average surface temperature. Specifically, increases in GHGs lead to increased absorption of infrared radiation by the Earth's atmosphere and warm the lower atmosphere further, thereby increasing temperatures and evaporation rates near the surface.

Variations in natural phenomena such as volcanoes and solar activity produced most of the global temperature increase that occurred during preindustrial times. More recently, however, increasing

atmospheric GHG concentrations resulting from human activity have been responsible for most of the observed global temperature increase.

Figure 4.7-1 The Greenhouse Gas Effect



Source: United Nations Environmental Program/GRID-Arendal. 2005. Greenhouse Effect. https://www.grida.no/resources/6467 (accessed October 2024).

Warming affects global atmospheric circulation and temperatures; oceanic circulation and temperatures; wind and weather patterns; average sea level; ocean acidification; chemical reaction rates; precipitation rates, timing, and form; snowmelt timing and runoff flow; water supply; wildfire risks; and other phenomena, in ways collectively referred to as climate change. Climate change is the alteration in the average weather of the Earth that is measured by modifications in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

TEMPERATURE PREDICTIONS

The United Nations Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to the understanding of climate change, its potential impacts, and options for adaptation and mitigation. The IPCC constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. In its Fourth Assessment Report, the IPCC predicted that the global mean temperature

change from 1990 to 2100, given six scenarios, could range from 1.1 degrees Celsius (°C) to 6.4°C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios. The report also concluded that "[w]arming of the climate system is unequivocal," and that "[m]ost of the observed increase in global average temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic GHG concentrations." Warming of the climate system is now considered to be unequivocal, with the global surface temperature increasing about 1.33 degrees Fahrenheit (°F) over the last 100 years. The IPCC predicts increases in global average temperature of between 2°F and 11°F over the next 100 years.[1]

GREENHOUSE GASES AND GLOBAL EMISSION SOURCES

Gases that trap heat in the atmosphere are referred to as GHGs. Prominent GHGs that naturally occur in the Earth's atmosphere are water vapor, carbon dioxide (CO_2), methane (CH_4), oxides of nitrogen (NO_X), and ozone. Anthropogenic (human-caused) GHG emissions include releases of these GHGs plus release of human-made gases with high global warming potential (GWP) (ozone-depleting substances such as chlorofluorocarbons [CFCs]) and aerosols, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The GHGs listed by the IPCC (CO_2, CH_4, nitrous oxide (N_2O), HFCs, PFCs, and SF_6) are discussed below, in order of abundance in the atmosphere. Water vapor, despite being the most abundant GHG, is not discussed below, because natural concentrations and fluctuations far outweigh anthropogenic influences, making it impossible to predict. Ozone is not included, because it does not directly affect radiative forcing. Ozone-depleting substances (CFCs, halons, carbon tetrachloride, methyl chloroform, and hydrochlorofluorocarbons) are not included, because they have been replaced by HFCs and PFCs.

The global warming potential is the potential of a gas or aerosol to trap heat in the atmosphere and is essentially a measurement of the radiative forcing of a GHG compared with the reference gas, CO_2. Individual GHG compounds have varying potential for contributing to global warming. For example, CH_4 is 25 times as potent as CO_2, while SF_6 is 22,200 times more potent than CO_2 on a molecule-per-molecule basis. To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method for comparing GHG emissions is the GWP methodology defined in the IPCC reference documents.[2] The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalents (CO_2e), which compares the gas in question to that of the same mass of CO2 (by definition, CO_2 has a GWP of 1). The global warming potential of a GHG is a measure of how much a given mass of a GHG is estimated to contribute to global warming. Thus, to describe how much global warming a given type and amount of GHG may cause, the CO_2e is used. A CO_2e is the mass emissions of an individual GHG multiplied by its global warming potential. As such, a high GWP represents high absorption of infrared radiation and a long atmospheric lifetime compared to CO_2. One must also select a time horizon to convert GHG emissions to equivalent CO_2 emissions to account for chemical reactivity and lifetime differences among various GHG species. The standard time horizon for climate change analysis is 100 years. Generally, GHG emissions are quantified in terms of metric tons (MT) of CO_2e emitted per year.

The atmospheric residence time of a gas is equal to the total atmospheric abundance of the gas divided by its rate of removal. The atmospheric residence time of a gas is, in effect, a half-life measurement of the length of time a gas is expected to persist in the atmosphere when accounting for removal mechanisms such as chemical transformation and deposition. Units commonly used to

[1] IPCC. 2007. AR4 Climate Change 2007: The Physical Science Basis. https://www.ipcc.ch/report/ar4/wg1/ (accessed February 2025)
[2] IPCC. 2014. Frequently Asked Questions. https://www.ipcc-nggip.iges.or.jp/faq/FAQ.pdf (accessed February 2025)

describe the concentration of GHGs in the atmosphere are parts per million (ppm), parts per billion (ppb), and parts per trillion (ppt), referring to the number of molecules of the GHG in a sampling of 1 million, 1 billion, or 1 trillion molecules of air. Collectively, HFCs, PFCs, and SF_6 are referred to as high-GWP gases. CO_2 is by far the largest component of worldwide CO_2e emissions, followed by CH_4, N_2O, and high-GWP gases, in order of decreasing contribution to CO_2e.

The primary human processes that release GHGs include the burning of fossil fuels for transportation, heating, and electricity generation; agricultural practices that release CH_4, such as livestock grazing and crop residue decomposition; and industrial processes that release smaller amounts of high-GWP gases. Deforestation and land cover conversion have also been identified as contributing to global warming by reducing the Earth's capacity to remove CO_2 from the air and altering the Earth's albedo or surface reflectance, thus allowing more solar radiation to be absorbed. Specifically, CO_2 emissions associated with fossil fuel combustion are the primary contributors to human-induced climate change. CO_2, CH_4, and N_2O emissions associated with human activities are the next largest contributors to climate change. GHGs of California concern are defined by California Assembly Bill (AB) 32 (see the Regulatory Environment subsection below for a description) and include CO_2, CH_4, NO_X, HFCs, PFCs, and SF_6. A seventh GHG, nitrogen trifluoride (NF_3), was also added under the California Health and Safety Code Section 38505(g)(7) as a GHG of concern. These GHGs are described in terms of their physical description and properties, global warming potential, atmospheric residence lifetime, sources, and atmospheric residence lifetime in Table 4.7-1.

Global Climate Change

EXTENT

Climate change is a global problem, because GHGs are global pollutants, unlike criteria air pollutants and hazardous air pollutants (i.e., toxic air contaminants) that are pollutants of regional and local concern. Pollutants with localized air quality effects have relatively short atmospheric lifetimes, approximately one day; by contrast, GHGs have long atmospheric lifetimes, several years to several thousand years. GHGs persist in the atmosphere for enough time to be dispersed around the globe.

Although the exact lifetime of particular GHG molecules depends on multiple variables and cannot be pinpointed, more CO_2 is currently emitted into the atmosphere than is sequestered. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through photosynthesis and dissolution, respectively. These are two of the most common processes of CO_2 sequestration. Of the total annual human-caused CO_2 emissions, approximately 54 percent is sequestered through ocean uptake, Northern Hemisphere forest regrowth, and other terrestrial sinks within a year, whereas the remaining 46 percent of human-caused CO_2 emissions is stored in the atmosphere.[3]

Similarly, effects of GHGs are borne globally, as opposed to the localized air quality effects of criteria air pollutants and hazardous air pollutants. The quantity of GHGs that it takes to ultimately result in climate change is not precisely known and cannot be quantified, and no single plan or project would be expected to measurably contribute to a noticeable incremental change in the global average temperature, or to global or local climates or microclimate. However, emissions of GHGs have the potential to adversely affect the environment, because such emissions contribute, on a cumulative basis, to global climate change.

[3] Seinfeld, J.H. and Pandis, S.N. 2006. Atmospheric Chemistry and Physics: From Air Pollution to Climate Change, 2nd Edition. New York. John Wiley & Sons.

Table 4.7-1 Description of Greenhouse Gases of California Concern

Greenhouse Gas	Physical Description and Properties	Global Warming Potential (100 years)	Atmospheric Residence Lifetime (years)	Sources
Carbon dioxide (CO_2)	Odorless, colorless, natural gas.	1	50–200	Burning coal, oil, natural gas, and wood; decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; oceanic evaporation; volcanic outgassing; cement production; land use changes.
Methane (CH_4)	Flammable gas and is the main component of natural gas.	25	12	Geological deposits (natural gas fields) extraction; landfills; fermentation of manure; and decay of organic matter.
Nitrous oxide (N_2O)	N_2O (laughing gas) is a colorless GHG.	298	114	Microbial processes in soil and water; fuel combustion; industrial processes.
Chloro-fluoro-carbons (CFCs)	Nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (level of air at the Earth's surface); formed synthetically by replacing all hydrogen atoms in CH_4 or ethane with chlorine and/or fluorine atoms.	3,800–8,100	45–640	Refrigerants aerosol propellants; cleaning solvents.
Hydro-fluoro-carbons (HFCs)	Synthetic human-made chemicals used as a substitute for CFCs and contain carbon, chlorine, and at least one hydrogen atom.	140-11,700	1–50,000	Automobile air conditioners; refrigerants.
Per- fluoro-carbons (PFCs)	Stable molecular structures and only break down by ultraviolet rays about 60 kilometers above Earth's surface.	6,500-9,200	10,000–50,000	Primary aluminum production; semiconductor manufacturing.
Sulfur hexafluoride (SF_6)	Human-made, inorganic, odorless, colorless, and nontoxic, nonflammable gas.	22,800	3,200	Electrical power transmission equipment insulation; magnesium industry, semiconductor manufacturing; a tracer gas.
Nitrogen trifluoride (NF_3)	Inorganic, is used as a replacement for PFCs, and is a powerful oxidizing agent.	17,200	740	Electronics manufacture for semiconductors and liquid crystal displays.

Sources:

IPCC. 2007. AR4 Climate Change 2007: The Physical Science Basis. https://www.ipcc.ch/report/ar4/wg1/ (accessed February 2025)

IPCC 2007. AR4 Climate Change 2007: Synthesis Report. https://www.ipcc.ch/report/ar4/syr/ (accessed February 2025)

TRENDS AND EFFECTS

Globally, climate change has the potential to affect numerous environmental resources through potential impacts related to future air temperatures and precipitation patterns. Scientific modeling predicts that continued GHG emissions at or above current rates would induce more extreme climate changes during the 21st century than was observed during the 20th century. Long-term trends found that each of the past four decades was warmer than all the previous decades in the instrumental record. The observed global mean surface temperature for the decade from 2011 to 2020 was 1.1°C higher than the global mean surface temperature over the period from 1850 to 1900.[4] Several independently analyzed data records of global and regional Land-Surface Air Temperature obtained from station observations agree that Land-Surface Air Temperature and sea surface temperatures have increased. Due to past and current activities, anthropogenic GHG emissions are increasing global mean surface temperature at a rate of 0.2°C per decade. In addition, there are identifiable signs that global warming is currently taking place, including substantial ice loss in the Arctic over the past two decades.[5,6]

According to California's Fourth Climate Change Assessment, Statewide temperatures from 1986 to 2016 were approximately 1°F to 2°F higher than those recorded from 1901 to 1960. Potential impacts of climate change in California may include loss in water supply from snowpack, sea level rise, more extreme heat days per year, more large forest fires, and more drought years. While there is growing scientific consensus about the possible effects of climate change at a global and Statewide level, current scientific modeling tools are unable to predict what local impacts may occur with a similar degree of accuracy.[7]

In California, climate change may result in consequences such as the following:

- **Reduction in the quality and supply of water from the Sierra snowpack.** If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate water supplies. It can also lead to a potential reduction in hydropower.
- **Increased risk of large wildfires.** If rain increases as temperatures rise, wildfires in the forests, grasslands and chaparral ecosystems of Southern California are estimated to increase by approximately 30 percent toward the end of the 21st century because more winter rain will stimulate the growth of more plant "fuel" available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.
- **Reductions in the quality and quantity of certain agricultural products.** The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.

[4] World Meteorological Organization. 2023. Rate and impacts of climate change surges dramatically in 2011-2020. https://wmo.int/news/media-centre/rate-and-impact-of-climate-change-surges-dramatically-2011-2020 (accessed February 2025)
[5] IPCC. 2014. Summary for Policymakers. In: AR5 Climate Change 2014, Mitigation of Climate Change. https://www.ipcc.ch/report/ar5/wg3/ (accessed February 2025)
[6] IPCC. 2018. Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report. https://www.ipcc.ch/sr15/ (accessed February 2025)
[7] California, State of. 2018. California Fourth Climate Change Assessment Statewide Summary Report. http://www.climateassessment.ca.gov/state/ (accessed February 2025)

- **Exacerbation of air quality problems.** If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the increase expected if rising temperatures remain in the lower warming range. This increase in air quality problems could result in an increase in asthma and other health-related problems.
- **Rise in sea levels resulting in the displacement of coastal businesses and residences.** During the past century, sea levels along California's coast have risen about seven inches. If emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.
- **Increase in temperature and extreme weather events.** Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in California. More heat waves can exacerbate chronic disease or heat-related illness.
- **Decrease in the health and productivity of California's forests.** Climate change can cause an increase in wildfires, an enhanced nuisance insect population, and establishment of non-native species.
- **Damage to marine ecosystems and natural environment.** Climate change can cause damage to marine ecosystems, including acidification of the oceans due to increased CO_2 levels (including coral bleaching).

Existing GHG Emissions

GLOBAL

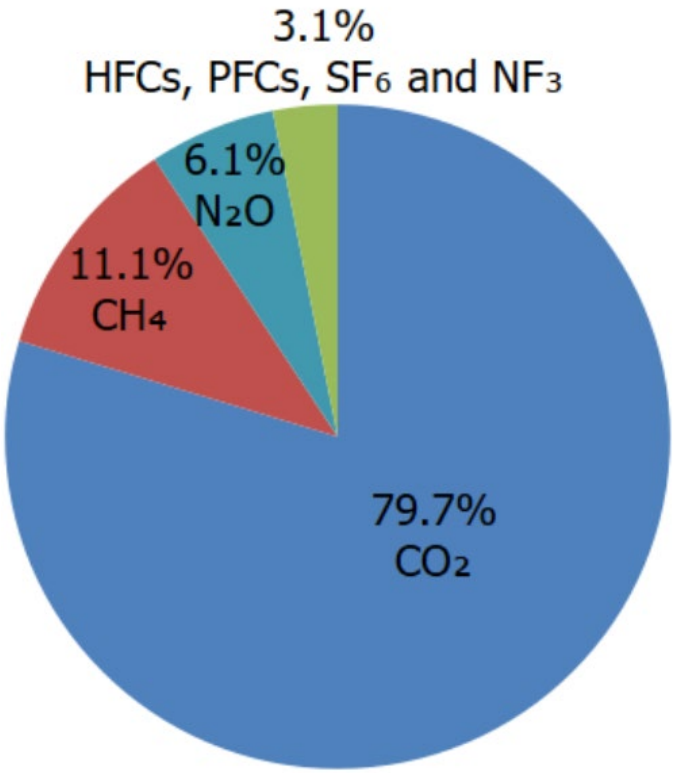
In 2019, worldwide anthropogenic emissions totaled 49,758 billion metric tons (MT) of CO_2e, which is a 53 percent increase from 1990 levels. Specifically, 74.4 percent of CO_2e is from CO_2, 17.3 percent from CH_4, 6.2 percent from N_2O, and 2.1 percent from fluorinated gases were emitted in 2019. The largest source of GHG emissions were energy production and use (including fuels used by vehicles and buildings), which accounted for 73.2 percent of the global GHG emissions. Agriculture uses and industrial processes contributed 18.4 percent and 5.2 percent, respectively. Waste sources contributed to 3.2 percent.[8]

UNITED STATES

In 2021, total U.S. GHG emissions were 6,347.7 million MT of CO_2e, which is a 2 percent decrease from 1990 levels. Net GHG emissions decreased by 16.3 percent from 2005 to 2021 but increased by 6.8 percent from 2020 to 2021. From 2019 to 2020, there was a sharp decline in emissions largely due to the impacts of the COVID-19 pandemic on travel and other economic activity. Between 2020 and 2021, the increase in total GHG emissions was driven largely by an increase in CO_2 emissions from fossil fuel combustion due to economic activity rebounding after the COVID-19 pandemic. In 2022, the largest source of CO_2, and of overall emissions, was fossil fuel combustion, representing approximately 79.7 percent of U.S. GHG emissions. CH_4 accounted for nearly 11.1 percent, N_2O accounted for approximately 6.1 percent, and the remaining 3.1 percent of U.S. GHG emissions were HFCs, PFCs, SF_6, and NF_3.[9] These numbers are reflected in Figure 4.7-2, below.

[8] Our World in Data. 2023. Greenhouse Gas Emissions. https://ourworldindata.org/greenhouse-gas-emissions (accessed February 2025).
[9] US EPA. 2024. "Overview of Greenhouse Gases." Overviews and Factsheets. 2024. https://www.epa.gov/ghgemissions/overview-greenhouse-gases (accessed February 2025)

Figure 4.7-2 2022 U.S. GHG Emissions by Gas



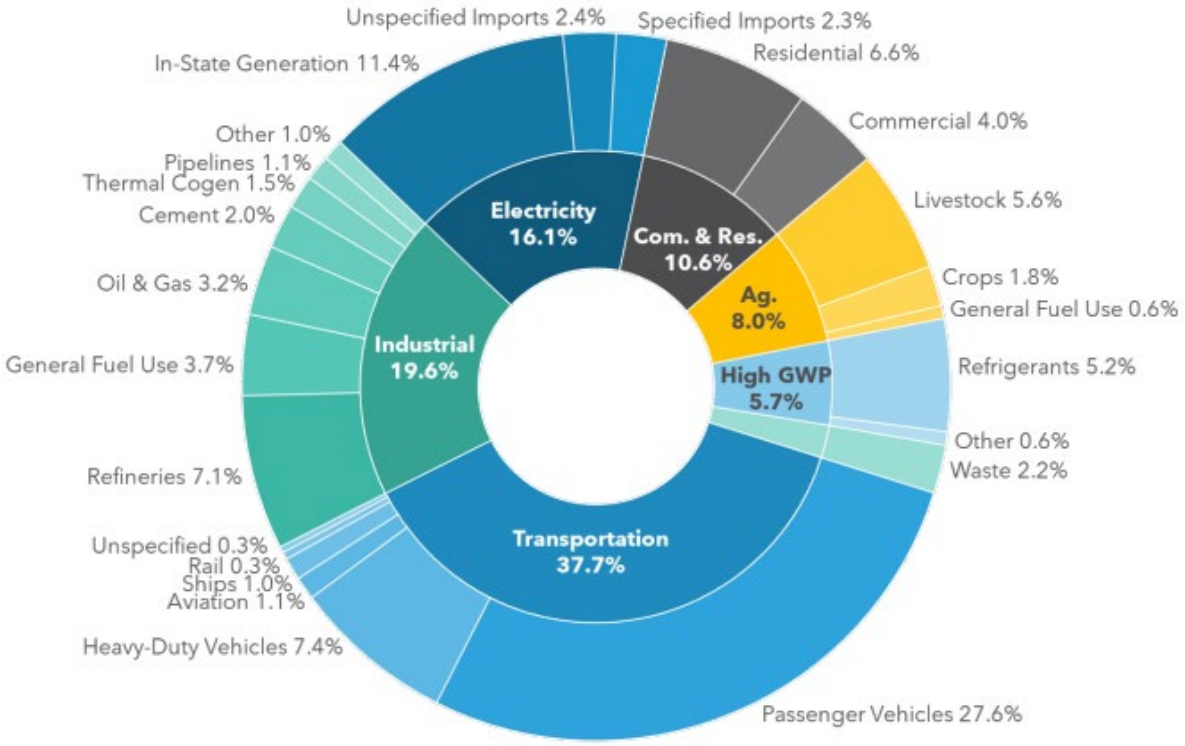
Source: US EPA. 2022. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2022.

CALIFORNIA

Based on the California Air Resources Board (CARB) California Greenhouse Gas Inventory for 2000-2022, total California GHG emissions were 371.1 million MT of CO_2e in 2022. This is 9.3 million MT of CO_2e (2.4 percent) lower than in 2021 (380.4 million MT of CO_2e). The major source of GHG emissions in California is associated with transportation, which contributed nearly 38 percent of Statewide GHG emissions in 2022. The industrial sector is the second largest source, contributing 19.6 percent of Statewide GHG emissions, and the electricity sector accounted for approximately 16 percent.[10] The breakdown of GHG emissions by sector and subsector is reflected in Figure 4.7-3, below.

[10] CARB. 2024. California GHG Emissions for 2000 to 2022: Trends of Emissions and Other Indicators. https://ww2.arb.ca.gov/sites/default/files/2024-09/nc-2000_2022_ghg_inventory_trends.pdf (accessed February 2025)

Figure 4.7-3 2022 California GHG Emissions by Scoping Plan Sectors and Sub-Sectors



Note: This figure breaks out 2022 California emissions by sector into an additional level of sub-sector categories. The inner ring shows the broad CARB Climate Change Scoping Plan sectors. The outer ring breaks out the sectors into sub-sectors or emission categories. The transportation sector represents tailpipe emissions from on-road vehicles and direct emissions from other off-road mobile sources; it does not include emissions from petroleum refineries and oil extraction and production, which are included in the industrial sector.

Source: CARB. 2024. California GHG Emissions for 2000 to 2022: Trends of Emissions and Other Indicators. https://ww2.arb.ca.gov/sites/default/files/2024-09/nc-2000_2022_ghg_inventory_trends.pdf (accessed February 2025)

PLACE OF USE (PROJECT AREA)

San Joaquin County

Per San Joaquin County's GHG emissions inventory that serves as the GHG emissions baseline for the County General Plan, approximately 3,051,996 MT of CO_2e was emitted in 2007 for sectors under local jurisdictional control (unincorporated). The largest source of emissions for the County was transportation, accounting for 44 percent of total unincorporated county emissions.[11] Transportation emissions are often the largest source of emissions in community inventories. Energy emissions (electricity and natural gas) as well as agricultural emissions are the two second largest sources of emissions and account for 27 percent of total community emissions, each. The remaining sources in order of greatest contributions were solid waste management (1.35 percent) followed by wastewater treatment (0.09 percent).

The GHG inventory presented here most closely relates to NSJWCD and SEWD project components, as the NSJWCD and SEWD project component areas are located within the area covered under the San Joaquin County General Plan.

[11] San Joaquin County. 2016. APPENDIX A: General Plan Sustainability Policies and Programs. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/Part%205_Appendix%20A_2016-11-22.pdf (accessed February 2025).

City of Stockton

Per the City of Stockton GHG emissions inventory that serves as the GHG emissions baseline for the City of Stockton Climate Action Plan (CAP), approximately 2,360,932 MT of CO_2e was emitted in 2005 for sectors under local jurisdictional control. The largest source of emissions for the City was on-road transportation, which represented 48 percent of total community emissions. Transportation emissions are often the largest source of emissions in community inventories. Building energy emissions are the second largest source of emissions and account for 33 percent of total community emissions. The building energy sector includes emissions associated with natural gas combustion and electricity consumption in residential, commercial, and industrial buildings and other uses in Stockton. The third largest source was off-road equipment, which contributed 8 percent of the total 2005 emissions. The remaining sources in order of greatest contributions were high Global Warming Potential (GWP) GHGs (4 percent), wastewater treatment (4 percent), solid waste management (3 percent), water importation (0.4 percent), and agriculture (0.04 percent).[12]

The GHG inventory presented here most closely relates to SEWD and the City of Stockton project components, as the SEWD and City of Stockton project component areas are located within the area covered under the City of Stockton CAP.

City of Lodi

The City of Lodi CAP, "Green House Gas Inventory," presents a GHG emissions inventory, which also serves as an emissions baseline for 2008.[13] The emissions inventory identifies the sources, distribution, and amount of GHG emissions by emission sector, including energy consumption, transportation, solid waste, wastewater and water consumption. Per the Lodi GHG emissions inventory, approximately 514,175 MT of CO_2e was emitted in Lodi in 2008 for sectors under local jurisdictional control. The largest source of emissions for the City was residential and non-residential energy consumption, accounting for 58 percent of total community emissions. The second largest source of emissions was transportation, accounting for 29 percent of community emissions. The remaining sources in order of greatest contributions were solid waste (11 percent), water consumption (1 percent), wastewater treatment (1 percent), and municipal (1 percent).

The GHG inventory presented here most closely relates to SEWD and NSJWCD project components, as a portion of the these project component areas are located within the area covered under the City of Lodi CAP.

Energy

Energy Fundamentals

Energy is generally transmitted either in the form of electricity, measured in kilowatts (kW) or megawatts (MW), or natural gas measured in British thermal units (BTU), cubic feet, or therms. Fuel, such as gasoline or diesel, is measured in gallons or liters.

[12] City of Stockton. 2014. Climate Action Plan. Available at: https://cms3.revize.com/revize/stockton/Documents/Government/City%20Manager/Sustainability/Climate_Action_Plan_August_2014.pdf (accessed February 2025).
[13] City of Lodi. August 2013. Climate Action Plan. Available at: https://www.lodi.gov/DocumentCenter/View/84/Climate-Action-Plan---Draft-Initial-Study-and-Negative-Declaration-PDF (accessed February 2025).

ELECTRICITY

Electricity is used primarily for lighting, appliances, cooking, HVAC equipment, and other uses associated with building and vehicle operations. Electricity sources include clean, renewable, and fossil fuels. Clean energy is that which produces little to no greenhouse gas emissions, is generated from renewable sources, and/or is carbon-free. Nuclear power is an example of clean energy. A renewable energy source is defined as a power source other than a conventional power source (conventional power sources include nuclear energy, large hydropower (> 30 MW) or combustion of fossil fuels).[14] Examples of renewable energy sources include solar, small hydropower, biomass,[15] wind, and geothermal.

NATURAL GAS

Natural gas is used primarily for heating, water heating, and cooking and is typically associated with building operations.

FUEL

Fuel is used primarily for powering off-road equipment and vehicles (commercial trucks and other vehicles). The typical fuel types used are diesel and gasoline. In addition, propane fuel is used in parts of San Joaquin County, particularly in rural areas, for heating and powering appliances.

Electricity Supply, Source, and Distribution

CALIFORNIA

Based on the California Energy Commission (CEC) California Energy Demand 2022-2035 Revised Forecast, Pacific Gas and Electric (PG&E) total energy to serve load[16] for 2023 is 97,285-gigawatt hour (GWh), and by 2035 will be 115,677 GWh of electricity.[17] The amount of California electricity generation is presented in Table 4.7-2. As shown in Table 4.7-2, 36.56 percent of this electricity was sourced from natural gas, 48.56 percent from renewable sources, 9.34 percent from nuclear, and the remaining 5.54 percent was sourced from coal, oil, other and unspecified sources. Specifically, the 48.56 percent of California's 2022 retail electric sales that were served by renewable resources including wind, solar, geothermal, biomass, small hydroelectric, and large hydroelectric.

[14] CEC. 2017. RPS Eligibility Guidebook, Ninth Edition Revised. Available at: https://efiling.energy.ca.gov/getdocument.aspx?tn=217317 (accessed February 2025)
[15] Biomass is considered renewable if a facility is using fuel that results from "biomass conversion" as defined in Public Resources Code Section 40106 according to the *RPS Eligibility Guidebook, Ninth Edition Revised*.
[16] The total energy to serve load is the total electricity demand for a given forecasted year within a utility service area. This forecast is a benchmark for the utility to have enough electricity to serve total demand.
[17] CEC. 2023. California Energy Demand Forecast, 2022 - 2035 Baseline Forecast PGE Planning Area. https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2022-integrated-energy-policy-report-update-2 (accessed February 2025).

Table 4.7-2 California 2023 Total System Electric Generation

Fuel Type	In-State Generation (GWh)	Percent of In-State Generation	Northwest Imports (GWh)	Southwest Imports (GWh)	State Energy Mix (GWh)	State Power Mix
Coal	257	0.12%	163	4,561	4,981	1.77%
Natural Gas	94,192	43.68%	52	8,530	102,774	36.56%
Oil	36	0.02%	0	0	36	0.01%
Other (Waste Heat/Petroleum Coke)	206	0.10%	0	0	206	0.07%
Unspecified	0	0.00%	100	10,273	10,373	3.69%
Total Thermal and Unspecified	**94,690**	**43.91%**	**316**	**23,363**	**118,370**	**42.10%**
Nuclear	17,714	8.22%	196	8,361	26,272	9.34%
Large Hydro	27,066	12.55%	4,712	1,109	32,886	11.70%
Biomass	5,037	2.34%	753	-	5,790	2.06%
Geothermal	10,999	5.10%	221	2,347	13,567	4.83%
Small Hydro	4,853	2.25%	133	2	4,988	1.77%
Solar	41,344	19.17%	417	6,108	47,869	17.03%
Wind	13,920	6.46%	9,177	8,302	31,399	11.17%
Total Non-GHG and Renewable Resources	**120,932**	**56.09%**	**15,609**	**26,229**	**162,771**	**57.90%**
Total Energy	**215,623**	**100.00%**	**15,925**	**49,593**	**281,140**	**100.00%**

GWh = gigawatt-hours

Source: CEC. 2024. California 2023 Total System Electric Generation. https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2023-total-system-electric-generation (accessed February 2025).

Electricity is distributed through the various electric load-serving entities (LSEs) in California. These entities include investor-owned utilities, publicly owned LSEs, rural electric cooperatives, community choice aggregators, and electric service providers.[18]

SAN JOAQUIN COUNTY AND PROJECT AREA

Pacific Gas & Electric Company (PG&E) is the electricity provider for San Joaquin County, California. PG&E is an investor-owned utility (IOU) that provides electricity and natural gas to a large area of central and northern California. In conjunction with the utility companies, the California Public Utilities Commission (CPUC) is involved in energy conservation programs. Lodi Electric Utility is the electricity provider for the City of Lodi, California. PG&E is the current electricity provider for the City of Stockton; however, the City is incorporating a different electricity provider, Ava Community Energy, starting in April 2025.

To establish an accurate estimate of county-wide electricity use, utility-provided electricity to these communities was estimated using CEC county-wide data as the basis for total San Joaquin County electricity usage. CEC county-wide data is reported based on residential and nonresidential

[18] CEC. 2024. Electric Load-Serving Entities (LSEs) in California. https://www.energy.ca.gov/almanac/electricity_data/utilities.html (accessed February 2025)

consumption and includes all electricity end-uses, which includes PG&E-supplied electricity and direct access. The CEC 2022 electricity usage for San Joaquin County was 2,090,602,041 kWh for residential uses, 3,680,678,009 kWh for nonresidential uses, for a total of 5,771,280,050 kWh.[19]

Natural Gas Supply and Distribution

CALIFORNIA

According to the CPUC, natural gas from out-of-state production basins is delivered into California via the interstate natural gas pipeline system. The major interstate pipelines that deliver out-of-State natural gas to California gas utilities are Gas Transmission Northwest Pipeline, Kern River Pipeline, Transwestern Pipeline, El Paso Pipeline, Ruby Pipeline, Mojave Pipeline, and Tuscarora.[20] Because natural gas is a dispatchable energy resource that provides load when the availability of hydroelectric power generation and/or other energy sources decrease, distribution varies greatly from year to year. The availability and distribution of hydroelectric-sourced energy, increasing renewable-source energy, and overall consumer demand are the variables that shape the need for natural gas.

SAN JOAQUIN COUNTY AND PROJECT AREA

San Joaquin County consumed approximately 187.3 million therms of natural gas in 2022 in both residential and non-residential uses.[21] PG&E is the natural gas provider for San Joaquin County, including the City of Lodi and City of Stockton.

Fuel Distribution

CALIFORNIA

Petroleum Fuels

Distributors of gasoline include companies or individuals who make the first distribution of gasoline in California. Aircraft manufacturers and certificated or licensed carriers by air may be included within the definition of distributor. Distributors can also be "Brokers," which includes every person, other than a distributor or a retailer, who deals in lots of 200 or more gallons of gasoline. Based on the California Transportation of Petroleum Second Northern California Refinery Safety Forum, output from the refineries is usually placed in intermediate tanks before blending finished products. Most gasoline is shipped from refinery by pipeline, which serves over 60 distribution terminals, which is then transported to retail and nonretail stations by tanker trucks.[22]

Alternative Vehicle Fuels

Various Statewide regulations and plans encourage alternative fuel use to reduce GHG emissions and criteria pollutant emissions. These include the Low Carbon Fuel Standard and SB 32, as well as myriad other Statewide and local air district regulations. Conventional gasoline and diesel may be replaced with different alternative fuels, depending on the capability of the vehicle. Descriptions of the most widely used alternative fuels include the following:

[19] CEC. 2022. Electricity Consumption by County. https://ecdms.energy.ca.gov/elecbycounty.aspx (accessed February 2025).
[20] CPUC. 2024. Natural Gas and California. https://www.cpuc.ca.gov/industries-and-topics/natural-gas/natural-gas-and-california (accessed February 2025)
[21] CEC. 2024. Gas Consumption by County. http://www.ecdms.energy.ca.gov/gasbycounty.aspx (accessed February 2025)
[22] Schremp. 2015. California Transportation of Petroleum: Second Northern California Refinery Safety Forum. https://calepa.ca.gov/wp-content/uploads/sites/6/2016/10/Refinery-Documents-2015yr-Petroleum.pdf (accessed February 2025).

- **Electricity** can power electric and plug-in hybrid electric vehicles directly from the power grid. Generally, these vehicles draw from the electricity grid and store the energy in their batteries.
- **Biodiesel** is a renewable alternative fuel that can be manufactured from vegetable oils, animal fats, or recycled restaurant grease. Biodiesel is biodegradable and cleaner-burning than petroleum-based diesel fuel. Generally, biodiesel can run in any diesel engine without alterations, but fueling stations have been slow to make it available.
- **Compressed natural gas (CNG) and liquefied natural gas (LNG)** is currently being used in vehicles. CNG is used in light-, medium-, and heavy-duty vehicles and gets about the same fuel economy. LNG is costly to produce and therefore is used in limited applications, typically in medium- and heavy-duty vehicles.
- **Hydrogen** is being explored for use in combustion engines and fuel cell electric vehicles. The interest in hydrogen as an alternative transportation fuel stems from its clean-burning qualities, its potential for domestic production, and the fuel cell vehicle's potential for high efficiency: hydrogen is two to three times more efficient than gasoline.

Existing Energy Use

CALIFORNIA

According to the U.S. Energy Information Administration (USEIA), total electricity direct consumption within California in 2022 was 13,052.857 GWh, down 0.004 percent, or 0.55 GWh, from 2021.[23] In 2023, total California natural gas demand for industrial, residential, commercial, and electric power generation was 2,087,461 million cubic feet per year (MCF/year).[24]

The main category of fuel use in California is transportation fuel, specifically gasoline and diesel. Gasoline is the most used transportation fuel in California: 97 percent of all gasoline sold in California is consumed by light-duty cars, pickup trucks, and sport utility vehicles. In 2022, an estimated 13.6 billion gallons of gasoline were sold (i.e., 37 million gallons gasoline per day).[25] Diesel is the second largest transportation fuel used in California. Many heavy duty-trucks, delivery vehicles, buses, trains, ships, boats and barges, farm, construction, and heavy-duty military vehicles and equipment have diesel engines. According to the California Annual Retail Fuel Outlet Report Results (CEC-A15), in 2023, 2,016 million gallons of diesel annually (i.e., 5.5 million gallons of diesel per day), including off-road diesel, was sold.[26]

SAN JOAQUIN COUNTY AND PROJECT AREA

As shown in Table 4.7-3, approximately 467 million gallons of transportation fuel were consumed in San Joaquin County in 2023, of which approximately 323 million gallons were gasoline and approximately 144 million gallons were diesel fuel.[27] This equates to approximately 1.27 million

[23] USEIA. 2022. California Electricity Profile 2022. https://www.eia.gov/electricity/state/archive/2022/california/ (accessed February 2025)
[24] USEIA. 2022. Natural Gas Consumption by End Use 2023. https://www.eia.gov/dnav/ng/ng_cons_sum_dcu_sca_a.htm (accessed February 2025)
[25] CEC. 2024. California Gasoline, Data, Facts, and Statistics. https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-gasoline-data-facts-and-statistics (accessed February 2025)
[26] CEC. 2024. California Retail Fuel Outlet Annual Reporting (CEC-A15) Results. https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting (accessed February 2025)
[27] CEC. 2024. 2010-2023 CEC-A15 Results and Analysis – Diesel Sales by County. https://www.energy.ca.gov/media/3874 (accessed February 2025)

gallons of fuel per day or 1.62 gallons of fuel per person per day, based on a 2023 Countywide population of 783,903 people.[28]

Table 4.7-3 Transportation Energy Consumption in San Joaquin County

Fuel Type	2023 Annual Fuel Use (million gallons)	2023 Daily Fuel Use (million gallons)
Gasoline (County)	323	0.88
Diesel (County)	144	0.39
Total (County)	**467**	**1.27**

Notes: Btu = British thermal units

Source: CEC. 2024. California Retail Fuel Outlet Annual Reporting (CEC-A15) Results. https://www.energy.ca.gov/data-reports/energy-almanac/transportation-energy/california-retail-fuel-outlet-annual-reporting (accessed February 2025).

4.7.3 Regulatory Framework

Additional regulatory information related to GHG emissions and energy efficiency standards are included throughout the other resource sections including Section 3.13, *Utilities and Service Systems*, which includes discussion of water use efficiency standards, solid waste standards, and wastewater standards, and Section 3.2, *Air Quality*, which includes discussion of air quality related regulations.

Federal Regulations

Clean Air Act (Regulation of GHGs)

The United States Environmental Protection Agency (USEPA) issued an Endangerment Finding under Section 202(a) of the Clean Air Act, opening the door to federal regulation of GHGs. The Endangerment Finding notes that GHGs threaten public health and welfare and are subject to regulation under the Clean Air Act. To date, the USEPA has not promulgated regulations on GHG emissions, but it has already begun to develop them.

Federal Fuel Efficiency Standards (CAFE)

Under the Clean Air Act, corporate average fuel economy (CAFE) standards have been set for passenger cars and light trucks. The State of California has traditionally had a waiver to set its own more stringent fuel efficiency standards. However, on August 2, 2018, the NHTSA and USEPA proposed the Safer Affordable Fuel-Efficient Vehicles Rule (SAFE Rule). This rule addresses emissions and fuel economy standards for motor vehicles and is separated in two parts as described below.

- Part One, "One National Program" (84 FR 51310) revokes a waiver granted by USEPA to the State of California under Section 209 of the CAA to enforce more stringent emission standards for motor vehicles than those required by USEPA for the explicit purpose of GHG reduction, and indirectly, criteria air pollutants and ozone precursor emission reduction. This revocation became effective on November 26, 2019, potentially restricting the ability of CARB to enforce more stringent GHG emission standards for new vehicles and set zero emission vehicle mandates in California.

[28] California Department of Finance (DOF). 2024. E-5 Population and Housing Estimates for Cities, Counties, and the State, 2011-2022 with 2010 Census Benchmark. https://dof.ca.gov/Forecasting/Demographics/Estimates/e-5-population-and-housing-estimates-for-cities-counties-and-the-state-2020-2024/ (accessed February 2025)

- Part Two addresses CAFE standards for passenger cars and light trucks for model years 2021 to 2026. This rulemaking proposes new CAFE standards for model years 2022 through 2026 and would amend existing CAFE standards for model year 2021. The proposal would retain the model year 2020 standards (specifically, the footprint target curves for passenger cars and light trucks) through model year 2026. The proposal addressing CAFE standards was jointly developed by NHTSA and USEPA, with USEPA simultaneously proposing tailpipe CO_2 standards for the same vehicles covered by the same model years.

Construction Equipment Fuel Efficiency Standard

USEPA sets emission standards for construction equipment. The first federal standards (Tier 1) were adopted in 1994 for all off-road engines over 50 horsepower (hp) and were phased in by 2000. A new standard was adopted in 1998 that introduced Tier 1 for all equipment below 50 hp and established the Tier 2 and Tier 3 standards. The Tier 2 and Tier 3 standards were phased in by 2008 for all equipment. The current iteration of emissions standards for construction equipment are the Tier 4 efficiency requirements are contained in 40 Code of Federal Regulations Parts 1039, 1065, and 1068 (originally adopted in 69 Federal Register 38958 [June 29, 2004], and most recently updated in 2014 [79 Federal Register 46356]). Emissions requirements for new off-road Tier 4 vehicles were completely phased in by the end of 2015.

U.S. Consolidated Appropriations Act (Mandatory GHG Reporting)

The Consolidated Appropriations Act, passed in December 2007, required the establishment of mandatory GHG reporting requirements. In September 2009, the USEPA issued the Final Mandatory Reporting of Greenhouse Gases Rule, which became effective January 1, 2010. The rule requires reporting of GHG emissions from large sources and suppliers in the U.S. and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 metric tons or more per year of GHG emissions are required to submit annual reports to USEPA. The first annual reports for the largest emitting facilities, covering calendar year 2010, were submitted to USEPA in 2011.

Energy Policy and Conservation Act

Enacted in 1975, the Energy Policy and Conservation Act established fuel economy standards for new light-duty vehicles sold in the United States. The law placed responsibility on the National Highway Traffic and Safety Administration (NHTSA), a part of the United States Department of Transportation (USDOT), for establishing and regularly updating vehicle standards. USEPA administers the Corporate Average Fuel Economy (CAFE) program, which determines vehicle manufacturers' compliance with existing fuel economy standards. Since the inception of the program, the average fuel economy for new light-duty vehicles steadily increased from 13.1 miles per gallon (mpg) for the 1975 model year to 30.7 mpg for the 2014 model year and can increase to 54.5 by 2025.

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National Energy Policy Act of 1992

The National Energy Policy Act of 1992 (EPACT92) calls for programs that promote efficiency and the use of alternative fuels. EPACT92 requires certain federal, state, and local governments and private operators to stock vehicle fleets with a percentage of light duty alternative fuel vehicles each year. In addition, EPACT92 has financial incentives: federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of alternative fuel vehicles. EPACT92 also requires states to consider a variety of incentive programs to help promote alternative fuel vehicles.

Energy Policy Act of 2005

The Energy Policy Act of 2005 provides renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Energy Independence and Security Act of 2007

The Energy Independence and Security Act, enacted by Congress in 2007, is designed to improve vehicle fuel economy and help reduce the United States dependence on foreign oil. It expands the production of renewable fuels, reducing dependence on oil, and confronting climate change. Specifically, it does the following:

- Increases the supply of alternative fuel sources by setting a mandatory Renewable Fuel Standard, requiring fuel producers to use at least 36 billion gallons of biofuel in 2022, which represents a nearly five-fold increase over current levels
- Reduces United States demand for oil by setting a national fuel economy standard of 35 miles per gallon (mpg) by 2020 – an increase in fuel economy standards of 40 percent

The Energy Independence and Security Act of 2007 also set energy efficiency standards for lighting (specifically light bulbs) and appliances. Development would also be required to install photosensors and energy-efficient lighting fixtures consistent with the requirements of 42 USC Section 17001 et seq.

State Regulations

Assembly Bill 1493 (Pavley Regulations and Fuel Efficiency Standards)

Assembly Bill (AB) 1493 (2002), California's Advanced Clean Cars program (referred to as Pavley), requires CARB to develop and adopt regulations to achieve "the maximum feasible and cost-effective reduction of GHG emissions from motor vehicles." On June 30, 2009, the USEPA granted the waiver of CAA preemption to California for its GHG emission standards for motor vehicles, beginning with the 2009 model year, which allows California to implement more stringent vehicle emission standards than those promulgated by the USEPA. Pavley I regulates model years from 2009 to 2016 and Pavley II, now referred to as "LEV (Low Emission Vehicle) III GHG," regulates model

years from 2017 to 2025. The Advanced Clean Cars program coordinates the goals of the LEV, Zero Emissions Vehicles (ZEV), and Clean Fuels Outlet programs and would provide major reductions in GHG emissions. By 2025, when the rules will be fully implemented, new automobiles will emit 34 percent fewer GHGs and 75 percent fewer smog-forming emissions from their model year 2016 levels.

Assembly Bill 32 (Global Warming Solutions Act and Scoping Plan)

California's major initiative for reducing GHG emissions is outlined in Assembly Bill (AB) 32, the "California Global Warming Solutions Act of 2006," which was signed into law in 2006. AB 32 codifies the statewide goal of reducing GHG emissions to 1990 levels by 2020 and requires CARB to prepare a Scoping Plan that outlines the main State strategies for reducing GHGs to meet the 2020 deadline. In addition, AB 32 requires CARB to adopt regulations to require reporting and verification of statewide GHG emissions. Based on this guidance, CARB approved a 1990 Statewide GHG level and 2020 limit of 427 million $MTCO_2e$. The Scoping Plan was approved by CARB on December 11, 2008 and included measures to address GHG emission reduction strategies related to energy efficiency, water use, and recycling and solid waste, among other measures. Many of the GHG reduction measures included in the Scoping Plan (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted since approval of the Scoping Plan.

In May 2014, CARB approved the first update to the AB 32 Scoping Plan. The 2013 Scoping Plan Update defined CARB's climate change priorities for the next five years and set the groundwork to reach post-2020 Statewide goals. The 2013 Scoping Plan Update highlighted California's progress toward meeting the 2020 GHG emission reduction goals defined in the original Scoping Plan. It also evaluated how to align the State's longer-term GHG reduction strategies with other State policy priorities, including those for water, waste, natural resources, clean energy, transportation, and land use. The State of California achieved its 2020 GHG emission reduction targets in 2016, and emissions have subsequently fallen further in 2018 to 425 $MMTCO_2e$.

Senate Bill 32 (Global Warming Solutions Act and Scoping Plan Extension)

Senate Bill (SB) 32 signed into law on September 8, 2016, tightens the requirements of AB 32 by requiring the State to further reduce GHGs to 40 percent below 1990 levels by 2030 (the other provisions of AB 32 remain unchanged). On December 14, 2017, CARB adopted the 2017 Scoping Plan, which provides a framework for achieving the 2030 target. The 2017 Scoping Plan relies on the continuation and expansion of existing policies and regulations, such as the Cap-and-Trade Program, as well as implementation of recently adopted policies, such as SB 350 and SB 1383. The 2017 Scoping Plan also puts an increased emphasis on innovation, adoption of existing technology, and strategic investment to support its strategies. As with the 2013 Scoping Plan Update, it recommends that local governments adopt policies consistent with statewide per capita goals of 6 $MTCO_2e$ by 2030 and 2 $MTCO_2e$ by 2050. As stated in the 2017 Scoping Plan, these goals may be appropriate for plan-level analyses (city, county, subregional, or regional level).

AB 1279 (California Climate Crisis Act and Scoping Plan Extension)

The California Climate Crisis Act (AB 1279), signed into law on September 16, 2022, requires the State to achieve and maintain net zero GHG emissions as soon as possible, but not later than 2045. The Climate Crisis Act also requires the State to reduce Statewide anthropogenic GHG emissions to 85 percent below the 1990 levels by 2045. Updates to the scoping plan are required to identify and recommend measures to achieve these goals and identify and implement policies and strategies

that enable carbon dioxide removal solutions and carbon capture, utilization, and storage technologies in the State.

On November 16, 2022, CARB also adopted the 2022 Scoping Plan, which provides a framework for achieving targets for carbon neutrality and reducing anthropogenic GHG emissions by 85 percent below 1990 levels no later than 2045, as directed by AB 1279. The 2022 Scoping Plan relies on significant reductions in fossil fuel combustion by deploying clean technologies and fuels, further reductions in short-lived climate pollutants, support for sustainable development, increased action on natural and working lands to reduce emissions and sequester carbon, and the capture and storage of carbon. Senate Bill 375 (Sustainable Communities and Climate Protection Act)

SB 375, signed in August 2008, enhances the State's ability to reach AB 32 goals by directing CARB to develop regional GHG emission reduction targets to be achieved from passenger vehicles by 2020 and 2035. In addition, SB 375 directs each of the State's 18 major Metropolitan Planning Organizations (MPOs) to prepare a "sustainable communities strategy" (SCS) that contains a growth strategy to meet these emission targets for inclusion in the Regional Transportation Plan (RTP). On March 22, 2018, CARB adopted updated regional targets for reducing GHG emissions from 2005 levels by 2020 and 2035. The San Joaquin Council of Governments (SJCOG) was assigned regional targets under SB 375. SJCOG must develop a "Sustainable Communities Strategy" (SCS) outlining how their region will achieve the assigned SB 375 targets by encouraging denser development near transit corridors and promoting mixed-use zoning.

Senate Bill 1383

Adopted in September 2016, SB 1383 (Lara, Chapter 395, Statutes of 2016) requires CARB to approve and begin implementing a comprehensive strategy to reduce emissions of short-lived climate pollutants. SB 1383 requires the strategy to achieve the following reduction targets by 2030:

- CH_4 – 40 percent below 2013 levels
- HFCs – 40 percent below 2013 levels
- Anthropogenic black carbon – 50 percent below 2013 levels

SB 1383 also requires the California Department of Resources Recycling and Recovery, in consultation with the CARB, to adopt regulations that achieve specified targets for reducing organic waste in landfills.

California Code of Regulations Title 24 (California Building Code)

Updated every three years, Title 24 of the California Code of Regulations requires California homes and businesses to meet strong energy efficiency measures, thereby lowering their energy use. Title 24 contains numerous subparts, including Part 1 (Administrative Code), Part 2 (Building Code), Part 3 (Electrical Code), Part 4 (Mechanical Code), Part 5 (Plumbing Code), Part 6 (Energy Code), Part 8 (Historical Building Code), Part 9 (Fire Code), Part 10 (Existing Building Code), Part 11 (Green Building Standards Code), Part 12 (Referenced Standards Code). The California Building Code is applicable to all development in California. (Health and Safety Code Sections 17950 and 18938(b).) The regulations receive input from members of industry, as well as the public, with the goal of "[r]educing of wasteful, uneconomic, inefficient, or unnecessary consumption of energy." (Pub. Res. Code Section 25402.) These regulations are scrutinized and analyzed for technological and economic feasibility (Pub. Res. Code Section 25402(d)) and cost effectiveness (Pub. Res. Code § 25402(b)(2) and (b)(3)).

PART 6 – BUILDING ENERGY EFFICIENCY STANDARDS/ENERGY CODE

CCR Title 24, Part 6 is the Building Energy Efficiency Standards or California Energy Code. This code, originally enacted in 1978, establishes energy-efficiency standards for residential and non-residential buildings to reduce California's energy demand. New construction and major renovations must demonstrate their compliance with the current Energy Code through submittal and approval of a Title 24 Compliance Report to the local building permit review authority and the CEC. The current iteration is the 2022 Title 24 standards.

The 2022 Standards build on California's technology innovations, encouraging energy efficient approaches to encourage building decarbonization, emphasizing in particular on heat pumps for space heating and water heating. This set of Energy Codes also extends the benefits of photovoltaic and battery storage systems and other demand flexible technology to work in combinations with heat pumps to enable California buildings to be responsive to climate change. This also strengthens ventilation standards to improve indoor air quality. This update provides crucial steps in the state's progress toward 100 percent clean carbon neutrality.

The 2022 Standards are divided into three basic sets. First, there is a basic set of mandatory requirements that apply to all buildings. Second, there is a set of performance standards – the energy budgets – that vary by climate zone (there are 16 in California) and building type; thus, the Energy Code are tailored to local conditions and provide flexibility in how energy efficiency in buildings can be achieved. Finally, the third set constitutes an alternative to the performance standards, which is a set of prescriptive packages that provide a recipe or a checklist compliance approach.

PART 11 – CALIFORNIA GREEN BUILDING STANDARDS

The California Green Building Standards Code, referred to as CALGreen, was added to Title 24 as Part 11, first in 2009 as a voluntary code, which then became mandatory effective on January 1, 2011 (as part of the 2010 California Building Standards Code). The 2022 CALGreen includes mandatory minimum environmental performance standards for all ground-up new construction of residential and non-residential structures. It also includes voluntary tiers with stricter environmental performance standards for these same categories of residential and non-residential buildings. Local jurisdictions must enforce the minimum mandatory CALGreen standards and may adopt additional amendments for stricter requirements.

The mandatory standards that could apply to a water infrastructure project require:

- Minimum 20 percent reduction in indoor water use relative to specified baseline levels;[29]
- Waste Reduction:
  - Minimum 65 percent non-hazardous construction/demolition waste diverted from landfills;
  - Nonresidential: 100 percent of trees, stumps, rocks and associated vegetation soils resulting from primary land clearing shall be reused or recycled.

[29] Similar to the compliance reporting procedure for demonstrating Energy Code compliance in new buildings and major renovations, compliance with the CALGreen water reduction requirements must be demonstrated through completion of water use reporting forms. Buildings must demonstrate a 20 percent reduction in indoor water use by either showing a 20 percent reduction in the overall baseline water use as identified in CALGreen or a reduced per-plumbing-fixture water use rate.

- Inspections of energy systems to ensure optimal working efficiency;
- Electric Vehicle (EV) Charging for New Construction.[30]

The CALGreen voluntary standards are only mandatory if a local ordinance requires them. Since the County has not made any of the voluntary measures mandatory, the following voluntary standards may not be applicable to the proposed project[31]:

- Deconstruct existing buildings and reuse applicable salvaged materials;

The CALGreen voluntary standards are divided into two tiers. Tier 1 adds additional requirements beyond the mandatory measures, whereas Tier 2 further increases the requirements.

- **Tier I**
  - Stricter energy efficiency requirements;
  - Stricter water conservation requirements for specific fixtures;
  - Minimum 65 percent reduction in construction waste with third-party verification;
  - Minimum 10 percent recycled content for building materials;
  - Minimum 20 percent permeable paving;
  - Minimum 20 percent cement reduction;
- **Tier II**
  - Stricter energy efficiency requirements;
  - Stricter water conservation requirements for specific fixtures;
  - Minimum 75 percent reduction in construction waste with third-party verification;
  - Minimum 15 percent recycled content for building materials;
  - Minimum 30 percent permeable paving;
  - Minimum 25 percent cement reduction;

Assembly Bill 341/Assembly Bill 1826 (Mandatory Recycling/Composting)

The California Integrated Waste Management Act of 1989, as modified by AB 341, requires each jurisdiction's source reduction and recycling element to include an implementation schedule that shows diversion away from landfills of 75 percent of all solid waste by 2020 and annually thereafter. AB 1826 requires recycling of organic waste (i.e., composting). All businesses and public entities that generate four or more cubic yards of solid waste per week and multi-family residential dwellings that have five or more units are required to recycle and compost.

Senate Bills 350 & 100 (Renewable Portfolio/Clean Energy & Pollution Reduction Act)

The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency in existing buildings by 2030.

[30] EV Capable = a vehicle space with electrical panel space and load capacity to support a branch circuit and necessary raceways to support EV charging. EV Ready = a vehicle space which is provided with a branch circuit and any necessary raceways to accommodate EV charging stations including a receptacle for future installation of a charger. See 2022 California Green Building Standard Code, Title 24 Part 11 for full explanation of mandatory measures including exceptions.
[31] The individual cities may require the CALGreen voluntary standards by ordinance.

Adopted on September 10, 2018, SB 100 supports the reduction of GHG emissions from the electricity sector by accelerating the State's Renewables Portfolio Standard Program, which was last updated by SB 350 in 2015. SB 100 requires electricity providers to increase procurement from eligible renewable energy resources to 33 percent of total retail sales by 2020, 44 percent by 2024, 60 percent by 2030, and 100 percent by 2045.

Assembly Bill 1007 (State Alternative Fuels Plan)

AB 1007 (Chapter 371, Statutes of 2005) required the CEC to prepare a State plan to increase the use of alternative fuels in California. The CEC prepared the State Alternative Fuels Plan (SAF Plan) in partnership with CARB and in consultation with other federal, State, and local agencies. The SAF Plan presents strategies and actions California must take to increase the use of alternative non-petroleum fuels in a manner that minimizes costs to California and maximizes the economic benefits of in-State production. The SAF Plan assessed various alternative fuels and developed fuel portfolios to meet California's goals to reduce petroleum consumption, increase alternative fuels use, reduce GHG emissions, and increase in-State production of biofuels without causing a significant degradation of public health and environmental quality.

CARB In-Use On-Road and Off-Road Diesel Rules

The CARB rule imposes limits on idling, restricts the addition of older vehicles, and requires the retirement or replacement of older engines depending on their fleet size category. This policy indirectly impacts energy consumption. More specifically, CARB is also charged with developing air pollution control regulations based upon the best available control measures and implementing feasible control measures under the State and Federal Clean Air Act. (Health & Saf. Code, Sections 39602.5, 39667, 43013, subds. (a) and (h), 43018, 40600, 40601, 40612(a)(2) and (c)(1)(A).) Pursuant to these statutory authorities, more stringent emission standards were adopted in 2004 for off-road construction equipment (i.e. "Tier 4" standards) (40 Code of Federal Regulations Parts 1039, 1065, and 1068; Cal. Code Regs., tit. 13, Section 2025; AR 2854). CARB also adopted emission standards for on-road heavy duty diesel vehicles (i.e. haul trucks). (Cal. Code Regs., tit. 13, Section 1956.8.) These haul truck regulations mandate fleet turn-over to ensure that by January 1, 2023 nearly all on-road diesel trucks will have 2010 model year engines or equivalent [i.e. Tier 4]. In addition, interim steps are incorporated into the regulations (e.g., vehicles older than 1999 will be replaced with newer engines by 2020).

California Advanced Clean Trucks Program

In June 2020, CARB approved the Advanced Clean Trucks regulation, which requires manufacturers who certify Class 2b-8 chassis or complete vehicles with combustion engines to sell zero-emission trucks as an increasing percentage of their annual California sales from 2024 to 2035. In addition, the regulation requires company and fleet reporting for large employers and fleet owners with 50 or more trucks. By 2045, all new trucks sold in California must be zero-emission. Implementation of this regulation would reduce consumption of nonrenewable transportation fuels as trucks transition to alternative fuel sources.

California Advanced Clean Fleets Regulation

In April 2023, CARB approved the Advanced Clean Fleets (ACF) regulation. The ACF regulation is part of California's strategy to accelerate the adoption of medium- and heavy-duty zero-emission vehicles (ZEVs). It complements the Advanced Clean Trucks ACT regulation and aims to achieve

public health, air quality, and climate goals. The ACF regulation applies to fleets performing drayage operations, those owned by State, local, and federal government agencies, and high priority fleets. The ACF regulation includes components such as a manufacturer sales mandate, drayage fleet registrations, requirements for drayage fleets to transition to zero-emission vehicles, and mandates for high priority and government fleets to purchase increasing percentages of ZEVs over time. The regulation provides flexibility and exemptions for cases where zero-emission trucks are not yet available. The ACF regulation is expected to significantly increase the number of ZEVs on California roads, leading to emissions reductions and health benefits. The Advanced Clean Trucks and ACF regulations together are expected to result in about 510,000, 1,350,000, and 1,690,000 ZEVs in California in 2035, 2045, and 2050, respectively.

Executive Order B-48-18 (Zero-Emission Vehicles)

On January 26, 2018, Governor Brown signed Executive Order B-48-18 requiring all State entities to work with the private sector to have at least 5 million zero-emission vehicles (ZEVs) on the road by 2030, as well as install 200 hydrogen fueling stations and 250,000 electric vehicle (EV) charging stations by 2025. It specifies that 10,000 of the EV charging stations should be direct current fast chargers. This order also requires all State entities to continue to partner with local and regional governments to streamline the installation of ZEV infrastructure. The Governor's Office of Business and Economic Development is required to publish a Plug-in Charging Station Design Guidebook and update the 2015 Hydrogen Station Permitting Guidebook to aid in these efforts. All State entities are required to participate in updating the 2016 Zero-Emissions Vehicle Action Plan, along with the 2018 ZEV Action Plan Priorities Update, which includes and extends the 2016 ZEV Action Plan (Governor's Interagency Working Group on Zero-Emission Vehicles 2016, 2018), to help expand private investment in ZEV infrastructure with a focus on serving low-income and disadvantaged communities.

Executive Order N-79-20 (Zero Emissions Vehicles Sales)

Governor Gavin Newsom signed Executive Order N-79-20 in September 2020, which sets a statewide goal that 100 percent of all new passenger car and truck sales in the State will be zero-emissions by 2035. It also sets a goal that 100 percent of statewide new sales of medium- and heavy-duty vehicles will be zero emissions by 2045, where feasible, and for all new sales of drayage trucks to be zero emissions by 2035. Additionally, the Executive Order targets 100 percent of new off-road vehicle sales in the State to be zero emission by 2035. CARB is responsible for implementing the new vehicle sales regulation.

Senate Bill 1020

Senate Bill 1020 (SB 1020), signed into law on September 16, 2022, requires renewable energy and zero-carbon resources to supply 90 percent of all retail electricity sales by 2035, 95 percent by 2040, and 100 percent by 2045. All State agencies facilities must be served by 100 percent renewable and zero-carbon resources by 2030. SB 1020 also requires the Public Utilities Commission, Energy Commission, and CARB to issue a joint progress report outlining the reliability of the electrical grid with a focus on summer reliability and challenges and gaps. Additionally, SB 1020 requires the Public Utilities Commission to define energy affordability and use energy affordability metrics to develop protections, incentives, discounts, or new programs for residential customers facing hardships due to energy or gas bills.

Warren-Alquist Act

The 1975 Warren-Alquist Act established the California Energy Resources Conservation and Development Commission, now known as the CEC. The Act established a State policy to reduce wasteful, uneconomical, and unnecessary uses of energy by employing a range of measures. The CPUC regulates privately owned utilities in the energy, rail, telecommunications, and water fields.

California Energy Plan

The CEC is responsible for preparing the California Energy Plan, which identifies emerging trends related to energy supply, demand, conservation, public health and safety, and the maintenance of a healthy economy. The 2008 California Energy Plan calls for the state to assist in the transformation of the transportation system to improve air quality, reduce congestion, and increase the efficient use of fuel supplies with the least environmental and energy costs. To further this policy, the plan identifies several strategies, including assistance to public agencies and fleet operators in implementing incentive programs for zero-emission vehicles and addressing their infrastructure needs, as well as encouragement of urban designs that reduce vehicle miles traveled (VMT) and accommodate pedestrian and bicycle access.

Assembly Bill 2076 (Reducing Dependence on Petroleum)

Pursuant to AB 2076 (Chapter 936, Statutes of 2000), CEC and CARB prepared and adopted a joint-agency report, *Reducing California's Petroleum Dependence,* in 2003. Included in this report are recommendations to increase the use of alternative fuels to 20 percent of on-road transportation fuel use by 2020 and 30 percent by 2030, significantly increase the efficiency of motor vehicles, and reduce per capita VMT. One of the performance-based goals of AB 2076 is to reduce petroleum demand to 15 percent below 2003 demand. Furthermore, in response to the CEC's 2003 and 2005 *Integrated Energy Policy Reports*, the Governor directed the CEC to take the lead in developing a long-term plan to increase alternative fuel use.

Senate Bill 1389 (Integrated Energy Policy Report)

Senate Bill 1389 (Chapter 568, Statutes of 2002) required the CEC to conduct assessments and forecasts of all aspects of energy industry supply, production, transportation, delivery and distribution, demand, and prices. The CEC uses these assessments and forecasts to develop energy policies that conserve resources, protect the environment, ensure energy reliability, enhance the state's economy, and protect public health and safety. The most recent assessment, the *2024 Integrated Energy Policy Report*, highlights the implementation of California's innovative policies and the role they have played in establishing a clean energy economy and provides more detail on several key energy policies, including decarbonizing buildings, increasing energy efficiency savings, and integrating more renewable energy into the electricity system.[32]

Regional and Local Regulations

San Joaquin Council of Governments 2018 RTP/SCS

The San Joaquin Council of Governments (SJCOG) adopted the 2018 RTP/SCS in June 2018. This long-range transportation planning document provides a plan for the region to reduce impacts from

[32] California Energy Commission. 2024. 2024 Integrated Energy Policy Report Update. https://www.energy.ca.gov/data-reports/reports/integrated-energy-policy-report/2024-integrated-energy-policy-report-update (accessed February 2025)

transportation networks and enhance multimodal transportation. The following policies and strategies from the 2018 RTP/SCS are relevant to the project:

- **Policy: Enhance the Environment for Existing and Future Generations and Conserve Energy**
  - Strategy #2: Enhance the Connection between Land Use and Transportation Choices through Project Supporting Energy and Water Efficiency
  - Strategy #3: Improve Air Quality by Reducing Transportation Related Emissions
- **Policy: Maximize Mobility and Accessibility**
  - Strategy #6: Facilitate Transit-Oriented Development to Maximize Existing Transit Investments
- **Policy: Improve the Quality of Life for Residents**
  - Strategy #25: Encourage Transportation Investments that Support a Greater Mix of Housing Options at All Income Levels
  - Strategy #26: Improve the Connection Between Land Use and Transportation

San Joaquin Valley Air Pollution Control District Guidance

San Joaquin Valley Air Pollution Control District (SJVAPCD) policies for addressing GHG emissions in CEQA are documented in their 2009 *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* (2009b). In the guidance, SJVAPCD recommends a performance-based standards approach that determines significance based on project design elements that would reduce GHG emissions. This approach would pre-quantify the emissions reduced and would negate the need to quantify project emissions. Implementation of SJVAPCD approved Best Performance Standards (BPS) would demonstrate that a new project would have a less than cumulatively significant impact. For land use development projects, examples of BPS include zero net energy buildings, energy efficient appliances, and reducing vehicle miles travelled. The combination of approved operation BPS must sum to at least a 29 percent reduction. For projects not implementing BPS, projects can comply with an approved GHG plan or reduce GHG emissions by at least 29 percent. Note that SJVAPCD states that implementing BPS is "expected to equal or exceed 29 percent reduction in GHG emissions from stationary sources and development projects", however SJVAPCD guidance does not address SB 32 goals nor CARB's latest Scoping Plan.

San Joaquin County General Plan

The County of Joaquin has established a series of provisions in the San Joaquin County 2035 General Plan that relate to the physical development of the County. Several goals and policies contained in the General Plan relate to greenhouse gases.[33] Applicable goals related to greenhouse gases are as follows:

Goal PHS-6 To reduce greenhouse gas emissions as part of the Statewide effort to combat climate change.

- **PHS-6.3 GHG Reduction Strategies.** The County shall promote greenhouse gas emission reductions by encouraging efficient farming methods (e.g., no-till farming, crop rotation, cover cropping); supporting the installation of renewable energy technologies; and protecting

[33] County of San Joaquin. 2016. General Plan. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf (accessed February 2025)

grasslands, open space, oak woodlands, riparian forest and farmlands from conversion to urban uses.

- **PHS-6.6 Business-related GHG Reduction Strategies.** The County shall encourage all businesses to help reduce GHG emissions by: replacing high mileage fleet vehicles with more efficient and/or alternative fuel vehicles; increasing the energy efficiency of facilities; transitioning toward the use of renewable energy instead of non-renewable energy sources; adopting purchasing practices that promote emissions reductions and reusable materials; and increasing recycling.
- **PHS-6.7 New Development.** The County shall require new development to incorporate all feasible mitigation measures to reduce construction and operational GHG emissions.
- **PHS-6.8 Agricultural Equipment and Emissions.** The County shall implement the following measures pertaining to agricultural equipment and emissions reductions:
  - Support SJVAPCD programs to fund equipment upgrades, retrofits, and replacement through the Carl Moyer heavy-duty vehicle and equipment program or other funding mechanisms (e.g., Rule 9510).
  - Work with SJVAPCD and stakeholders to identify practical and feasible options for fuel-efficient agricultural equipment.
  - Work with agricultural organizations and stakeholders to provide workshops and presentations and outreach materials focused on promoting fuel efficient farm equipment and operations and encourage participation in the Carl Moyer incentive program.
- **PHS-6.9 Public Awareness.** The County shall support public awareness about climate change and encourage County residents and businesses to become involved in activities and lifestyle changes that will aid in reduction of greenhouse gas emissions through alternative energy use, energy and water conservation, waste reduction and recycling, and other sustainable practices.
- **PHS-R: Monitor GHG Emissions.** The County shall monitor GHG emissions a minimum of every five years and verify results of meeting the GHG emission reduction targets and goals.

Envision Stockton 2040 General Plan

The City of Stockton has established a series of goals, policies, and implementation measures in the Envision Stockton 2040 General Plan to address climate change and reduce GHG emissions.[34] GHG-related goals include:

- **Policy LU-3.2:** Retain narrower roadways and reallocate right-of-way space to preserve street trees and mature landscaping and enhance the pedestrian and bicycle network within and adjacent to residential neighborhoods.
  - **Action LU-5.2H:** Comply with applicable water conservation measures.
- **Policy LU-5.3:** Define discrete and clear city edges that preserve agriculture, open space, and scenic views.
  - **Action LU-5.4A:** Require all new development, including major rehabilitation, renovation, and redevelopment, to adopt best management practices for water use efficiency and demonstrate specific water conservation measures.

[34] City of Stockton. 2024. Envision Stockton 2040 General Plan. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf (accessed February 2025)

- **Policy CH-5.1:** Accommodate a changing climate through adaptation, mitigation, and resiliency planning and projects.
  - **Action CH-5.1A:** Upon the next revision of the City's Local Hazard Mitigation Plan, conduct a comprehensive climate change vulnerability assessment to inform the development of adaptation and resilience policies and strategies, and incorporate them into the Safety Element, in accordance with SB 379.
  - **Action CH-5.1B:** Maintain and implement the City of Stockton Climate Action Plan (CAP) and update the CAP to include the following:
    - Updated communitywide GHG emissions inventory;
    - 2030 GHG emissions reduction target, consistent with SB 32;
    - Estimated 2030 GHG emissions reduction benefits of State programs;
    - Summary of the City's progress toward the 2020 local GHG emissions reduction target;
    - New and/or revised GHG reduction strategies that, when quantified, achieve the 2030 reduction target and continue emission reductions beyond 2030; and
    - New or updated implementation plan for the CAP.
  - **Action CH-5.1C** Accommodate a changing climate through adaptation and resiliency planning and projects.

City of Lodi General Plan

The City of Lodi has established a series of goals, policies, and implementation measures in the 2024 General Plan, adopted in 2010, to address climate change and reduce GHG emissions.[35] GHG-related goals include:

- **Policy C-P36:** Prepare and adopt a comprehensive climate action plan (CAP) by 2012, with implementation beginning in 2013. The CAP will be an additional policy document for the City of Lodi, based on policies listed in Appendix A. The CAP should include the following provisions:
  - An inventory of citywide greenhouse gas emissions;
  - Emissions targets that apply at reasonable intervals through the life of the CAP;
  - Enforceable greenhouse gas emissions control measures;
  - A monitoring and reporting program to ensure targets are met; and
  - Mechanisms to allow for revision of the CAP, as necessary.
- **Policy C-P37:** Promote incorporation of energy conservation and weatherization features into existing structures. Update the Zoning Ordinance and make local amendments to the California Building Code, as needed, to allow for the implementation of green building, green construction, and energy efficiency measures.
- **Policy C-P38:** Encourage the development of energy efficient buildings and communities. All new development, including major rehabilitation, renovation, and redevelopment projects, shall incorporate energy conservation and green building practices to the maximum extent feasible and as appropriate to the project proposed. Such practices include, but are not limited to: building orientation and shading, landscaping, and the use of active and passive solar heating

[35] City of Lodi. 2010. Lodi General Plan. https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF (accessed February 2025)

and water systems. The City may implement this policy by adopting and enforcing a Green Building Ordinance.

- **Policy C-P41:** Encourage the use of passive and active solar devices such as solar collectors, solar cells, and solar heating systems into the design of local buildings. Promote voluntary participation in incentive programs to increase the use of solar photovoltaic systems in new and existing residential, commercial, institutional, and public buildings.
- **Policy C-P43:** Work with the California Energy Commission and other public and non-profit agencies to promote the use of programs that encourage developers to surpass Title 24 Energy Efficiency standards by utilizing renewable energy systems and more efficient practices that conserve energy, including, but not limited to natural gas, hydrogen or electrical vehicles. Offer incentives such as density bonus, expedited process, fee reduction/ waiver to property owners and developers who exceed California Title 24 energy efficiency standards.
- **Policy C-P44:** Develop, adopt, and implement a heat island mitigation plan to reduce carbon dioxide emissions, smog, and the energy required to cool buildings. This plan should contain requirements and incentives for the use of cool roofs, cool pavements, and strategic shade tree placement, all of which may result in as much as 6-8° F temperature decrease from existing conditions.
- **Policy C-P45:** Encourage the planting of shade trees along all City streets and residential lots (but, particularly in areas that currently lack street trees) to reduce radiation heating and greenhouse gases. Develop a tree planting informational packet to help future residents understand their options for planting trees.
- **Policy C-P46:** Promote public education energy conservation programs that strive to reduce the consumption of natural or human-made energy sources.
- **Policy C-P47**: Post and distribute hard-copy and electronic information on currently available weatherization and energy conservation programs.

San Joaquin Valley Air Pollution Control District Climate Change Action Plan

In 2008, the SJVAPCD adopted the Climate Change Action Plan (CCAP). The CCAP directed SJVAPCD to develop guidance to assist lead agencies, project components, permit applicants, and interested parties in evaluating and mitigating the impacts of GHG emissions from proposed projects. In 2009, the SJVAPCD adopted the *Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA* and the *District Policy – Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the Lead Agency*.

The guidance relies on the use of performance based standards, otherwise known as Best Performance Standards (BPS) to assess significance of project-related GHG emissions on global climate change during the environmental review process, as required by CEQA. Use of BPS is a method of streamlining the CEQA process of determining significance and is not a required emission reduction measure. Projects implementing BPS would be determined to have a less than cumulatively significant impact. Otherwise, demonstration of a 29 percent reduction in GHG emissions, from business-as-usual, is required to determine that a project would have a less than cumulatively significant impact. The guidance does not limit a lead agency's authority in establishing its own process and guidance for determining significance of project related impacts on global climate change.

City of Stockton Climate Action Plan

The City of Stockton adopted a Climate Action Plan (CAP) in August 2014. The CAP addressed AB 32 requirements by establishing a goal of 10 percent below 2005 community GHG levels by 2020. To address GHG emissions from new projects, the City created the Development Review Process (DRP) as part of the discretionary approval process under CEQA. Per the DPR, a new project would need to quantify project GHG emissions and reduce emissions by 29 percent of the baseline emissions. Out of the 29 percent reduction required, approximately 25 percent of the reduction would be from state and local mandatory measures that are outlined in Section 3.4.4 of the CAP. Therefore, a new development would be required to achieve a 4 percent reduction in project emissions. Project applicants can choose any appropriate measures to achieve this reduction. CAP Appendix G, Climate Impact Study Process, describes reduction measures to reduce construction and operational GHG emissions. A project must identify the measures that would be incorporated into the project and score the points from the measures. If the number of points exceed 29 points, then the project would be considered less-than-significant. If the project has points below 29, then the project is potentially significant. However, the CAP does not address SB 32 GHG emissions reduction target nor has there been an update to address post-2020 GHG emissions.

City of Lodi Climate Action Plan

The City of Lodi Climate Action Plan is intended to provide strategies for reducing greenhouse gas emissions throughout the City of Lodi, including White Slough Water Pollution Control Facility.[36] The purpose of the plan is to guide the development, enhancement, and ultimately the implementation of actions and strategies that reduce Lodi's greenhouse gas emissions. The plan consists of five (5) chapters and appendices that:

- Summarize climate change, outline actions by the State and City to reduce emissions, and describe how Lodi residents and business owners can participate in GHG reduction efforts;
- Describe the role public participation played in the formation of the CAP, State regulations governing climate action planning, and regional climate change initiatives and programs;
- Characterize Lodi's current GHG emissions, indicate the City's projected emissions in 2020 and 2050, and note the action by City General Plan policy to establish a reduction target;
- Propose strategies and measures the City can take to achieve its emissions reduction target, and analyze the estimated cost of the proposed measures; and
- Discuss the means by which the City will monitor the Plan's implementation, verify achievements; and fund the selected measures.

4.7.4 Impacts and Mitigation Measures

Significance Criteria

The proposed project utilizes the following 2025 *CEQA Guidelines* Appendix G significance criteria questions related to GHG Emissions and Energy.

Would MICUP (the proposed project):

a) Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?

[36] City of Lodi. 2013. Climate Action Plan. Available at: https://www.lodi.gov/DocumentCenter/View/84/Climate-Action-Plan---Draft-Initial-Study-and-Negative-Declaration-PDF (accessed February 2025).

b) Conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?

c) Result in potentially significant environmental impacts due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

d) Conflict with or obstruct a State of local plan for renewable energy or energy efficiency?

Approach to Analysis

GHG Emissions

Construction GHG emissions were estimated for the proposed project. GHG emissions for proposed project construction and operation were calculated using the methodologies and factors utilized in the California Emissions Estimator Model (CalEEMod), Version 2022. However, the format of the project information was not ideal for use in the CalEEMod model; thus, the methodologies, data inputs, and emission factors were incorporated into an Excel workbook.

Longer-term operational GHG emissions associated with implementation of the proposed project are discussed qualitatively. The project is anticipated to have minimal sources of operational GHG emissions, primarily associated with a few passenger vehicle trips for periodic maintenance and energy usage for MICUP. It is anticipated that the proposed project would require quarterly trips for monitoring, maintenance, and inspection. This would result in minimal operational emissions of GHGs.

The qualitative discussion of GHG emissions associated with implementation of the proposed project is performed by comparing the proposed project to the CARB 2022 Scoping Plan. In addition, the proposed project is qualitatively compared to other applicable plans, policies, and regulations adopted for the purpose of reducing the emissions of GHGs.

Energy

Energy consumption is analyzed herein in terms of construction and operational energy. Construction energy demand accounts for anticipated energy consumption during construction of the proposed project, such as fuel consumed by construction equipment and construction workers' vehicles traveling to and from the construction site. Operational energy demand accounts for the anticipated energy consumption during operation of the proposed project, such as fuel consumed by cars, trucks, and public transit; natural gas consumed for on-site power generation; and electricity consumed for renewable energy generation, EV charging/transmission, public transit/active transportation, and other project-related power needs, as applicable. This analysis considers the equipment and processes employed during construction and operation of the proposed project to qualitatively determine whether energy consumed during construction and operation would be wasteful, inefficient, or unnecessary. In addition, the proposed project is qualitatively compared to applicable plans adopted for the purpose of reducing non-renewable and overall energy consumption.

EIR Scoping Comments Consideration

No comments relevant to CEQA were received in response to the EIR NOP specific to greenhouse gases that need to be addressed in the impacts discussion.

Specific Thresholds of Significance

GHG Emissions Generation

Individual projects do not generate sufficient GHG emissions to influence climate change directly. However, physical changes caused by a project can contribute incrementally to significant cumulative effects, even if individual changes resulting from a project are limited. The issue of climate change typically involves an analysis of whether a plan or project's contribution towards an impact would be cumulatively considerable. "Cumulatively considerable" means the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects (CEQA Guidelines Section 15064[h][1]). The SJVAPCD does not have adopted GHG emissions significance thresholds for individual projects or plan-level documents. Therefore, the proposed project is analyzed qualitatively for its ability to result in substantial GHG emissions and for consistency with applicable plans to reduce GHG emissions, with the primary plans being the CARB 2022 Scoping Plan, San Joaquin County CAP, City of Stockton CAP, and City of Lodi CAP, noting the presence of the San Joaquin County General Plan, and the City of Stockton and City of Lodi General Plans. If the proposed project is not consistent with these plans, it could be considered to have an incremental significant impact related to generation of GHG emissions.

Energy Consumption

San Joaquin County does not have quantitative thresholds for evaluation of energy consumption; however, the following qualitative thresholds are used to evaluate the significance of energy impacts resulting from implementation of the proposed project if it would:

- Result in a wasteful, inefficient, and unnecessary consumption of energy during construction and operational activities; or if
- Construction and operation of buildings and appliances would not adhere to the energy-use reduction measures included in CALGreen.

Impact Evaluation

GHG Emissions Generation and GHG Reduction Plans Consistency

Significance Criterion a:	Would the proposed project generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment?
Significance Criterion b:	Would the proposed project conflict with an applicable plan, policy, or regulation adopted for the purpose of reducing the emissions of GHGs?

Impact GHG-1 IMPLEMENTATION OF THE PROPOSED PROJECT WOULD NOT GENERATE GHG EMISSIONS IN A MANNER THAT WOULD HAVE A SIGNIFICANT IMPACT ON THE ENVIRONMENT. THE PROJECT WOULD SUPPORT APPLICABLE PLANS, POLICIES, AND REGULATIONS INTENDED TO REDUCE EMISSIONS OF GHGS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

Construction

Construction of the proposed project would require a varying construction schedule depending on the project component. Construction of the proposed project would generate greenhouse gas emissions from off-road equipment use and vehicle emissions. Off-site emissions would be

generated by construction worker daily commute trips and heavy-duty diesel haul and vendor truck trips. Construction emissions would vary substantially from day to day, depending on the level of activity and the specific type of operation. Construction GHG emissions were quantified for the lifetime of each proposed project component and then amortized over 30 years to estimated annual average GHG emissions. As follows is an analysis of estimated GHG emissions associated with the project components for each Partner Agency and then the overall project.

North San Joaquin Water Conservation District

Expanded Use of North, South, and CalFed System

NSJWCD would utilize MICUP water by increasing diversions from the Mokelumne River using its existing North, South, and CalFed Systems. The NSJWCD also would increase the capacity of these systems to take MICUP water. This construction activity would result in GHG emissions related to construction equipment use and construction worker travel and is anticipated to require 36 months for the North System and 28 months for the South System (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-3 and Table 3-11 of this Draft EIR and the corresponding excavation amounts and related construction GHG emissions are provided in Appendix G, along with additional supporting calculation details.[37] Table 4.7-4 shows the annual construction GHG emissions for these NSJWCD project components.

Table 4.7-4 NSJWCD North, South, and CalFed System Total Construction GHG Emissions

NSJWCD	Project Emissions (total metric tons CO_2e)
North and CalFed System	717
South System	579
Subtotal	**1,296**
Amortized	**43**

CO_2e = carbon dioxide equivalents.

North and South System are shown separately, as each component has a unique equipment list and construction duration.

Expanded Use of Private Pumps for Flood-MAR and In-lieu Recharge

The existing private pumps PODs and Flood-MAR sites may require improvements such as increasing the pump capacity and adding fish screens to convey water off the Mokelumne River onto the adjacent agricultural fields and other locations. This construction activity would result in GHG emissions related to construction equipment use and construction worker travel and is anticipated to require 58 months (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-3 of this Draft EIR and the corresponding excavation amounts and related construction GHG emissions are provided in Appendix G, along with additional supporting calculation details. Table 4.7-5 shows the annual construction GHG emissions for these NSJWCD project components.

[37] Since construction air emissions modeling was complete, the total length of pipeline anticipated to be installed under the refined project design for NSJWCD project components has been updated and reduced from 198,950 linear feet to approximately 189,900 linear feet. This reduction in pipeline length would correspondingly reduce the amount of excavation and related construction activities required. As a result, construction-related GHG emissions associated with pipeline installation would be lower than those estimated in the emissions analysis for NSJWCD components. Therefore, the GHG emissions analysis for the NSJWCD project components is conservative, and actual construction emissions are expected to be less than those disclosed in this document.

Table 4.7-5 NSJWCD PODs Total Construction GHG Emissions

NSJWCD	Project Emissions (total metric tons CO_2e)
Expanded Use of Private Pumps (PODs)	878
Subtotal	**878**
Amortized	**29**

CO_2e = carbon dioxide equivalents.

DIRECT RECHARGE (ASR WELLS AND RECHARGE BASINS)

The ASR wells off the East Bay Municipal Utility District (EBMUD) Mokelumne Aqueduct would require construction of one new intertie structure into the aqueduct and construction of 20 individual wells; construction of the ASR wells is anticipated to require 80 months. Construction of Recharge Basins additionally are anticipated to require 100 months. This construction activity would result in GHG emissions related to construction equipment use and construction worker travel (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-3 of this Draft EIR and the corresponding excavation amounts and related construction GHG emissions are provided in Appendix G, along with additional supporting calculation details. Table 4.7-6 shows the annual construction GHG emissions for these NSJWCD project components.

Table 4.7-6 NSJWCD Direct Recharge Total Construction GHG Emissions

NSJWCD	Project Emissions (total metric tons CO_2e)
ASR Wells	812
Recharge Basins	6,148
Subtotal	**7,000**
Amortized	**233**

CO_2e = carbon dioxide equivalents.

Collectively, the ASR Wells and Recharge Basins represent emissions from the ASR Wells off Mokelumne Aqueduct. Values are separated here as each subphase has a unique construction schedule and equipment list.

Stockton East Water District

BECKMAN ASR WELL/ASR WELLS OFF MOKELUMNE AQUEDUCT

The existing Beckman ASR Well (included in *ASR Wells off Mokelumne Aqueduct* in Table 3-11 of this Draft EIR) would be upgraded to inject MICUP water into the aquifer. This construction activity would result in GHG emissions related to construction equipment use and construction worker travel and is anticipated to require 4 months (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-4 of this Draft EIR and the corresponding excavation amounts and related construction GHG emissions are provided in Appendix G, along with additional supporting calculation details. However, specific offroad construction fleets were not provided, so it is assumed that the Beckman ASR Well construction activity would have fewer annual emissions than those presented in Table 4.7-6.

WEST LINDEN & MOSHER CREEK RECHARGE AREAS

For the West Linden Recharge Areas, implementation would require construction of a new Mokelumne Aqueduct intertie and up to 4 ASR wells and 142 dry wells. The water conveyed from the Mokelumne Aqueduct to the West Linden Recharge Area and then to other recharge facilities,

ASR wells, and dry wells would be pressurized off the Mokelumne Aqueduct and conveyed through approximately 70,000 linear feet of pipeline.

For the Mosher Creek Recharge Areas, pipelines would be extended from the West Linden Recharge Area to new recharge basins near Mosher Creek at Tully Dam and East Mosher Creek at Messick Road. This construction activity would result in GHG emissions related to construction equipment use and construction worker travel and is anticipated to require 4 months for the West Linden Project and 6 months for the recharge basins (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-4 of this Draft EIR and the corresponding excavation amounts and related construction GHG emissions are provided in Appendix G, along with additional supporting calculation details. Table 4.7-7 shows the annual construction GHG emissions for these SEWD project components.

Table 4.7-7 SEWD West Linden and Mosher Creek Total Construction GHG Emissions

SEWD	Project Emissions (total metric tons CO_2e)
West Linden	1,106
Mosher Creek	855
East Mosher Creek	744
Subtotal	**2,705**
Amortized	**90**

CO_2e = carbon dioxide equivalents.

City of Stockton

DWTP RECHARGE BASIN PROJECT

The Delta Water Treatment Plant (DWTP) Groundwater Recharge Basin Project would utilize existing or currently designed infrastructure to convey water to the proposed recharge facilities at the DWTP. No new pipelines would be constructed. The proposed recharge basins and dry wells (nine in total) would be built onsite at the DWTP. This construction activity is anticipated to require four months for the dry well construction (please refer to Table 3-10 of this Draft EIR). Table 4.7-9 shows the annual construction GHG emissions for City of Stockton DWTP project components.

Table 4.7-8 City of Stockton DWTP Recharge Basin Total Construction GHG Emissions

City of Stockton	Project Emissions (total metric tons CO_2e)
DTWP Recharge Basins (Dry Wells)	576
Subtotal	**576**
Amortized	**19**

CO_2e = carbon dioxide equivalents.

Amortized represents emissions over a 30 year timeframe to reflect the lifetime of the project.

STORMWATER BASINS

The City of Stockton would utilize existing infrastructure to convey MICUP water to the existing stormwater basins for groundwater recharge. No new pipelines or other infrastructure (e.g., dry wells, recharge basins) would be constructed.

RECHARGE BASINS

The City of Stockton would build up to 70 acres of new recharge basins. Lateral pipelines would need to be built to convey water to these basins. A conservative estimate of the lateral pipeline needed is assumed to be 6,000 linear feet of 18-inch diameter pipeline, depending on the final basin locations

This construction activity would result in GHG emissions related to construction equipment use and construction worker travel and is anticipated to require 35 months (please refer to Table 3-10 of this Draft EIR). The estimated pipeline length is provided in Table 3-5 of this Draft EIR and the corresponding excavation amounts and related construction GHG emissions are provided in Appendix G, along with additional supporting calculation details. Table 4.7-9 shows the annual construction GHG emissions for City of Stockton recharge basin project components.

Table 4.7-9 City of Stockton Recharge Basins Construction GHG Emissions

City of Stockton	Project Emissions (total metric tons CO_2e)
Recharge Basins	2,483
Subtotal	**2,483**
Amortized	**83**

CO_2e = carbon dioxide equivalents.

Overall

The overall all-districts project construction GHG emissions are provided in Table 4.7-10 below. Quantification of GHG emissions during construction are provided for informational purposes only, as there is no quantitative threshold provided by the District to compare to. Overall, the MICUP construction impact related to generation of GHG emissions would be less than significant.

Table 4.7-10 Overall Proposed Project Total Construction Emissions

Construction Phase	Project Emissions (total metric tons CO_2e)
NSJWCD	9,174
SEWD	2,705
City of Stockton	3,059
All Project Components	14,939
Amortized	**498**

CO_2e = carbon dioxide equivalents.

Operation

The following sections discuss the potential emissions associated with operational activities for each of the proposed project components. Operational activities include MICUP water right coordination and use, and maintenance.

GHG Emissions Generation

ALL DISTRICTS

MICUP Water Right Coordination and Use

There are not anticipated operational sources of combustion-related GHG emissions; however, there may be some limited energy consumption that would result in indirect emissions (i.e., relying on grid power which is produced offsite from fossil fuel combustion). The energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. For example, 2,625 KW of power is anticipated to operate the Aqueduct's pump facilities during the diversion period.[38] However, each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. Furthermore, indirect GHG emissions from power plant operation are subject to local, state, and federal control measures, which can be considered the maximum feasible level of mitigation for stack emissions. These measures would help to reduce MICUP overall operational coordination and use energy consumption, including non-renewable energy consumption and result in minimal GHG emissions. Therefore, the MICUP operational impact related to generation of GHG emissions would be less than significant.

Maintenance Activities

Vehicle trips related to operation and maintenance of proposed MICUP facilities would be nominal and incorporated into existing facility plans. As such, there would be no measurable increase in GHG emissions associated with proposed project maintenance activities, and no impact related to generation of GHG emissions would occur.

GHG Reduction Plan Consistency

ALL DISTRICTS

2022 Scoping Plan

The principal State GHG reduction plans and policies are AB 32, the California Global Warming Solutions Act of 2006, and the subsequent legislation, SB 32 and AB 1279. The goal of SB 32 is to reduce GHG emissions to 40 percent below 1990 levels by 2030. In 2022, the State passed AB 1279, which declares the State would achieve net-zero GHG emissions by 2045 and would reduce GHG emissions by 85 percent below 1990 levels by 2045. The latest iteration of the Scoping Plan is the 2022 Scoping Plan, which focuses on outcomes needed to achieve carbon neutrality by assessing paths for clean technology, energy deployment, natural and working lands, and others, and is designed to meet the state's long-term climate objectives and support a range of economic, environmental, energy security, environmental justice, and public health priorities. The 2022 Scoping Plan's strategies that apply to the proposed project include: building resilience to climate change.

[38] The Aqueduct is a 3,500 HP system, according to information provided to Rincon. Assuming about 0.75 kw per HP for the pumping facilities, this produces an energy consumption estimate of 2,625 KW to operate the pumps.

Supporting the regional water systems would help support climate resiliency and adaptation. Improved water infrastructure will help make the region more resilient to climate impacts, such as droughts and extreme weather events. Therefore, the proposed project would not conflict with the 2022 Scoping Plan and GHG impacts would be less than significant.

San Joaquin, City of Stockton, and City of Lodi Climate Action Plans

In 2008, the SJVAPCD adopted the Climate Change Action Plan (CCAP). The CCAP directed SJVAPCD to develop guidance to assist lead agencies, project components, permit applicants, and interested parties in evaluating and mitigating the impacts of GHG emissions from projects. This CCAP aims to achieve AB32 statewide GHG reduction goals, specifically, achieving a 29 percent reduction in GHG emissions, from business-as-usual. Similarly, the City of Stockton adopted a Climate Action Plan (CAP) in August 2014. The CAP addressed AB 32 requirements by establishing a goal of 10 percent below 2005 community GHG levels by 2020. Finally, the City of Lodi Climate Action Plan is intended to provide strategies for reducing greenhouse gas emissions throughout the City of Lodi. The San Joaquin CCAP, and City of Stockton and City of Lodi CAPs provide strategies and measures the community can take to achieve its emissions reduction target, in accordance with statewide reduction goals, which includes strategies that aim to improve climate resilience, preserve open spaces, and reduce consumption of nonrenewable energy sources, among others, to achieve GHG emissions reduction goals.

The proposed project would be consistent with the San Joaquin CCAP, and City of Stockton and City of Lodi CAPs in multiple ways. MICUP would entail diverting unappropriated Mokelumne River water either to serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge additional water into underground storage for later extraction at existing production wells to meet such demands.

Supporting the regional water systems would help support climate resiliency and adaptation. Improved water infrastructure will help make the region more resilient to climate impacts, such as droughts and extreme weather events. Additionally, as stated in *Section 3.5.4 Energy Consumption*, the energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. Each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. These measures would help to reduce MICUP's overall energy consumption, including non-renewable energy consumption, and thus, would support the GHG reduction goals and strategies implemented by the County of San Joaquin, City of Stockton, and City of Lodi. Therefore, the proposed project would not conflict with the San Joaquin CCAP or the Stockton and Lodi CAPs and GHG impacts would be less than significant.

San Joaquin, City of Stockton, and City of Lodi General Plans

The County of Joaquin has established a series of provisions in the San Joaquin County 2035 General Plan that relate to the physical development of the County. Several goals and policies contained in the General Plan relate to greenhouse gases. The proposed project would be consistent with these goals in multiple ways. For example, under Goal PHS-6 To reduce greenhouse gas emissions as part of the Statewide effort to combat climate change, PHS-6.3 GHG Reduction Strategies states "the County shall promote greenhouse gas emission reductions by encouraging efficient farming methods (e.g., no-till farming, crop rotation, cover cropping); supporting the installation of renewable energy technologies; and protecting grasslands, open space, oak woodlands, riparian

forest and farmlands from conversion to urban uses." The proposed project would be consistent with this policy, as the project goals aim to preserve existing farmland to sustain potential future drought conditions from climate change by putting unappropriated Mokelumne River water to beneficial use. MICUP does not propose any new or expanded pumping and use of groundwater from the Subbasin. MICUP would serve existing demand for agricultural irrigation on currently cultivated lands that otherwise are supplied by groundwater pumping. As stated in Section 2.2 MICUP Objectives, the proposed MICUP goals include: develop a supplemental Mokelumne River surface water supply; use surface water and groundwater together to respond to drought and climate change; improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin; and achieve integrated water supply and environmental benefits in the lower Mokelumne watershed.

Similarly, the project would be consistent with PHS-6.6 Business-related GHG Reduction Strategies, which states "the County shall encourage all businesses to help reduce GHG emissions by: replacing high mileage fleet vehicles with more efficient and/or alternative fuel vehicles; increasing the energy efficiency of facilities; transitioning toward the use of renewable energy instead of non-renewable energy sources; adopting purchasing practices that promote emissions reductions and reusable materials; and increasing recycling". As stated in Section 3.5.4 Energy Consumption, the energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. Each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. These measures would help to reduce MICUP's overall energy consumption, including non-renewable energy consumption.

Furthermore, supporting the regional water systems would help support climate resiliency and adaptation. Improved water infrastructure will help make the region more resilient to climate impacts, such as droughts and extreme weather events. Therefore, the proposed project would not conflict with the San Joaquin County 2035 General Plan and GHG impacts would be less than significant.

The City of Stockton has established a series of goals, policies, and implementation measures in the Envision Stockton 2040 General Plan to address climate change and reduce GHG emissions. The proposed project would be consistent with these goals and policies in multiple ways. For example, under Policy CH-5.1, the City states "accommodate a changing climate through adaptation, mitigation, and resiliency planning and projects". The proposed project would be consistent with this policy, as the project goals aim to preserve existing farmland to sustain potential future drought conditions from climate change by putting unappropriated Mokelumne River water to beneficial use. MICUP does not propose any new or expanded pumping and use of groundwater from the Subbasin. MICUP would serve existing demand for agricultural irrigation on currently cultivated lands that otherwise are supplied by groundwater pumping. As stated in Section 2.2 MICUP Objectives, the proposed MICUP goals include: develop a supplemental Mokelumne River surface water supply; use surface water and groundwater together to respond to drought and climate change; improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin; and achieve integrated water supply and environmental benefits in the lower Mokelumne watershed. For these same reasons, the project would also be consistent with Action CH-5.1C Accommodate a changing climate through adaptation and resiliency planning and projects. Furthermore, supporting the regional water systems would help support climate resiliency and adaptation. Improved water infrastructure will help make the region more resilient to climate impacts, such as droughts and

extreme weather events. Therefore, the proposed project would not conflict with the Envision Stockton 2040 General Plan and GHG impacts would be less than significant.

The City of Lodi has established a series of goals, policies, and implementation measures in the 2024 General Plan, adopted in 2010, to address climate change and reduce GHG emissions. The proposed project would be consistent with these goals and policies in multiple ways. For example, under goal C-P43, the City states, "Work with the California Energy Commission and other public and non-profit agencies to promote the use of programs that encourage developers to surpass Title 24 Energy Efficiency standards by utilizing renewable energy systems and more efficient practices that conserve energy, including, but not limited to natural gas, hydrogen or electrical vehicles. Offer incentives such as density bonus, expedited process, fee reduction/ waiver to property owners and developers who exceed California Title 24 energy efficiency standards." The proposed project would be consistent with this policy, as stated in Section 3.5.4 Energy Consumption, the energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. Each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. These measures would help to reduce MICUP's overall energy consumption, including non-renewable energy consumption.

Furthermore, supporting the regional water systems would help support climate resiliency and adaptation. Improved water infrastructure will help make the region more resilient to climate impacts, such as droughts and extreme weather events. Therefore, the proposed project would not conflict with the City of Lodi 2024 General Plan and GHG impacts would be less than significant.

Conclusion

Construction emissions would be short term in nature, and operation of the project would result in minimal emissions. Additionally, these actions are consistent with the State GHG reduction goals and policies established by SB 32 and AB 279 and the 2022 CARB Scoping Plan, as well as the local GHG reduction goals and measures established by the San Joaquin County, City of Stockton, and City of Lodi CAPs and General Plans. As such, MICUP would not conflict with adopted GHG reduction plans. Therefore, MICUP impacts related to generation of GHG emissions and consistency with GHG reduction plans and regulations would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

Energy Consumption

Significance Criterion c:	Would the proposed project result in a potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation?

Impact GHG-2 THE PROPOSED PROJECT WOULD NOT RESULT IN WASTEFUL, INEFFICIENT, OR UNNECESSARY CONSUMPTION OF ENERGY. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

ALL DISTRICTS

The proposed project would require the use of energy during construction. Energy use during construction would be primarily in the form of fuel consumption to operate heavy equipment, light-duty vehicles, machinery, and generators for lighting. Temporary grid power may also be provided to construction trailers or electric construction equipment. The proposed project would utilize construction contractors that comply with applicable CARB regulations such as accelerated retrofitting, repowering, or replacement of heavy-duty diesel on- and off-road equipment, and restricted idling of heavy-duty diesel motor vehicles. Construction contractors are required to comply with the provisions of CCR Title 13, sections 2449 and 2485, prohibiting diesel-fueled commercial and off-road vehicles from idling for more than five minutes, minimizing unnecessary fuel consumption. Construction equipment would be subject to the USEPA Construction Equipment Fuel Efficiency Standard, which would minimize inefficient fuel consumption. These construction equipment standards (i.e., Tier 4 efficiency requirements) are contained in 40 Code of Federal Regulations Parts 1039, 1065, and 1068. Electrical power would be consumed during construction activities, and the demand, to the extent required, would be supplied from existing electrical infrastructure in the area.

Overall, construction activities would not have an adverse impact on available electricity supplies or infrastructure. Construction activities would utilize fuel-efficient equipment consistent with State and federal regulations and would comply with State measures to reduce the inefficient, wasteful, or unnecessary consumption of energy. Per the applicable regulatory requirements of CALGreen, the proposed project would comply with construction waste management practices to divert construction and demolition debris from landfills. Furthermore, in the interest of cost efficiency, construction contractors would not utilize fuel in a manner that is wasteful or unnecessary. These practices would result in efficient use of energy during construction of the proposed project.

The proposed project is designed to put the Mokelumne River water supply to beneficial use to help offset the needs for additional water conveyance to meet the region's needs. As such, MICUP construction activities across the three Partner Agency areas would not result in significant environmental effects due to the wasteful, inefficient, or unnecessary consumption of energy, and construction impacts would be less than significant.

Operation

ALL DISTRICTS

As discussion in Section 3.5.4, the energy consumption of the operation of each MICUP project component facility would depend on the specifics of the facilities and their operation. For example, 2,625 KW of power is anticipated to operate the Aqueduct's pump facilities during the diversion period.[39] The energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. However, emissions associated with this additional energy use would be substantially reduced with implementation of project design features and mitigation measures. For example, each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. These measures would help to reduce MICUP's overall energy consumption, including non-renewable energy consumption, and therefore substantially reduce pollutant emissions from operation of the proposed project. Water conveyed through the DWTP pipeline would require energy use to power the pump station. In addition, there would be an incremental increase in electricity use related to operation of enlarged NSJWCD North System, South System, and CalFed pump stations. No additional workers or vehicle trips would be required for operational coordination, use, and maintenance. As such, no additional associated fuel use would be consumed.

Such overall use of energy (specifically electricity) would be required to meet or exceed energy efficiency standards and, thus, would not be wasteful or inefficient. Therefore, MICUP operation across the three Partner Agency areas would not result in significant environmental effects from wasteful, inefficient, or unnecessary consumption of energy, and operational impacts would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

Energy Efficiency or Renewable Energy Standards Consistency

Significance Criterion d:	Would the proposed project conflict with or obstruct a State or local plan for renewable energy or energy efficiency?

Impact GHG-3 THE PROPOSED PROJECT WOULD BE CONSISTENT WITH APPLICABLE ENERGY EFFICIENCY GOALS AND REGULATIONS, INCLUDING RELEVANT PROVISIONS OF CALGREEN AND CALIFORNIA ENERGY CODE TITLE 24. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

Policy consistency is limited to operational energy use discussion. No MICUP construction impacts related to consistency with an applicable renewable energy or energy efficiency plan would occur.

[39] The Aqueduct is a 3,500 HP system, according to information provided to Rincon. Assuming about 0.75 kw per HP for the pumping facilities, this produces an energy consumption estimate of 2,625 KW to operate the pumps.

Operation

ALL DISTRICTS

Relevant plans and policies that aim to increase energy efficiency and the production of renewable energy include SB 1020, the 2022 California Green Building Standards Code (CALGreen or Title 24 Part 11), and the 2022 California Building Energy Efficiency Standards (Title 24 Part 6). SB 1020 supports the reduction of GHG emissions from the electricity sector by accelerating the State's Renewables Portfolio Standard Program and requires 90% of all retail sales of electricity to California end-use customers by the end of 2035, 95% by the end of 2040, and 100% by the end of 2045. Also, 100% of electricity procured to serve all state agencies by the end of 2035. CALGreen (Title 24 Part 11) institutes mandatory minimum environmental performance standards for all ground-up new non-residential and residential structures and major renovations.[40] In addition, the California Building Energy Efficiency Standards (Title 24 Part 6) establishes energy-efficiency standards for residential and non-residential buildings in order to reduce California's energy demand. CCR Title 24 (Parts 6 and 11) is updated periodically to incorporate and consider new energy-efficiency technologies and methodologies as they become available. New structures and major renovations must demonstrate their compliance with the current Building Energy Efficiency Standards through submission and approval of a Title 24 Compliance Report to the local building permit review authority and the CEC.

Consistency with State Renewable Energy Plans

Vehicle trips related to O&M of proposed MICUP facilities would be nominal and incorporated into existing O&M facility plans. Similarly, operation of the proposed project would result in minimal increases in energy usage and would also implement measures to reduce use of non-renewably sourced energy. Improving these water systems would reduce the reliance on other potential means of meeting the local water demand that could result in increased fossil fuel and/or energy demand to meet the local needs via increased need for import of water via vehicle use or other means of long-range transportation. The proposed project would, thus, align with the overall intent of SB 1020 to reduce demand on retail sales of electricity from non-renewable or zero-carbon sources (a target of 90% conversion by the end of 2035) and be consistent with State renewable energy plans, and not conflict with the applicable State and local plans for renewable energy. Furthermore, the proposed project would help support CALGreen's goals of improving water resource efficiencies.

Consistency with State Energy Efficiency Plans

Operation of the proposed project would result in minimal increases in energy usage and would also implement measures to improve energy efficiency. Construction of any of the individual project components is presumed to comply with the California Energy Commission's 2022 Building Energy Efficiency Standards, as applicable, to support improving energy efficiency standards. The proposed project would, thus, align with the goals of the California Building Energy Efficiency Standards, and not conflict with the applicable State and local plans for energy efficiency.

[40] Major renovations are defined as changes to the building envelop or changing equipment, including different components and entire systems.

Consistency with Local Energy Efficiency and Renewable Energy Plans

The City of Stockton, City of Lodi, and County of San Joaquin have all established a series of goals, policies, and implementation measures in their respective General Plans to address climate change, encourage the use of renewable energy sources, improve energy efficiencies, and reduce energy consumption. In the City of Stockton's General Plan, for example, Policy LU-5.4 states "Require water and energy conservation and efficiency in both new construction and retrofits." Similarly, in the City of Lodi's General Plan, Policy C-G9 encourages the conservation of energy and promotes the reduction of per capita energy consumption. The County of San Joaquin's General Plan also includes measures to promote renewable energy consumption and improve energy efficiency. For example, LU-6.8 Sustainable Technologies states that "the County shall encourage all employment and industrial projects to incorporate sustainable technologies including energy and water efficient practices."

The proposed project would be consistent with the goals and policies outlined in the County of San Joaquin, City of Stockton, and City of Lodi General Plans, described above, in multiple ways. Vehicle trips related to O&M of proposed MICUP facilities would be nominal and incorporated into existing O&M facility plans. Similarly, operation of the proposed project would result in minimal increases in energy usage and would also implement measures to reduce use of non-renewably sourced energy. Improving these water systems would reduce the reliance on other potential means of meeting the local water demand that could result in increased fossil fuel and/or energy demand to meet the local needs via increased need for import of water via vehicle use or other means of long-range transportation. The proposed project would, thus, align with the overall intent of the General Plans to reduce demand on retail sales of electricity from non-renewable or zero-carbon sources (a target of 90% conversion by the end of 2035), and not conflict with the applicable State and local policies for renewable energy. Furthermore, the proposed project would help support CALGreen's goals of improving water resource efficiencies.

Additionally, as stated in *Section 3.5.4 Energy Consumption*, the energy consumption of each MICUP component would depend on the specifics of the facilities and their operation. Each component would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. This could include the use of energy-efficient equipment, the implementation of energy-saving operational procedures, or the use of renewable energy sources. These measures would help to reduce MICUP's overall energy consumption, including non-renewable energy consumption.

OVERALL

MICUP would decrease non-renewable (i.e., natural gas) consumption and overall energy consumption in new and existing structures and facilities by encouraging the production and storage of local renewable energy as well as requiring energy efficient improvement, and incentivizing energy-efficient retrofits. These actions are consistent with the State energy goals and policies established by SB 1020, CALGreen, and the California Building Energy Efficiency Standards as well as the local energy goals policies established by the San Joaquin County, City of Stockton, and City of Lodi CAPs and General Plans. As such, MICUP would not conflict with adopted renewable energy or energy conservation plans, and MICUP operational impacts related to consistency with State and local renewable energy and energy efficiency plans would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

4.7.5 Cumulative Impacts

GHG emissions and global climate change represent cumulative impacts. GHG emissions cumulatively contribute to the significant adverse environmental impacts of global climate change. No single project could generate enough GHG emissions to noticeably change the global average temperature; instead, the GHG emissions from past, present, and future projects and activities have contributed, currently are contributing, and would contribute to global climate change and its associated environmental impacts. The geographic scope of the cumulative energy analysis is the PG&E service area. The cumulative analysis considers the nearby past, present, and reasonably foreseeable future projects listed in Table 4-1 (refer to Chapter 4.0, *Environmental Impact Analysis*) located throughout San Joaquin County in addition to the proposed plan.

GHG Emissions

Cumulative development across San Joaquin County would generate GHG emissions from vehicle trips, electricity and water use, and other sources. The analysis of GHG emissions is cumulative in nature, as emissions affect the accumulation of GHGs in Earth's atmosphere. Individual cumulative projects that fall below thresholds are considered to have a less than significant impact, both cumulatively and individually. The combined increase in GHG emissions generation from cumulative projects would potentially result in a significant cumulative impact related to contribution to climate change. It is conservatively assumed, therefore, that cumulative development could result in a significant impact related to the GHG emissions.

However, as indicated under Impact GHG-1, the proposed project would result in a less-than-significant impact related to GHG emissions and would not conflict with GHG reduction plans. The proposed project involves putting the Mokelumne River water supply to beneficial use to help offset the needs for additional water conveyance to meet the region's needs. A reliance on other water resources may result in increased fossil fuel and/or energy demand to meet the local needs. This would help support the goals of meeting carbon neutrality. As such, individual MICUP project GHG emissions impacts would be less than significant, and the proposed project would not represent a cumulatively considerable impact related to GHG emissions.

Therefore, the overall cumulative impact related to GHG emissions would be less than significant.

Energy

Cumulative development across San Joaquin County would increase demand for energy resources. However, new iterations of the California Building Energy Efficiency Standards and CALGreen would require increasingly more energy efficient appliances and building materials that reduce energy consumption in new cumulative development. In addition, vehicle fuel efficiency is anticipated to continue improving through implementation of the existing Pavley Bill regulations under AB 1493. Nevertheless, the combined increase in energy consumption from cumulative projects would potentially result in a significant cumulative impact related to the wasteful, inefficient, and unnecessary consumption of energy resources. It is conservatively assumed, therefore, that cumulative development could result in a significant impact related to the wasteful, inefficient, or unnecessary consumption of energy resources.

However, as described under Impacts GHG-2 and GHG-3, proposed project development would be limited in energy demand (as they are primarily focused on water conveyance rather than other more energy-intensive land uses) and constructed in accordance with the California Building Energy Efficiency Standards and CALGreen. There are minimal mobile source activities associated with the proposed project, which would limit vehicle fuel consumption. Furthermore, the proposed project would implement measures to improve energy efficiency and reduce use of non-renewably sourced energy. The proposed project supports beneficial use of regional water resources that, in turn, would reduce reliance on external resources that could be less energy efficient to acquire. As the proposed project would not result in a wasteful, inefficient, or unnecessary consumption of energy, its contribution to a significant cumulative energy impact is not cumulatively considerable.

Plans and projects throughout the State are required to adhere to applicable renewable energy and energy efficiency laws, programs, and policies such as the SB 1920, AB 1493, and Title 24 standards. Therefore, the cumulative impact related to consistency with renewable energy and energy reduction plans would be less than significant. As discussed under Impact GHG-3, proposed project development would be consistent with the energy-related goals and policies of the Statewide plans and regulations. Therefore, the proposed project would not contribute to a cumulative impact with respect to consistency with renewable energy and energy efficiency plans.

Therefore, the overall cumulative impact related to energy would be less than significant.

Overall Level of Cumulative Significance

Less Than Significant

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4.8 Hazards, Hazardous Materials, and Wildfire

4.8.1 Introduction

This section describes the existing hazards, hazardous materials, and wildfire conditions in the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas) as well as the relevant regulatory framework. This section also evaluates the possible impacts related to hazards, hazardous materials, and wildfire that could result from implementation of the proposed project.

Information in this section is based on information available on the California Department of Toxic Substances (DTSC), State Water Resources Control Board (SWRCB), California Environmental Protection Agency (CalEPA), California Department of Forestry and Fire Protection, and County Department of Public Works and Partner Agency websites.

4.8.2 Environmental Setting

Fundamentals

Hazards

This description of existing conditions focuses on hazards from fire, as well as hazardous materials and wastes. A hazard is a situation that poses a level of threat to life, health, property, or the environment. Hazards can be dormant or potential, with only a theoretical risk of harm. However, once a hazard becomes active, it can create an emergency. A hazardous situation that has already occurred is called an incident. Emergency response is action taken in response to an unexpected and dangerous occurrence in an attempt to mitigate its impact on people, structures, or the environment. Emergency situations can range from natural disasters to hazardous-materials problems and transportation incidents.

Hazardous Materials

Hazardous materials, as defined by the California Code of Regulations, are substances with certain physical properties that could pose a substantial present or future hazard to human health or the environment when handled, disposed, or otherwise managed improperly. Hazardous materials are grouped into the following four categories, based on their properties:

- Toxic—causes human health effects
- Ignitable—has the ability to burn
- Corrosive—causes severe burns or damage to materials
- Reactive—causes explosions or generates toxic gases

A hazardous waste is any hazardous material that is discarded, abandoned, or slated to be recycled. If improperly handled, hazardous materials and hazardous waste can result in public health hazards if released into the soil or groundwater or through airborne releases in vapors, fumes, or dust. Soil and groundwater having concentrations of hazardous constituents higher than specific regulatory levels must be handled and disposed of as hazardous waste when excavated or pumped from an aquifer. The California Code of Regulations, Title 22, Sections 66261.20-24 contain technical descriptions of toxic characteristics that could cause soil or groundwater to be classified as hazardous waste.

HAZARDOUS BUILDING MATERIALS

Many older buildings and structures contain building materials that consist of hazardous materials. These materials include lead-based paint, asbestos-containing material, and polychlorinated biphenyls (PCBs).

Prior to the United States Environmental Protection Agency (USEPA) ban in 1978, lead-based paint was commonly used on interior and exterior surfaces of buildings. Disturbances such as sanding and scraping activities, renovation work, gradual wear and tear, old peeling paint, and paint dust particulates have been found to contaminate surface soils or cause lead dust to migrate and affect indoor air quality. Exposure to residual lead can cause severe health effects, especially in children.

Asbestos is a naturally occurring fibrous material that was extensively used as a fireproofing and insulating agent in building construction materials before such uses were banned by the USEPA in the 1970s due to harmful health effects. In addition, many types of electrical equipment contained PCBs as an insulator, including transformers and capacitors. After PCBs were determined to be a carcinogen in the mid to late 1970s, the USEPA banned PCB use in new equipment and began a program to phase out certain existing PCB-containing equipment. For example, fluorescent lighting ballasts manufactured after January 1, 1978, do not contain PCBs and are required to have a label clearly stating that PCBs are not present in the unit.

HAZARDOUS SUBSTANCES

A hazardous substance can be any biological, natural, or chemical substance, whether solid, liquid, or gas, that may cause harm to human health. Hazardous substances are classified on the basis of their potential health effects, whether acute (immediate) or chronic (long-term). Dangerous goods are classified on the basis of immediate physical or chemical effects, such as fire, explosion, corrosion, and poisoning. An accident involving dangerous goods could seriously harm human health or damage property or the environment. Harm to human health may happen suddenly (acute), such as dizziness, nausea, and itchy eyes or skin; or it may happen gradually over years (chronic), such as dermatitis or cancer. Some people can be more susceptible than others. Hazardous substances and dangerous goods can include antiseptic used for a cut, paint for walls, a cleaning product for the bathroom, chlorine in a pool, carbon monoxide from a motor vehicle, fumes from welding, vapors from adhesives, or dust from cement, stone, or rubber operations. Such hazardous substances can make humans very sick if they are not used properly.

HAZARDOUS WASTES

Hazardous waste is any hazardous material that is to be discarded, abandoned, or recycled. The criteria that define a material as hazardous also define a waste as hazardous. Specifically, materials and waste may be considered hazardous if they are poisonous (toxic); can be ignited by open flame (ignitable); corrode other materials (corrosive); or react violently, explode, or generate vapors when mixed with water (reactive). Soil or groundwater contaminated with hazardous materials above specified regulatory state or federal thresholds is considered hazardous waste if it is removed from a site for disposal. If handled, disposed, or otherwise handled improperly, hazardous materials and hazardous waste can result in public health hazards if released into the soil or groundwater or through airborne releases in vapors, fumes, or dust. Soil and groundwater having concentrations of hazardous constituents higher than specific regulatory levels must be handled and disposed of as hazardous waste when excavated or pumped from an aquifer. The California Code of Regulations, Title 22, Sections 66261.20-24 contains technical descriptions of toxic characteristics that could cause soil or groundwater to be classified as hazardous waste.

Hazardous Materials Listing

The Cortese List is a list of known hazardous materials, including hazardous waste facilities, that meet one or more of the provisions of Government Code Section 65962.5, including:

- The list of hazardous waste and substances sites from the California DTSC EnviroStor database.[1]
- The list of leaking underground storage tank (LUST) sites by county and fiscal year from the SWRCB GeoTracker database.[2]
- The list of solid waste disposal sites identified by the SWRCB with waste constituents exceeding hazardous waste levels outside the waste management unit.[3]
- The list of active cease-and-desist orders and cleanup and abatement orders from SWRCB.[4]
- The list of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code, as identified by DTSC.[5]

Presence of Hazardous Materials

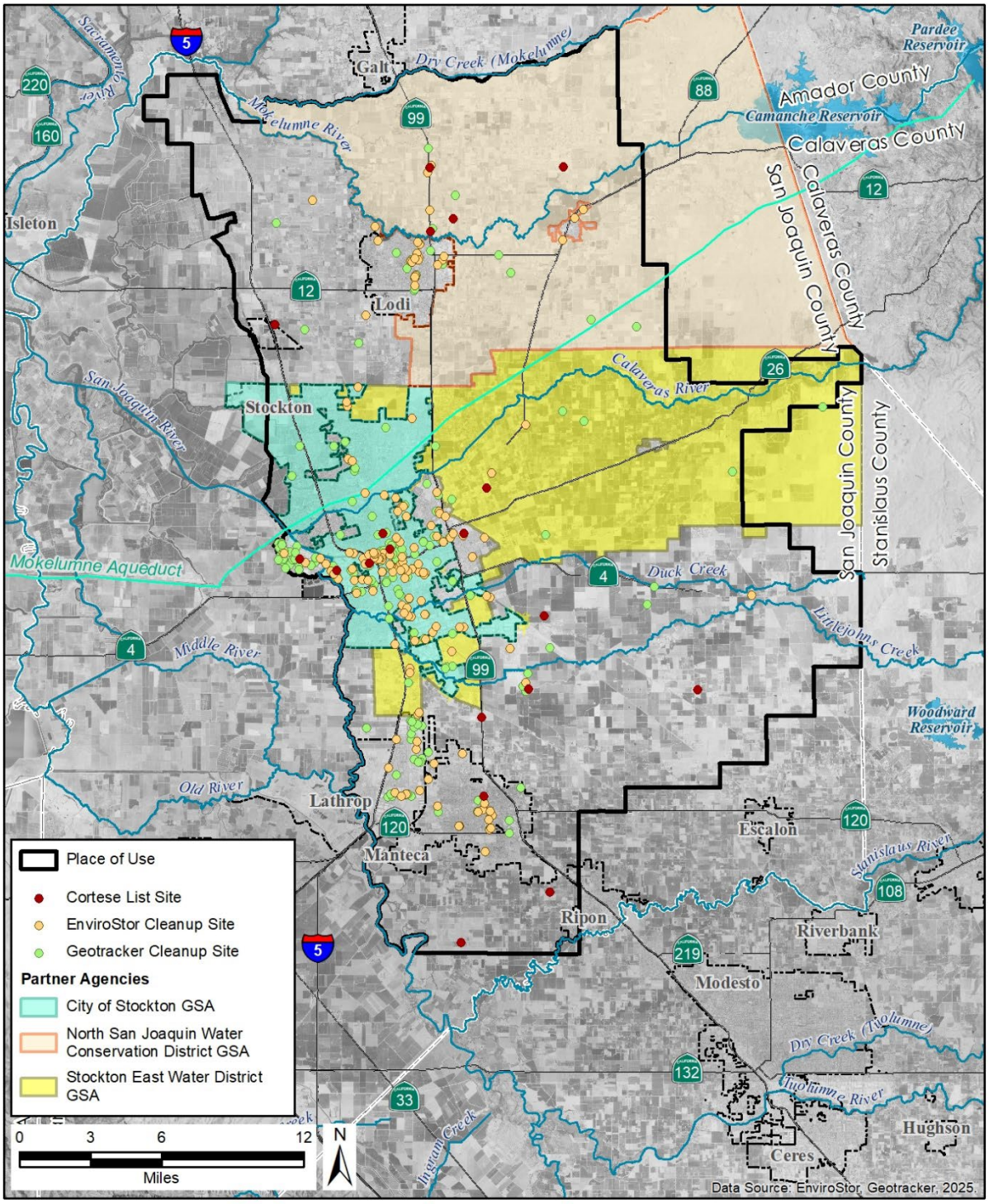
Place of Use

According to databases of hazardous material sites maintained by California DTSC EnviroStor and SWRCB GeoTracker, there are approximately 1,700 listed hazardous materials sites throughout the Place of Use. All listed sites are shown in table format in Appendix H and are shown in Figure 4.8-1. Listed hazardous materials sites are either under active investigation, remediation, or certified operation and maintenance and are primarily located within the City of Stockton. Listed hazardous materials sites across the Place of Use are shown in Figure 4.8-1 below.

Within the Eastern San Joaquin Sub Basin (ESJSB), point sources include hazardous materials and hazardous material sites, as defined by the Department of Toxic Substances Control (DTSC) Cortese List, and DTSC EnviroStor and SWRCB GeoTracker databases. The United States Environmental Protection Agency, DTSC, and the Central Valley RWQCB provide oversight of point-source pollution through existing regulatory programs, including management of remedial action for point-source contamination sites. Most sites within the ESJSB are fuel sites (e.g., gas or diesel) that are under active investigation or remediation.[6] Sites that have the potential to cause groundwater plumes (movement of hazardous materials within the groundwater) are managed by existing regulatory programs as detailed in Section 4.8.2, *Regulatory Framework*.

[1] California DTSC. "Cortese" list of DTSC EnviroStor database list of Hazardous Waste and Substances sites. DTSC Hazardous Waste and Substances Site List—Site Cleanup (Cortese List). Available: http://www.dtsc.ca.gov/SiteCleanup/Cortese_List.cfm.
[2] SWRCB. "Cortese" List of Leaking Underground Storage Tank Sites by County (San Francisco County). Available: https://geotracker.waterboards.ca.gov/sites_by_county.
[3] CalEPA. "Cortese" list of solid waste disposal sites identified with waste constituents above hazardous waste levels outside the waste management unit. Available: http://www.calepa.ca.gov/files/2016/10/SiteCleanup-CorteseList-CurrentList.pdf.
[4] CalEPA. "Cortese" list of State Water Board sites with active Cease and Desist Orders or Cleanup Abatement Orders. Available: http://www.calepa.ca.gov/files/2016/10/SiteCleanup-CorteseList-CDOCAOList.xlsx.
[5] CalEPA. "Cortese" list of sites subject to Corrective Action pursuant to Health and Safety Code 25187.5. Available: https://www.calepa.ca.gov/sitecleanup/corteselist/section-65962-5a/.
[6] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. (accessed January 2025).

Figure 4.8-1 Listed Hazardous Materials Sites within the Place of Use



GEI Consultants, 2026

Specific point source sites and contaminants include:[7]

- **Petroleum hydrocarbons** – Petroleum hydrocarbon constituents are most commonly fuels (diesel, gasoline, motor oil, or aviation fuel) and volatile organic compounds (VOCs) commonly added to fuels, including Methyl tert-butyl ether (MTBE) and benzene, toluene, ethylbenzene, and xylenes (BTEX) constituents. Concentrations of petroleum hydrocarbons have not been modeled across the ESJSB; concentrations are local and site specific.
- **Synthetic organics** – At these sites, pesticides, herbicides, fertilizer, and pesticides are the most common constituents. Other constituents include VOCs such as perchloroethylene (PCE) and trichloroethylene (TCE). Concentrations of synthetic organics have not been modeled across the ESJSB; concentrations are local and site specific.
- **Mixed Constituents** – Sites with mixed constituents are those that include a release of more than one type of contaminant, such as a mix of heavy metals, diesel, inorganics, and/or organics. At these sites, the most common constituents include a mixture of heavy metals (chromium, arsenic, and lead), inorganics, and solvents.
- **Emerging contaminants** – Many chemical and microbial constituents that have not historically been considered as contaminants are occasionally, and in some cases with increasing frequency, detected in groundwater. These newly recognized (or emerging) contaminants are commonly derived from municipal, agricultural, industrial wastewater, and domestic wastewater sources and pathways. These newly recognized contaminants are dispersed to the environment from domestic, commercial, and industrial uses of common household products. Residual waste products of genetically modified organisms are also of potential concern.
    - Perfluorooctanesulfonic acid (PFOS) and perfluorooctantoic acid (PFOA) – Organic chemicals synthesized for water and lipid resistance, used in a wide variety of consumer products as well as fire-retarding foam and various industrial processes. These chemicals tend to accumulate in groundwater, though typically in a localized area in association with a specific facility, such as a factory or airfield.
    - 1,2,3-Trichloropropane (1,2,3-TCP) – Solvent and is typically found in industrial or hazardous waste sites. Along with an industrial solvent, 1,2,3-TCP is a cleaning and degreasing agent and associated with pesticide products

Project Area

NSJWCD

Listed hazardous materials sites within the NSJWCD area include four Cortese sites and thirteen listed sites including several evaluation sites, remediation sites, and tiered permit sites. Sites are concentrated along roadways, primarily along State Route 99 and near the unincorporated community of Lockeford.

SEWD

Listed hazardous materials sites within the SEWD area include one Cortese site and approximately sixteen listed sites including several active investigation sites, remediation sites, and tiered permit sites. Sites are concentrated along roadways and primarily located along the boundary of the City of Stockton.

[7] *Ibid*

CITY OF STOCKTON

Listed hazardous materials sites within the City of Stockton area include six Cortese sites and approximately 230 listed sites including several active investigation sites, remediation sites, tiered permit sites, and certified operation and maintenance sites. Sites are dispersed throughout the City of Stockton but are primarily concentrated within the central portion of the City of Stockton.

Proximity to Schools

Place of Use

School locations require consideration, because children are particularly sensitive to hazardous materials exposure. San Joaquin County also includes sensitive land uses such as hotels and motels; group homes, churches; other learning institutions; and libraries.

Within the Place of Use area, there are approximately 200 schools. Schools are located within the Cities of Lodi and Stockton.[8] Schools within the Place of Use are shown in Figure 4.8-2.

Project Area

NSJWCD

There are 23 schools within the NSJWCD area. There are no schools located within 0.25-mile of a hazardous material site.

SEWD

There are 84 schools within the SEWD area. There is potential for a school to be located within 0.25-mile of a hazardous material site.

CITY OF STOCKTON

There are 55 schools within the City of Stockton. There is potential for a school to be located within 0.25-mile of a hazardous material site.

[8] San Joaquin Council of Governments. 2025. Education. https://www.sjcog.org/241/ Education (accessed January 2025)

Figure 4.8-2 School Locations within the Place of Use

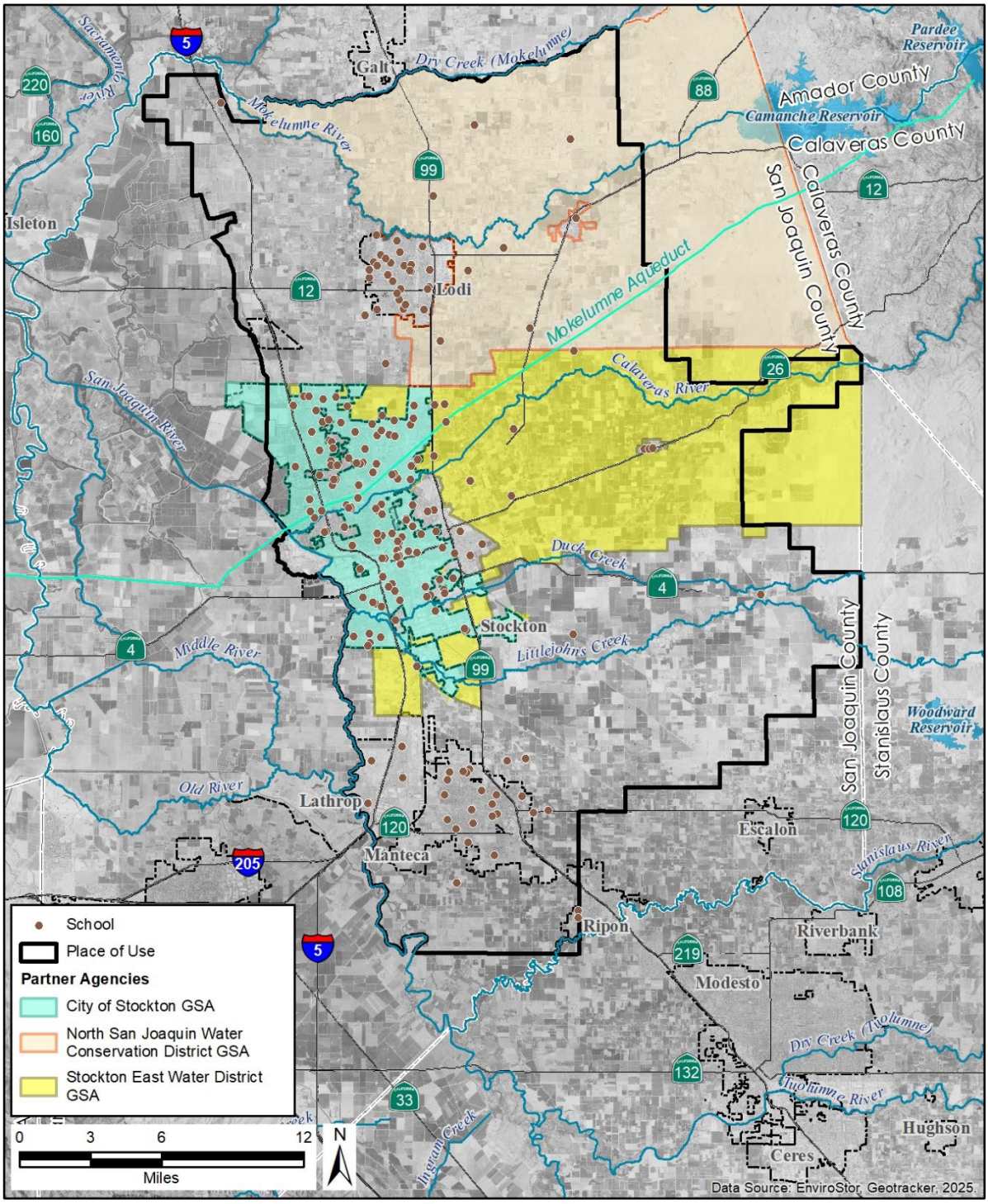


Figure Source: GEI Consultants, Inc. 2025.

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Wildfire Hazard Area Designations

Classifications and Zones

In California, responsibility for wildfire prevention and suppression is shared by federal, State, and local agencies. Federal agencies are responsible for federal lands in Federal Responsibility Areas (FRA). The State of California has determined that some non-federal lands in unincorporated areas with watershed value are of Statewide interest and have classified those lands as State Responsibility Areas (SRA), which are managed by CAL FIRE.[9] All incorporated areas and other unincorporated lands are classified as Local Responsibility Areas (LRA).

CAL FIRE is required by law to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors (Public Resources Code Sections 4201-4204 and California Government Code Sections 51175-89). As described above, the primary factors that increase an area's susceptibility to fire hazards include slope, vegetation type and condition, and atmospheric conditions. CAL FIRE maps fire hazards based on zones, referred to as FHSZs. CAL FIRE maps three zones in SRA: 1) Moderate FHSZs; 2) High FHSZs; and 3) Very High FHSZs (VHFHSZs). Only the VHFHSZs are mapped in LRA. Each of the zones influence how people construct buildings and protect property to reduce risk associated with wildfires.

San Joaquin County

San Joaquin County is primarily located outside of FHSZs. However, the northeastern most area of the County, east of Lodi, is located within a Moderate SRA and LRA FHSZ. And the southwestern most portion of the County, southwest of Interstate 580, is partially designated as a High FHSZ and a Very High FHSZ within an SRA. A map of fire hazard zones near and within the Place of Use is shown in Figure 4.8-3.

Project Area

NSJWCD

Within the Place of Use, the NSJWCD area is not located within an SRA and LRA. However, outside of the Place of Use boundary, the northeastern portion of the NSJWCD area is located within a Moderate FHSZ in an SRA. [10]

SEWD

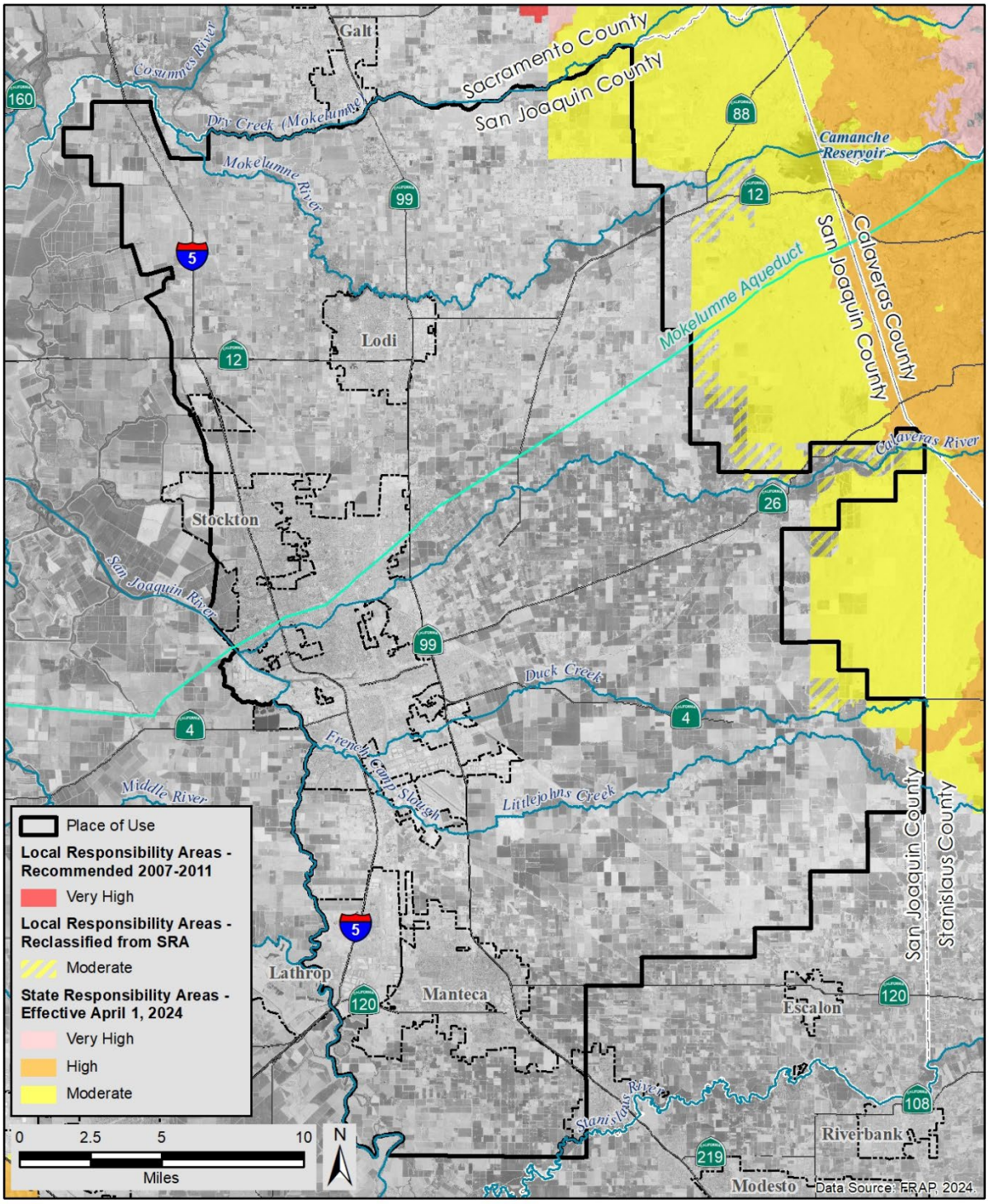
The eastern portion of the SEWD area is designated as a Moderate FHSV within an SRA and LRA. [11]

CITY OF STOCKTON

The City of Stockton area is not located within a FHSZ in an SRA or LRA. [12] The nearest FHSZ is a Moderate FHSZ in an SRA, located approximately 15 miles east of the City of Stockton.

[9] United States Department of the Interior, US Department of Agriculture, and CAL FIRE. ND. California Master Cooperative Wildland Fire Management and Stafford Act Response Agreement. https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5380381.pdf (accessed January 2025).
[10] California Department of Forestry and Fire Protection. 2024. Fire Hazard Severity Zone Viewer. https://experience.arcgis.com/experience/03beab8511814e79a0e4eabf0d3e7247/ (accessed January 2025).
[11] Ibid.
[12] Ibid.

Figure 4.8-3 Fire Hazard Severity Zones



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Wildfire-Conducive Conditions

Because of substantial open space areas and associated vegetation and wildlife habitats throughout the State, California is subject to fire hazards. Grassland or other vegetation in California is easily ignited, particularly in dry seasons. Wildfire is a serious hazard in high dry fuel load areas, particularly near areas of natural vegetation and steep slopes, since fires tend to burn more rapidly on steeper terrain. Wildfire is also a serious hazard in areas of high wind, given that fires will travel faster and farther geographically when winds are higher. Furthermore, wildfire is more likely in areas where electric power lines are located above ground and could ignite vegetation where it comes into contact. Wildfire could also spread in areas of fuel lines, which could fail (whether due to earthquake or error) and ignite a fire. Extreme wildfire events are expected to increase in frequency with the effects of increased global temperature, although changes in specific fire-prone areas are difficult to predict with any certainty.[13]

In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and enhance siltation of rivers and streams, thereby enhancing flood potential, harming aquatic life, and degrading water quality. Lands stripped of vegetation are also subject to increased debris flow hazards. Slope instability from wildfire scarring of the landscape can result in slope instability in the form of more intensive flooding and landslides. Such post-fire slope soils and altered drainage patterns can result in soil creep on downslope sides of foundations and reduce lateral support.

Vegetation

Vegetation is fuel to a wildfire, and it changes over time with seasonal growth and die-back. The relationship between vegetation and wildfire is complex, but generally some vegetation is naturally fire resistant, while other vegetation is extremely flammable. Some plant types in California landscapes are fire resistant, while others are fire-dependent for their seed germination cycles.

Wildfire behavior depends on the type of fuels present, such as ladder fuels, surface fuels, and aerial fuels. Surface fuels include grasses, logs, and stumps low to the ground. Ladder fuels, such as tall shrubs, young trees, and the lowest branches of mature trees, provide a path for fire to climb upward into the crowns of trees. Aerial fuels include upper limbs, foliage, and branches not in contact with the ground. Ample spacing in between tree crowns and trimming of lower branches close to the ground is effective at preventing fire from either igniting the crown of a tree or spreading from an ignited tree to adjacent trees; conversely, closely packed trees with low branches are especially susceptible to crown ignition and spread.[14] Weather and climate conditions, including drought cycles, can lead to dry vegetation with low moisture content, increasing its flammability.

Changes in precipitation patterns and increased temperatures associated with climate change will alter the distribution and character of natural vegetation and associated moisture content of plants and soils. An increase in frequency of extreme heat events and drought are also expected. These changes will lead to increased frequency and intensity of large wildfires.

[13] United States Forest Service (USFS). 2025. Fire. https://research.fs.usda.gov/fire (accessed January 2025)
[14] CAL FIRE. 2025. Fuels Reduction. https://www.fire.ca.gov/what-we-do/natural-resource-management/fuels-reduction#:~:text=Almost%20every%20day%2C%20CAL%20FIRE,ecosystems%2C%20and%20promote%20community%20resilience. (accessed January 2025).

PLACE OF USE

Land uses within the Place of Use range from primarily rural, agricultural, and open space to some areas that are urban and developed, particularly within the Cities of Stockton and Lodi. According to the CAL FIRE Fire Hazard Severity Zone Map, most of the Place of Use is not designated as being within a FHSZ. Areas located within a Moderate FHSZ in an SRA and LRA are located in the northeastern and eastern portion of the Place of Use.

Slope and Aspect

According to CAL FIRE, sloping land increases susceptibility to wildfire because fire typically burns faster up steep slopes, and they may hinder firefighting efforts.[15] Following severe wildfires, sloping land is also more susceptible to landslide or flooding from increased runoff during substantial precipitation events. Aspect is the direction that a slope faces, and it determines how much radiated heat the slope will receive from the sun. Slopes facing south to southwest will receive the most solar radiation and are warmer and drier than slopes facing a northerly to northeasterly direction, increasing the potential for wildfire ignition and spread.[16]

Slope instability from wildfire scarring of the landscape can result in slope instability in the form of more intensive flooding and landslides. These post-fire slope soils and altered drainage patterns can result in soil creep on downslope sides of foundations and reduce lateral support.

PLACE OF USE

The major post-wildfire hazards in San Joaquin County are altered drainage patterns. Though the Place of Use is relatively flat, there are some sloped areas in the eastern portions of the NSJWCD and SEWS areas. Downslope hazards may include landslides from these sloped areas. The Place of Use is not located within a State-designated earthquake -induced landslide hazard zone.[17]

Weather and Atmospheric Conditions

Wind, temperature, and relative humidity are the most influential weather elements in fire behavior and susceptibility.[18] Fire moves faster under hot, dry, and windy conditions. Wind may also blow embers ahead of a fire, causing its spread. Drought conditions lead to extended periods of excessively dry vegetation, increasing the fuel load and ignition potential.

According to data collected by the California Energy Commission, most precipitation is received from October through April, with an average annual rainfall of 14.1 inches.[19] May through September is the driest time of the year and coincides with what has traditionally been considered the fire season in California. However, increasingly persistent drought and climatic changes in California have resulted in drier winters, and fires during the autumn, winter, and spring months are becoming more common.

[15] CAL FIRE. 2007b. Fact Sheet: California's Fire Hazard Severity Zones. May 2007. https://www.sccgov.org/sites/dpd/DocsForms/Documents/Fire_Hazard_Zone_Fact_Sheet.pdf (accessed January 2025).
[16] University of California. 2018. Field Operations Manual. Revised November 2018. https://www.ucop.edu/safety-and-loss-prevention/_files/field-research-safety/wildland-fire-safety.pdf (accessed January 2025).
[17] California Department of Conservation. 2022. CGS Seismic Hazards Program: Landslide Zones [map]. https://gis.data.ca.gov/datasets/cadoc::cgs-seismic-hazards-program-landslide-zones/explore?location=37.905697%2C-121.274784%2C10.31 (accessed January 2025)
[18] CAL FIRE. 2025. Fuels Reduction. https://www.fire.ca.gov/what-we-do/natural-resource-management/fuels-reduction#:~:text=Almost%20every%20day%2C%20CAL%20FIRE,ecosystems%2C%20and%20promote%20community%20resilience. (accessed January 2025).
[19] California Energy Commission. 2025. Cal-Adapt [tool]. https://cal-adapt.org/tools/annual-averages (accessed January 2025).

PLACE OF USE

In general, the average wind speed in San Joaquin County is approximately 7.4 miles per hour. The windiest month of the year in is June with an average hourly wind speed of 9.1-miles per hour. Prevailing winds in the Place of Use tend to travel in a west to east direction.[20] Within the Place of Use, the hot season has an average daily high temperature above 90 degrees Fahrenheit and the hottest month of the year is July with an average high of 98 degrees Fahrenheit. The cool season has an average daily temperature below 64 degrees Fahrenheit and the coldest month of the year is December with an average high of 57 degrees Fahrenheit. The Place of Use sees an average rainfall of 2.3 inches with the most rainfall occurring in the month of February.[21]

Fuel and Energy Lines

Electric power lines mostly occur in urban areas and along roadways. Electric power, natural gas, and petroleum lines pose a risk of causing fire in the event of failure (whether due to earthquake or error). Natural gas poses a lower risk of causing a fire than petroleum products, because it is transported at lower pressures and, when released, rises and dissipates into the atmosphere.[22]

PLACE OF USE

Natural gas and petroleum pipelines occur across San Joaquin County. There are natural gas pipelines that traverse the Place of Use from the northern portion of the County to the southern portion of the County, through the City of Stockton. Natural gas pipelines also traverse northern San Joaquin County from the western portion of the County to the eastern portion of the County. Hazardous liquid pipelines extend from the southern portion of the County and extend through the City of Lodi up to the northern portion of the County. A hazardous liquid pipeline also extends east into San Joaquin County from the western County boundary eastward into the City of Stockton.[23]

Emergency and Evacuation Routes/Access

San Joaquin County

San Joaquin County has identified evacuation maps for neighborhoods within San Joaquin County. The three Partner Agencies fall within different evacuation zones, as described below.

Project Area

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The NSJWCD area includes the Lockeford Evacuation Zone and Beckman Road Evacuation Zone. The Lockeford Evacuation Zone identifies SR-12, SR-88, Elliott Road, Tully Road, Locke Road, and a portion of Tretheway Road south of the river from Locke Road to SR-12, as evacuation routes.[24] The

[20] Weather Spark. 2025. Climate and Average Weather Year Round in San Joaquin. https://weatherspark.com/y/1302/Average-Weather-in-San-Joaquin-California-United-States-Year-Round#:~:text=The%20windiest%20month%20of%20the,of%205.4%20miles%20per%20hour. (accessed January 2025).
[21] *Ibid*
[22] United States Department of Energy. 2025. Alternative Fuels Data Center. Available: https://afdc.energy.gov/vehicles/natural_gas_safety.html (accessed January 2025).
[23] National Pipeline Mapping System. 2025. NPMS Public Viewer. https://pvnpms.phmsa.dot.gov/PublicViewer/ (accessed January 2025).
[24] San Joaquin County Office of Emergency Services. 2010. Lockeford Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/lockeford_public_Streetmap.pdf. Accessed: December 2024.

Beckman Road Evacuation Zone identifies an evacuation route from Victor Road and Kettleman Lane to SR-99.[25]

STOCKTON EAST WATER DISTRICT

The SEWD area is located partially within and west of the Linden Evacuation Zone, which identifies an evacuation route from Duncan Road (both north and south) to SR-26 (both east and west).[26]

CITY OF STOCKTON

The City of Stockton is located between the Bear Creek Evacuation Zone and the Harney Lane Evacuation Zone. These zones identify the following evacuation routes:[27,28]

- Eight Mile Road, east to SR-99 and west to I-5;
- Lower Sacramento Road, north and south to Eight Mile Road and Harney Lane;
- Thornton Road, south;
- Davis Road, north to Eight Mile Road and south to Thornton Road;
- West Lane, north and south;
- Morada Lane, east; and
- Hutchins Street, south.

Airport Safety Zone Proximity

San Joaquin County

The San Joaquin County Airport Land Use Commission developed the Countywide Airport Land Use Compatibility Plan that includes the land use plans for the New Jerusalem Airport, Lodi Airport, Lodi Precissi Airpark, Kingdon Airpark, and Tracy Municipal Airport. The MICUP Partner Agencies are generally located nearest to the Kingdon Airpark and Lodi Airport. A description of the distances from each airport by MICUP Partner Agency is included below. A map of airport safety zones is shown in Figure 4.8-4.

Project Area

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The closest airports to the NJSWCD area are the Lodi Airport – located approximately 3.0 and 5.0 miles from the North System and South System Recharge project components, respectively – and Kingdon Airpark – located approximately 8.5 and 6.75 miles from the North System and South System Recharge project components, respectively.[29] As such, the above-ground NSJWCD project components are not located within an airport safety zones. The western-most FloodMAR area has

[25] San Joaquin County Office of Emergency Services. 2010. Beckman Road Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/Lodi_BeckmanRoad_Public_Streetmap.pdf. Accessed: December 2024.
[26] San Joaquin County Office of Emergency Services. 2019. Linden Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/Linden_Public_Symbology_English.pdf. Accessed: December 2024.
[27] San Joaquin County Office of Emergency Services. 2018. Harney Lane Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/Lodi_HarneyLane_Public_Streetmap.pdf. Accessed: December 2024.
[28] San Joaquin County Office of Emergency Services. 2010. Bear Creek Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/NorthStockton_BearCreek_Public.pdf. Accessed: December 2024.
[29] San Joaquin County Council of Governments. 2009. San Joaquin County Aviation System Airport Land Use Compatibility Plan. https://www.sjcog.org/DocumentCenter/View/17/2009-San-Joaquin-County-ALUCP---Amended-January-2018?bidId= (accessed January 2025)

the potential to overlap with the Lodi Airport Influence Area but would not be within an airport safety zone. None of the other project components fall within the Lod Airport Influence Area. NSJWCD would also not be located within the Kingdon Airpark Airport Influence Area.

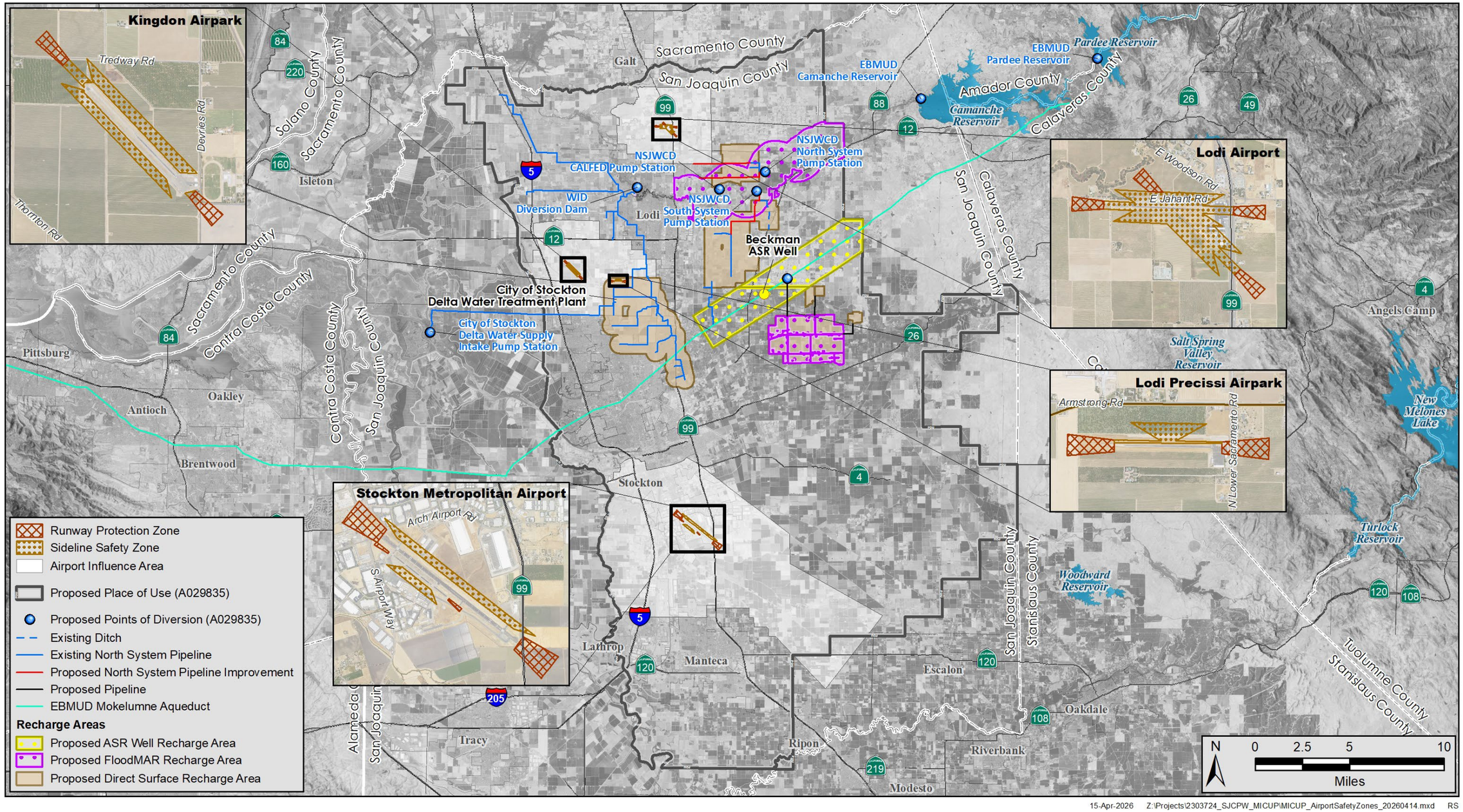
STOCKTON EAST WATER DISTRICT

The closest airports to the SEWD project area are the Lodi Airport – located approximately 11 miles from the SEWD project component areas – and the Kingdon Airpark – located approximately 11.5 miles from SEWD project component areas, respectively. As such, the SEWD project components are not located within airport safety zones nor located within an Airport Influence Area.

CITY OF STOCKTON

The closest airport to the City of Stockton project component area at the Delta Water Treatment Plant is the Kingdon Airpark, located approximately two miles to the northwest. As such, the DWTP site is not located within airport safety zones but would be within the Kingdon Airpark and Lodi Precissi Airpark Airport Influence Area.

Figure 4.8-4 Airport Safety Zones within the Place of Use



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4.8.3 Regulatory Framework

Federal Regulations

Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act

The USEPA is responsible for implementing and enforcing federal laws and regulations pertaining to hazardous materials. The primary legislation includes the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and the Emergency Planning and Community Right-to-Know Act (known as SARA Title III). RCRA and the 1984 RCRA Amendments regulate the treatment, storage, and disposal of hazardous and non-hazardous wastes and mandate that hazardous wastes be tracked from the point of generation to their ultimate fate in the environment, including detailed tracking of hazardous materials during transport and permitting of hazardous material handling facilities. As permitted by RCRA, in 1992, the USEPA approved California's program called the Hazardous Waste Control Law (HWCL), administered by the DTSC, to regulate hazardous wastes in California, as discussed further below. The purpose of CERCLA is to identify and clean up chemically contaminated sites that pose a significant environmental health threat, and the Hazard Ranking System is used to determine whether a site should be placed on the National Priorities List for cleanup activities. SARA relates primarily to emergency management of accidental releases and requires annual reporting of continuous emissions and accidental releases of specified compounds that are compiled into a nationwide Toxics Release Inventory. Finally, SARA Title III requires formation of state and local emergency planning committees that are responsible for collecting material handling and transportation data for use as a basis for planning and provision of chemical inventory data to the community at large under the "right-to-know" provision of the law.

Hazardous Materials Transportation Act

Under the Hazardous Materials Transportation Act of 1975, the United States Department of Transportation (DOT), Office of Hazardous Materials Safety regulates the transportation of hazardous materials on water, rail, highways, through air, or in pipelines, and enforces guidelines created to protect human health and the environment and reduce potential impacts by creating hazardous-material packaging and transportation requirements. It also includes provisions for material classification, packaging, marking, labeling, placecarding, and shipping documentation. The DOT provides hazardous-materials safety training programs and supervises activities involving hazardous materials. In addition, DOT develops and recommends regulations governing the multimodal transportation of hazardous materials.

Clean Water Act

The Clean Water Act (CWA) (Title 33 § 1251 et seq. of the United States Code [33 USC 1251, et seq.]) is the major federal legislation governing water quality. The CWA established the basic structure for regulating discharges of pollutants into waters of the United States. The objective of the act is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA establishes the basic structure for regulating the discharge of pollutants into waters of the United States. Responsibility for administering the CWA resides with SWRCB and the nine respective RWQCBs; the Central Valley RWQCB administers the CWA in the San Joaquin County area.

Section 404 of the CWA regulates temporary and permanent fill and disturbance of waters of the United States, including wetlands. The United States Army Corps of Engineers requires that a permit be obtained if a project proposes to place fill in navigable waters and/or to alter waters of the United States below the ordinary high-water mark in nontidal waters. Section 401 of the CWA requires compliance with State water quality standards for actions within State waters. Compliance with the water quality standards required under Section 401 is a condition for issuance of a Section 404 permit. Under Section 401 of the CWA, every applicant for a permit or license for any activity that may result in a discharge to a water body must obtain a State water quality certification from the RWQCB to demonstrate that the proposed activity would comply with State water quality standards.

Federal Insecticide, Fungicide, and Rodenticide Act

This Act (7 U.S. Code [USC] 136 et seq.) provides federal control of pesticide distribution, sale, and use. The USEPA was given authority under the Act to study the consequences of pesticide usage, and to require users (farmers, utility companies, and others) to register when purchasing pesticides. Later amendments to the law required users to take exams for certification as applicators of pesticides. All pesticides used in the United States must be registered (licensed) by the USEPA. Registration assures that pesticides will be properly labeled and that, if used in accordance with specifications, they will not cause unreasonable harm to the environment.

Lead-Based Paint Elimination Final Rule 24 Code of Federal Regulations

Governed by the U.S. Housing and Urban Development, regulations for LBP are contained in the Lead-Based Paint Elimination Final Rule 24 Code of Federal Regulations (CFR) 33, which requires sellers and lessors to disclose known LBP and LBP hazards to perspective purchasers and lessees. Additionally, all LBP abatement activities must follow California and federal occupational safety and health administrations (California Occupational Safety and Health Administration [CalOSHA] and federal Occupational Safety and Health Administration [OSHA], respectively) and with the State of California Department of Health Services requirements. Only LBP trained and certified abatement personnel can perform abatement activities. All lead LBP removed from structures must be hauled and disposed of by a transportation company licensed to transport this type of material at a landfill or receiving facility licensed to accept the waste.

Federal Disaster Mitigation Act

The Disaster Mitigation Act of 2000 requires a State-level mitigation plan as a condition of disaster assistance and provides funding to communities developing their own mitigation plans through the Pre-Disaster Mitigation Grant Program. There are two different levels of State disaster plans: "Standard" and "Enhanced." States that develop an approved Enhanced State Plan can increase the amount of funding available through the Hazard Mitigation Grant Program. The Act also established new requirements for local mitigation plans. The State of California has an Enhanced Hazard Mitigation Plan.[30]

[30] California Governor's Office of Emergency Services. 2023. California State Emergency Plan Coordinating Draft. https://www.caloes.ca.gov/wp-content/uploads/Preparedness/Documents/2023-SEP-Draft-Public-Review.pdf (accessed February 2025)

National Fire Plan

The National Fire Plan was developed in August 2000, following a historic wildfire season. Its intent is to establish plans for active response to severe wildfires and their impacts to communities while ensuring sufficient firefighting capacity. The plan addresses firefighting, rehabilitation, hazardous fuels reduction, community assistance, and accountability.

State Regulations

California Hazardous Waste Control Law

The California Hazardous Waste Control Law (HWCL) is the primary hazardous waste statute in the State of California, and implements RCRA as a "cradle-to-grave" waste management system in the State of California for handling hazardous wastes in a manner that protects human health and the environment and would reduce potential resulting impacts. The law specifies that generators have the primary duty to determine whether their waste is hazardous and to ensure proper management. The HWCL also establishes criteria for the reuse and recycling of hazardous waste used or reused as raw materials. The law exceeds federal requirements by mandating source reduction planning, and a much broader requirement for permitting facilities that treat hazardous waste. It also regulates a number of types of waste and waste management activities that are not covered by federal law.

The hazardous waste management program enforced by DTSC was created by the Hazardous Waste Control Act (California Health and Safety Code Section 25100 et seq.), which is implemented by regulations described in California Code of Regulations (CCR) Title 26. The State program is similar to, but more stringent than, the federal program under RCRA. The regulations list materials that may be hazardous, and establish criteria for their identification, packaging, and disposal. Environmental health standards for management of hazardous waste are contained in CCR Title 22, Division 4.5. As required by California Government Code Section 65962.5, DTSC maintains a Hazardous Waste and Substances Site List for the State called the Cortese List.

If any soil is excavated from a site containing hazardous materials, it would be considered a hazardous waste if it exceeded specific criteria in Title 22 of the California Code of Regulations. Remediation of hazardous wastes found at a site may be required if excavation of these materials is performed, or if certain other soil disturbing activities would occur. Even if soil or groundwater at a contaminated site does not have the characteristics required to be defined as hazardous waste, remediation of the site may be required by regulatory agencies subject to jurisdictional authority. Cleanup requirements are determined on a case-by-case basis by the agency taking jurisdiction.

California Health and Safety Code

The California Health and Safety Code (HSC § 25141) defines hazardous waste as a waste or combination of waste that may:

> . . . because of its quantity, concentration, or physical, chemical, or infection characteristics:
>
> (1) Cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitation-reversible illness.

(2) Pose a substantial present or potential hazard to human health or the environment, due to factors including, but not limited to, carcinogenicity, acute toxicity, chronic toxicity, bioaccumulative properties, or persistence in the environment, when improperly treated, stored, transported, or disposed of or otherwise managed.

This statutory framework establishes criteria for identifying, packaging, and labeling hazardous wastes; prescribes management practices for hazardous wastes; establishes permit requirements for hazardous-waste treatment, storage, disposal, and transportation; and identifies hazardous waste that commonly would be disposed of in landfills.

Under both the RCRA and HWCL, hazardous-waste manifests must be retained by the generator for a minimum of 3 years. The generator must match copies of the manifests with copies of manifest receipts from the treatment, disposal, or recycling facility.

In accordance with Chapter 6.11 of the California Health and Safety Code (HSC § 25404, et seq.), local regulatory agencies enforce many federal and State regulatory programs through the Certified Unified Program Agencies program, including:

- Hazardous Materials Business Plans (HMBPs) (HSC § 25501, *et seq*.);
- State Uniform Fire Code (UFC) requirements (UFC § 80.103, as adopted by the State Fire Marshal pursuant to HSC § 13143.9);
- Underground Storage Tanks (USTs) (HSC § 25280, *et seq*.);
- Aboveground storage tanks (HSC § 25270.5[c]); and
- Hazardous-waste-generator requirements (HSC § 25100, et seq.).

The San Joaquin County Environmental Health Department is the CUPA for San Joaquin County and the Place of Use and enforces State statutes and regulations through the Hazardous Materials Unified Program Agency (HMUPA). The HMUPA oversees aboveground petroleum tanks; generation of hazardous materials; storage and treatment; USTs; generation of medical waste; the accidental-release prevention program; and the Local Oversight Program, which interfaces with SWRCB and the Central Valley RWQCB on LUSTs and UST release sites. An HMBP must be submitted if a facility ever handles any individual hazardous material in an aggregate amount equal to or greater than 55 gallons (liquids), 500 pounds (solids), or 200 cubic feet (gases). An HMBP must include:

- Details that include facility floor plans and identify the business conducted at the site;
- An inventory of hazardous materials handled or stored on the site;
- An emergency response plan; and

A training program in safety procedures and emergency response for new employees who may handle hazardous materials, with an annual refresher course in the same topics for those same employees.

California Public Resources Code Section 21151.4

The California Public Resources Code Section 21151.4 states that, for projects that might reasonably be expected to emit or handle hazardous materials and are located within 0.25 mile (402 meters) of a school site, consultation with the school district is required regarding potential hazards.

California Code of Regulations Title 8 (Workplace Safety Regulations)

The California Division of Occupational Safety and Health (CalOSHA) assumes primary responsibility for developing and enforcing workplace safety regulations. These regulations concern the use of hazardous materials in the workplace, including requirements for employee safety training; availability of safety equipment; accident and illness prevention programs; hazardous-substance exposure warnings; and preparation of emergency action and fire prevention plans.

CalOSHA also enforces hazard communication program regulations, including procedures for identifying and labeling hazardous substances, and requires that safety data sheets (formerly known as material safety data sheets) be available for employee information and training programs. CalOSHA standards are generally more stringent than federal regulations. Construction workers and operational employees within the plan area would be subject to these requirements.

California Code of Regulations, Title 8, Section 1529 authorizes CalOSHA to implement the survey requirements of CFR Title 29 relating to asbestos. These federal and state regulations require facilities to take all necessary precautions to protect employees and the public from exposure to asbestos. Workers who conduct asbestos abatement must be trained in accordance with federal and State OSHA requirements. The BAAQMD oversees the removal of regulated asbestos-containing materials (see "Asbestos Demolition, Renovation, and Manufacturing Rule" below).

California Code of Regulations Title 8, Section 1532.1 includes requirements to manage and control exposure to lead-based paint. These regulations cover the demolition, removal, cleanup, transportation, storage, and disposal of lead-containing material. The regulations outline the permissible exposure limit, protective measures, monitoring, and compliance to ensure the safety of construction workers exposed to lead-based material. Loose and peeling lead-based paint must be disposed of as a State and/or federal hazardous waste if the concentration of lead equals or exceeds applicable hazardous waste thresholds. Federal and State OSHA regulations require a supervisor who is certified with respect to identifying existing and predictable lead hazards to oversee air monitoring and other protective measures during demolition activities in areas where lead-based paint may be present. Special protective measures and notification of CalOSHA are required for highly hazardous construction tasks related to lead, such as manual demolition, abrasive blasting, welding, cutting, or torch burning of structures, where lead-based paint is present.

California Code of Regulations Title 14 – Fire Safe Roads

The Board of Forestry maintains fire safe road regulations, as part of CCR Title 14. This includes requirements for road width, surface treatments, grade, radius, turnarounds, turnouts, structures, driveways, and gate entrances. These regulations are intended to ensure safe access for emergency wildland fire equipment and civilian evacuation.

California Code of Regulations Title 22 (Environmental Health Standards for the Management of Hazardous Waste)

California Code of Regulations Title 22, Division 4.5 contains the Environmental Health Standards for the Management of Hazardous Waste, which includes California waste identification and classification regulations. California Code of Regulations Title 22, Chapter 11, Article 3, "Soluble Threshold Limits Concentrations/Total Threshold Limits Concentration Regulatory Limits," identifies the concentrations at which soil is determined to be a California hazardous waste. California's Universal Waste Rule (22 CCR § 66273) provides an alternative set of management standards in lieu of regulation as hazardous wastes for certain common hazardous wastes, as defined in 22 California

Code of Regulations Section 66261.9. Universal wastes include fluorescent lamps, mercury thermostats, and other mercury-containing equipment. Existing structures may contain fluorescent light ballasts that could contain mercury or lead. The Alternative Management Standards for Treated Wood Waste (22 CCR § 67386) were developed by DTSC to allow for disposal of treated wood as a nonhazardous waste, to simplify and facilitate the safe and economical disposal of such waste. Chemically treated wood can contain elevated levels of hazardous chemicals (e.g., arsenic, chromium, copper, pentachlorophenol, or creosote) that equal or exceed applicable hazardous waste thresholds. The Alternative Management Standards provide for less stringent storage requirements and extended accumulation periods, allow shipments without a hazardous waste manifest and a hazardous waste hauler, and allow disposal at specific nonhazardous waste landfills.

California Code of Regulations Title 24 (California Building Code)

Updated every three years through a rigorous stakeholder process, Title 24 of the California Code of Regulations requires California homes and businesses to meet strong fire and safety measures. Title 24 contains numerous subparts, including Part 1 (Administrative Code), Part 2 (Building Code), Part 3 (Electrical Code), Part 4 (Mechanical Code), Part 5 (Plumbing Code), Part 6 (Energy Code), Part 8 (Historical Building Code), Part 9 (Fire Code), Part 10 (Existing Building Code), Part 11 (Green Building Standards Code), Part 12 (Referenced Standards Code). The California Building Code is applicable to all development in California. (Health and Safety Code §§ 17950 and 18938(b).)

The regulations receive input from members of industry, as well as the public, with the goal of "[r]educing of wasteful, uneconomic, inefficient, or unnecessary consumption of energy." (Pub. Res. Code § 25402.) These regulations are scrutinized and analyzed for technological and economic feasibility (Pub. Res. Code § 25402(d)) and cost effectiveness (Pub. Res. Code § 25402(b)(2) and (b)(3)).

PART 9 – CALIFORNIA FIRE CODE

The 2022 California Fire Code is Part 9 of CCR Title 24. It establishes the minimum requirements consistent with nationally recognized good practices to safeguard public health, safety, and general welfare from the hazards of fire, explosion, or dangerous conditions in new and existing buildings, structure, and premises, and to provide safety and assistance to firefighters and emergency responders during emergency operations. It is the primary means for authorizing and enforcing procedures and mechanisms to ensure the safe handling and storage of any substance that may pose a threat to public health and safety. The California Fire Code regulates the use, handling, and storage requirements for hazardous materials at fixed facilities. The California Fire Code and the California Building Code (CBC) use a hazard classification system to determine what protective measures are required to protect fire and life safety. These measures may include construction standards, separations from property lines and specialized equipment. To ensure that these safety measures are met, the California Fire Code employs a permit system based on hazard classification. The provisions of this Code apply to the construction, alteration, movement, enlargement, replacement, repair, equipment, use and occupancy, location, maintenance, removal, and demolition of every building or structure or any appurtenances connected or attached to such building structures throughout California.

More specifically, the Fire Code is included in CCR Title 24. Title 24, part 9, Chapter 7 addresses fire-resistances-rated construction; CBC (Part 2), Chapter 7A addresses materials and construction methods for exterior wildfire exposure; Fire Code Chapter 8 addresses fire related Interior finishes; Fire Code Chapter 9 addresses fire protection systems; and Fire Code Chapter 10 addresses fire

related means of egress, including fire apparatus access road width requirements. Fire Code Section 4906 also contains existing regulations for vegetation and fuel management to maintain clearances around structures. These requirements establish minimum standards to protect buildings located in FHSZs within SRAs and WUI Fire Areas. This code includes provisions for ignition-resistant construction standards for new buildings and structures.

California Porter-Cologne Act

The Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act) is California's statutory authority for the protection of water quality. Under the Porter-Cologne Act, the State must adopt water quality policies, plans, and objectives that protect the State's waters for the use and enjoyment of the people. Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The RWQCBs are required to formulate and adopt water quality control plans (also known as basin plans) for all areas of the region and establish water quality objectives in the plans. The Porter-Cologne Act sets forth the obligations of SWRCB and RWQCBs to adopt and periodically update water quality control plans that recognize and reflect the differences in existing water quality, the beneficial uses of the region's groundwater and surface water, and local water quality conditions and problems. It also authorizes SWRCB and the respective RWQCBs to issue and enforce waste discharge requirements and to implement programs for controlling pollution in State waters. Finally, the Porter-Cologne Act also authorizes SWRCB and the respective RWQCBs to oversee site investigation and cleanup for unauthorized releases of pollutants to soils and groundwater and in some cases to surface waters or sediments.

California Fire Plan

The Strategic Fire Plan for California is the State's roadmap for reducing the risk of wildfire. The most recent version of the plan was finalized in 2024 and directs each CAL FIRE Unit to address and meet incremental requirements to achieve six specific goals, including improving core capabilities, enhancing internal operations, ensuring health and safety, and building an engaged workforce.[31]

CAL FIRE has mapped fire threat potential throughout California. CAL FIRE maps fire threat based on the availability of fuel and the likelihood of an area burning (based on topography, fire history, and climate). The threat levels include no fire threat, moderate, high, and very high fire threat. Further, the maps designate San Joaquin County as the Local Responsibility Area for the plan areas. The CAL FIRE Office of the State Fire Marshal provides oversight of enforcement of the California Fire Code as well as overseeing hazardous liquid pipeline safety.

California Multi-Hazard Mitigation Plan

The California Office of Emergency Services (CalOES) prepares the State of California Multi-Hazard Mitigation Plan (SHMP). The SHMP identifies hazard risks and includes a vulnerability analysis and a hazard mitigation strategy. The SHMP is federally required under the Federal Disaster Mitigation Act of 2000 for the State to receive Federal funding. The Federal Disaster Mitigation Act of 2000 requires a State mitigation plan as a condition of disaster assistance.

[31] CAL FIRE. 2024. Strategic Fire Plan for California. https://www.paperturn-view.com/cal-fire-communications/cal-fire-strategicplan24-web?pid=ODg8828162&p=25&v=2 (accessed January 2025).

California Emergency Plan

The foundation of California's emergency planning and response is a Statewide mutual aid system, which is designed to ensure that adequate resources, facilities, and other support is provided to jurisdictions whenever their own resources prove to be inadequate to cope with a given situation.

The California Disaster and Civil Defense Master Mutual Aid Agreement (California Government Code Sections 8555–8561) requires signatories to the agreement to prepare operational plans to use within their jurisdiction, and outside their area. These plans include fire and non-fire emergencies related to natural, technological, and war contingencies. The State of California, all State agencies, all political subdivisions, and all fire districts signed this agreement in 1950.

Section 8568 of the California Government Code, the "California Emergency Services Act," states that "the State Emergency Plan shall be in effect in each political subdivision of the State, and the governing body of each political subdivision shall take such action as may be necessary to carry out the provisions thereof." The Act provides the basic authorities for conducting emergency operations following the proclamations of emergencies by the Governor or appropriate local authority, such as a City Manager. The provisions of the Act are reflected and expanded on by appropriate local emergency ordinances. The Act further describes the function and operations of government at all levels during extraordinary emergencies, including war.

All local emergency plans are extensions of the California Emergency Plan. The State Emergency Plan conforms to the requirements of California's Standardized Emergency Management System (SEMS), which is the system required by Government Code 8607(a) for managing emergencies involving multiple jurisdictions and agencies. The SEMS incorporates the functions and principles of the Incident Command System (ICS), the Master Mutual Aid Agreement, existing mutual aid systems, the operational area concept, and multi-agency or inter-agency coordination. Local governments must use SEMS to be eligible for funding of their response-related personnel costs under State disaster assistance programs. The SEMS consists of five organizational levels that are activated as necessary, including: field response, local government, operational area, regional, and State. CalOES divides the State into several mutual aid regions. San Joaquin County is located in Mutual Aid Region IV, which includes Alpine, Amador, Calaveras, El Dorado, Nevada, Placer, Sacramento, San Joaquin, Stanislaus, Tuolumne, and Yolo Counties.[32]

California Public Resources Code

The California Public Resources Code (PRC) includes fire safety regulations that restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors on construction equipment that use an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided on-site for various types of work in fire-prone areas.

- These regulations include the following: Earthmoving and portable equipment with internal combustion engines would be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (PRC § 4442);
- Appropriate fire suppression equipment would be maintained during the highest fire danger period—from April 1 to December 1 (PRC § 4428);

[32] California Governor's Office of Emergency Services. 2025. Fire Operations. https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/fire-operations/ (accessed January 2025)

- On days when a burning permit is required, flammable materials would be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor would maintain the appropriate fire suppression equipment (PRC § 4427); and
- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines would not be used within 25 feet of any flammable materials (PRC § 4431).

California Department of Pesticide Regulation – Restricted Materials Permits and Pesticide Use Report

The California Department of Pesticide Regulation (CDPR) is dedicated to protect human health and the environment by regulating pesticide sales and use, and by fostering reduced-risk pest management. The State of California maintains a list of pesticides that are especially dangerous to human health or the environment if used incorrectly, commonly called restricted materials. These pesticides are listed in 3 California Code of Regulations (CCR) Section 6400. CDPR puts special controls and limitations on these pesticides; furthermore, the purchase or use of restricted materials for agricultural purposes requires a permit from the CAC. Use requirements for these pesticides are given in 3 CCR Sections 6445 through 6489.[33]

CDPR maintains a list of registered pesticides known to cause groundwater contamination in California; these pesticides are listed in Title 3, California Code of Regulations (3 CCR), Section 6800(a): atrazine, bantazon, bromacil, diuron, norflurazon, prometon, simazine. Section 6800(a) pesticides have certain use restrictions. Section 6800(a) pesticides are prohibited below the high water mark inside artificial recharge basins, unless the pesticide is applied six months or more before the basin is used to recharge groundwater (3 CCR Section 6487.1). CDPR also maintains a list of pesticides that have the potential to move to, but are not currently found in groundwater, listed in 3 CCR Section 6800(b). Section 6800(b) pesticides are not prohibited for use in artificial recharge basins.[34] CDPR also has regulations pertaining to wellhead protection and the use of pesticides, as listed in 3 CCR Section 6609 (CDPR 2025c[35]). These measures apply to all wells (irrigation, domestic, municipal, monitoring, abandoned, dry, or drainage wells) where pesticides are mixed, loaded, rinsed, or otherwise used within 100 feet of the well. The following management measures are given by CDPR to protect wellheads:

- Wells protected from runoff:
  - The well should be sited so that no surface water runoff can contact the wellhead including the concrete base, or;
  - A berm should be constructed adjacent to the wellhead to prevent movement of surface water to the wellhead. Preemergent herbicides from the 6800(a) and 6800 (b) lists are prohibited between the berm and the wellhead.
- Wells not protected from runoff: The following activities are prohibited within 100 feet of an unprotected well:
  - Mixing, loading, and storing pesticides,

[33] California Department of Pesticide Regulation. 2025a.Restricted Materials Use Requirements. Available: https://www.cdpr.ca.gov/docs/enforce/permitting.htm. Accessed January 20, 2025.
[34] California Department of Pesticide Regulation . 2025b. California Code of Regulations (T3. Food and Agriculture) Division 6. Pesticides and Prest control Operations. Available: https://www.cdpr.ca.gov/docs/enforce/permitting.htm. Accessed January 20, 2025.
[35] California Department of Pesticide Regulation . 2025c. Regulations. Available: https://www.cdpr.ca.gov/docs/emon/grndwtr/gwp_regs.htm#:~:text=Wellhead%20protection&text=Restricts%20pesticide%20handling%20practices%20within,a%20berm%20and%20the%20wellhead.&text=Wellhead%20Protection%203CCR%20section%206609. Accessed January 20, 2025.

- Rinsing of spray equipment or pesticide containers,
- Maintenance of spray equipment that could result in a pesticide or pesticide residue spill,
- Application of preemergent herbicides from the Section 6800(a) and Section 6800 (b) lists.

California became the first state to require full reporting of agricultural pesticide use in response to demands for more realistic and comprehensive pesticide use data. Under the PUR program, all agricultural pesticide use must be reported monthly to county agricultural commissioners, who in turn, report the data to CDPR.

Regional and Local Regulations

San Joaquin County Multi-Jurisdictional Hazard Mitigation Plan

The San Joaquin County Office of Emergency Services' multijurisdictional Local Hazard Mitigation Plan for San Joaquin County was updated in 2022. This Hazard Mitigation Plan is a comprehensive strategy that assesses the risks and vulnerabilities associated with various hazards, such as droughts, earthquakes, extreme temperatures, flooding, and wildfires. It identifies actions and measures to reduce the impacts of these hazards, protect lives, buildings, infrastructure, and property, and strengthen abilities to recover from these types of events.

San Joaquin County Emergency Operations Plan

The purpose of the San Joaquin County Emergency Operations Plan (EOP) describes how agencies would work together during emergencies and major disasters whether natural or human-caused hazards. The plan includes prevention, protection, mitigation, response, and recovery. It identifies the necessary actions for government before, during, and after emergencies and major disasters. This EOP continues the County's compliance with the Standardized Emergency Management System (SEMS), the National Incident Management System (NIMS), the Incident Command System (ICS), the National Response Framework (NRF), and the National Preparedness Guidelines to include Developing and Maintaining Emergency Operations Plans, Comprehensive Preparedness Guide (CPG) 101, version 3.0. It facilitates multi-agency and multi-jurisdictional coordination during emergency operations, public information functions, and resource management.

San Joaquin County Ordinance Code

Division 8, Hazardous Materials, of the San Joaquin County Ordinance Code provides regulations regarding hazardous material response plans, inventories, underground storage, and risk management. In part, this County Ordinance Code division requires that any business classified as farm operations that handles a specific quantity of hazardous materials comply with Chapter 6.95 of the Health and Safety Code to the Agricultural Commissioner's Office/

California has developed an emergency response plan to coordinate emergency services provided by federal, State, and local governments and private agencies. Responding to hazardous-materials incidents is one part of this plan. The plan is administered by the California Governor's Office of Emergency Services, which coordinates the responses of other agencies. The Contra Costa County Office of the Sheriff: Emergency Services Division coordinates response to emergencies in the County. Emergency response team members respond and work with local fire and police agencies, emergency medical providers, the California Highway Patrol, CAL FIRE, CDFW, and Caltrans.

City of Stockton Municipal Code

The City of Stockton's Municipal Code Section 16.36.080 includes standards intended to ensure that the use, handling, storage, and transportation of hazardous materials would comply with all applicable State laws (Government Code Section 65850.2 and Health and Safety Code Section 25505, et seq.) and that appropriate information is reported to the City.

City of Lodi Municipal Code

The City of Lodi's Municipal Code Chapter 8.20 includes methods for the reduction of environmental damage due to the release of hazardous materials.

San Joaquin County Airport Land Use Compatibility Plan (ALUCP)

The role of the Airport Land Use Commission is to "formulate a comprehensive plan that will provide for the orderly growth at each public use airport and the area surrounding the airport within the jurisdiction of the commission" (State of California Public Utilities Code Section 21675). The SJCOG Board of Directors serves as the airport land use commission for San Joaquin County. The SJCOG was designated as the ALUC in May 1973. The SJCOG is a joint-powers authority comprised of the County of San Joaquin and the Cities of Stockton, Lodi, Manteca, Tracy, Ripon, Escalon, and Lathrop. SJCOG serves as the regional transportation planning agency, which provides a forum for regional decision-making on issues such as growth, transportation, environmental management, housing, open space, air quality, fiscal management, and economic development. SJCOG also considers population statistics, airport land use, habitat and open space planning, and other regional issues.[36]

San Joaquin County General Plan

The San Joaquin County General Plan[37] includes the following goals and policies related to hazards and hazardous materials and wildfire applicable to the proposed project:

- **PHS-2.7 Preservation of Floodway and Floodplains.** The County shall preserve floodways and floodplains for non-urban uses in an effort to maintain existing flood carrying capacities, except that development may be allowed in floodplains with mitigation measures that are in conformance with the County's floodplain management ordinance.
- **PHS-7.2 Avoid Contamination of Resources.** The County shall strive to ensure that hazardous materials and wastes do not contaminate air, water, or soil resources.
- **PHS-7.3 Control Hazardous Materials.** The County shall require the use, storage, and disposal of hazardous materials and wastes to comply with local, State, and Federal safety standards

[36] San Joaquin County Council of Governments. 2009. Airport Land Use Compatibility Plan. Amended January 2018. https://www.sjcog.org/DocumentCenter/View/17/2009-San-Joaquin-County-ALUCP---Amended-January-2018?bidId= (accessed January 2025).
[37] San Joaquin, County of. 2016. San Joaquin County General Plan. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/GENERAL%20PLAN%202035.pdf (accessed January 2025).

City of Stockton General Plan

The City of Stockton General Plan Safety Element[38] includes the following policy related to hazards and hazardous materials and wildfire applicable to the proposed project:

- **Policy SAF-2.6:** Minimize the risk to city residents and property associated with the transport, distribution, use, and storage of hazardous materials.

City of Lodi General Plan

The City of Lodi General Plan Safety Element[39] includes the following goals and policies related to hazards and hazardous materials and wildfire applicable to the proposed project:

- **Policy S-P18.** Consider the potential for the production, use, storage, and transport of hazardous materials in approving new development. Provide for reasonable controls on such hazardous materials. Ensure that the proponents of applicable new development projects address hazardous materials concerns through the preparation of Phase I or Phase II hazardous materials studies, as necessary, for each identified site as part of the design phase for each project. Require projects to implement federal or State cleanup standards outlined in the studies during construction.
- **Policy S-P21.** Continue to follow the County Comprehensive Airport Land Use Plan for guidelines on land use compatibility near airports, land use restrictions, and to ensure public safety.
- **Policy S-P23.** Continue to mark underground utilities and abide by federal safe-digging practices during construction.
- **Policy S-P29.** Maintain a vegetation management program to ensure clearing of dry brush areas. Conduct management activities in a manner consistent with all applicable environmental regulations.
- **Policy S-P30.** Participate in mutual aid agreements and regional efforts to mitigate and adapt to future fire risks.

4.8.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 CEQA Guidelines Appendix G significance criteria questions related to hazards/hazardous materials and wildfire.

Would MICUP (the proposed project):

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?

[38] Stockton, City of. 2018. Envision Stockton 2040 General Plan. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/Stockton_General_Plan_Adopted.pdf (accessed January 2025).

[39] Lodi, City of. 2024. Lodi General Plan Safety Element. https://www.lodi.gov/DocumentCenter/View/8322/2024-Adopted-Safety-Element-Update (accessed January 2025).

d) Be located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment?

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, result in a safety hazard or excessive noise for people residing or working in the project area?

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

g) Expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?

h) If located in or near State responsibility areas or lands classified as Very High Fire Hazard Severity Zones:

   1. Substantially impair an adopted emergency response plan or emergency evacuation plan?
   2. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?
   3. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?
   4. Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Approach to Analysis

EIR Scoping Comments Consideration

No comments that pertain to hazards, hazardous materials, or wildfire were received in response to publication of the Notice of Preparation for this EIR.

General Approach to Analysis

Environmental impacts related to hazards and hazardous materials and wildfire have been assessed using impact significance criteria from federal, State, and local regulations. The impact analysis is based on available literature regarding the existing plans, policies, and resources in the project area. Criteria used during this analysis are described below.

HAZARDS (SPECIFIC TO HAZARDOUS MATERIALS UPSET AND EXPOSURE RISK)

This evaluation focuses on whether the proposed project would result in changes to the physical environment that would cause or exacerbate adverse effects related to the use, transportation, disposal, accidental release, or emission of hazardous materials. Potential construction-related and operational impacts from existing hazardous materials in soils, sediments, groundwater, surface water, and structures are evaluated using available information from the Department of Toxic Substances Control and the State Water Resources Control Board.

HAZARDS (SPECIFIC TO AVIATION SAFETY AND NOISE EXPOSURE RISK)

The airport safety zones and noise contours for airports within San Joaquin County were reviewed to determine potential impacts from exposure to aviation-related hazards and noise.

EMERGENCY EVACUATION AND RESPONSE

The County does not have significance thresholds related to emergency access. The County Ordinance Code adopts the California Fire Code. The evaluation includes a determination of whether the changes to the physical environment caused by the proposed project would impair or interfere with emergency response plans.

In addition, pursuant to California Attorney General Best Practices for Analyzing and Mitigating Wildfire Impacts of Development Projects Under the California Environmental Quality Act, this evaluation assesses whether projects located in or near State responsibility areas or lands classified as very high fire hazard severity zones would substantially impair an adopted emergency response plan or emergency evacuation plan.

WILDFIRE EXPOSURE RISK

The California Department of Forestry and Fire Protection Hazard Severity Maps were consulted in determining the project's proximity to State Responsibility Areas or lands classified as very high fire hazard severity zones. Impacts related to wildfire hazards and risks were evaluated using FHSZ mapping for San Joaquin County, aerial imagery, and topographic mapping. The Place of Use is partially located within a Moderate FHSZ in an SRA at its easternmost boundary. It was assessed whether the proposed project would risk exacerbating those existing environmental conditions or causing new direct, indirect, or cumulative impacts to other aspects of the environment.

California Attorney General Best Practices for Analyzing and Mitigating Wildfire Impacts of Development Projects Under the California Environmental Quality Act restates the CEQA requirement that an EIR analyze "any significant environmental effects the project might cause or risk exacerbating by bringing development and people into the area affected," including by locating development in wildfire risk areas. As such, this evaluation assesses whether projects located in or near State responsibility areas or lands classified as very high fire hazard severity zones would exacerbate wildfire risks, and thereby expose people or structures to significant risks during or post wildfire event; require the installation of emergency-related infrastructure; or result in temporary or ongoing impacts to the environment.

Specific Thresholds of Significance

For purposes of this analysis, the following thresholds are used to evaluate the significance of the hazards and wildfire impacts resulting from implementation of the proposed project.

- Regular transport of hazardous materials to/from the plan areas on an unsuitable road or use of highly volatile hazardous materials, which would create a significant hazard to the public or the environment.
- Location of new development within 0.25 mile of an existing or proposed school in conjunction with hazardous emissions or handle hazardous materials, waste, or substances.
- Location of new development on a hazardous materials sites lists such as CalEPA, California Facility Inventory Database (CA FID) UST and State Water Efficiency and Enhancement Program (SWEEP), HAZNET, California DTSC EnviroStor, San Joaquin Valley Air District, and/or the SWRCB GeoTracker regulated facilities databases for files related to possible Recognized Environmental Conditions.
- Location of new development within an airport land use plan or within two miles of a public airport and reduction of safety of people working or residing in the plan areas.

- Impairing implementation of or interfere with an adopted emergency response plan or emergency evacuation plan via blockage of an evacuation route or provision of only one access point for emergency vehicles.
- Location of new development in or near area of steep slopes, high-wind areas, or historical wildfire burn areas leading to greater wildfire risk and, thereby, exposing occupants to smoke and other wildfire-related air pollutants.
- Installation or maintenance of roads, fuel breaks, emergency water sources, electrical power lines, or natural gas lines that may exacerbate fire risk.
- Location of new development in or near area of wildfire-scarred slopes or altered drainage areas and, thereby, exacerbating flooding and landslide hazards.

Impact Evaluation

Hazardous Materials Upset and Exposure

Significance Criterion a:	Would the proposed plan create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?
Significance Criterion b:	Would the proposed plan create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?
Significance Criterion c:	Would the proposed plan emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school?

Impact HAZ-1 MICUP CONSTRUCTION ACTIVITIES COULD RESULT IN THE RELEASE OF POTENTIALLY HAZARDOUS MATERIALS, WHICH MAY OCCUR WITHIN 0.25 MILE OF A SCHOOL. HOWEVER, COMPLIANCE WITH LOCAL, REGIONAL, STATE, AND FEDERAL REGULATIONS RELATED TO HAZARDOUS MATERIALS WOULD MINIMIZE THE RISK OF RELEASES AND EXPOSURE TO THESE MATERIALS. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

The Place of Use overlies agricultural areas, as described in Section 4.2, *Agriculture and Land Use*. Hazardous material use associated with agricultural uses include pesticides (herbicides, insecticides, fungicides). The regulation of pesticide storage, application, and waste disposal is under the jurisdiction of the County Agricultural Commissioner. The San Joaquin County Agricultural Commissioner regulates agriculture and pesticide use in the County and pesticide application permits must be renewed yearly. In addition, regulated commercial applications of pesticides are documented monthly and compiled in an annual report submitted to the County. Agriculture production within the County must comply with all DPR pesticide regulations including pesticide registration and work requirements. To a lesser extent, other hazardous chemicals used on agricultural land uses include heavy equipment fuels, fertilizers, cleaning agents, and veterinary chemicals.

Water treatment chemicals, particularly at the DWTP site, would be necessary for water treatment processes and require the use and storage of hazardous materials. Chemicals for these processes may include alkalinity chemicals and citric acid, caustic soda, sodium hypochlorite, sodium

hydroxide, or similar cleaning chemicals.[40] Risks associated with handling these chemicals would be managed by using secondary containment structures at chemical storage locations, providing adequate access and egress space for chemical delivery trucks, developing hazardous material business response plans, and installing eye-wash and shower stations at each chemical storage and feed location, as appropriate

There is potential for accidental or unauthorized releases of hazardous materials that would pose a public health concern. If improperly handled, hazardous materials can result in public health hazards through human contact with contaminated soils or groundwater, or through airborne releases in vapors, fumes, or dust. However, the use, transport, and disposal of hazardous materials and wastes are required to occur in accordance with Federal, State, and local regulations. As such, the transport of hazardous materials and wastes can only occur with transporters who have received training and appropriate licensing. Additionally, hazardous waste transporters are required to complete and carry a hazardous waste manifest, which includes forms, reports, and procedures designed to seamlessly track hazardous waste.

Additional protective regulations apply to projects that could use or disturb potentially hazardous products near or at schools. The California Public Resources Code Section 21151.4 requires projects that would be located within 0.25 mile of a school and might reasonably be expected to emit or handle hazardous materials to consult with the school district regarding potential hazards. Numerous day care facilities and schools are located within the Place of Use.

Construction

North San Joaquin Water Conservation and Stockton East Water Districts

Construction of the project components would temporarily increase the transport and use of hazardous materials in the Place of Use through the operation of vehicles and equipment. Such substances include diesel fuel, oil, solvents, and other similar materials brought onto construction sites for use and storage during the construction period. The use of construction machinery would involve the transport, use, and disposal of hazardous materials such as paints, solvents, oils, grease, and caulking. Additionally, hazardous materials would be needed for fueling and servicing construction equipment. These materials would be contained within vessels specifically engineered for safe storage and would not be transported, stored, or used in quantities that would pose a significant hazard to the public or construction workers themselves. The transport, use, and storage of hazardous materials during construction would be conducted in accordance with applicable federal and State laws, such as the Hazardous Materials Transportation Act, California Hazardous Material Management Act, and California Code of Regulations, Title 22.

Compliance with existing applicable regulations and policies would minimize risks from routine use, transport, handling, storage, disposal, and release of hazardous materials during construction. Oversight by the appropriate federal, State, and local agencies and compliance by new development with applicable regulations related to the handling and storage of hazardous materials would minimize the risk of the public's potential exposure to these substances.

Within the Place of Use, there are approximately 200 schools. Transport of hazardous materials along identified hazardous material routes within the Place of Use such as, I-5, SR 4, SR 12, SR 26, SR 88, and SR 99, would be subject to federal, State, and local regulations as discussed under Section

[40] Sodium hypochlorite is a liquid disinfection agent added to the water and is commonly referred to as "bleach." Sodium hypochlorite is not the equivalent of chlorine gas, and chlorine gas would not be used or released during project construction or operation.

4.8.3, *Regulatory Framework,* that would reduce potential impacts of accidental hazardous materials releases proximate to schools. Construction of the proposed project would not emit hazardous emissions or handle emissions or handle hazardous or acutely hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school. In addition, adherence to existing regulations would reduce potential impacts of hazardous materials releases proximate to schools. Therefore, construction impacts associated with the NSJWCD and SEWD project components and related to a hazard to the public or the environment through routine transport, use or disposal of hazardous materials or reasonably foreseeable upset and/or accidental release of hazardous materials, including within 0.25 mile of a school, would be less than significant.

City of Stockton

The nearest schools to the DWTP site are Lakewood Elementary School and Woodbridge Elementary School, located 0.8-mile and one mile, respectively from the DWTP site. Additional schools may be located within close proximity to proposed pipeline construction and additional recharge basin sites. Transport of hazardous materials within the vicinity of these schools would be subject to Federal, state, and local regulations as discussed under Section 4.8.3, *Regulatory Framework,* that would reduce potential impacts of hazardous materials releases proximate to schools within the City of Stockton. However, adherence to existing regulations would reduce potential impacts of hazardous materials release proximate to schools. Therefore, construction impacts associated with the City of Stockton project components and related to a hazard to the public or the environment through routine transport, use or disposal of hazardous materials or reasonably foreseeable upset and/or accidental release of hazardous materials, including within 0.25 mile of a school, would be less than significant.

Operation

All Districts

Operation and maintenance of water diversions, pump stations, pipelines, and recharge areas across the three Partner Agency areas would not utilize substantial quantities of hazardous materials and, thereby, pose little risk of exposing the public and environment to hazardous materials. Note that while the existing Stockton DWTP utilizes various chemicals, such as caustic soda and sodium hyphochlorite, to treat water at this plant, the treatment facilities would not be altered due to MICUP; rather additional recharge facilities would be constructed and operated on the lands around the DWTP. Operation and maintenance activities associated with MICUP project components could be subject to compliance with CCR, Cal OSHA, and other agencies to ensure hazardous materials risks to the public are minimized during operational use and transport as well. Compliance with existing applicable regulations and policies would minimize risks from routine use, transport, handling, storage, disposal, and release of hazardous materials. Oversight by the appropriate federal, State, and local agencies and compliance by new development with applicable regulations related to the handling and storage of hazardous materials would minimize the risk of the public's potential exposure to these substances. While there are several hazardous materials routes throughout the Place of Use, transport of hazardous materials along these routes would be subject to federal, State, and local regulations as listed in Section 4.8.3, *Regulatory Framework,* that would reduce potential impacts of releases, including in proximity to schools. Therefore, project operational impacts related to a hazard to the public or the environment through routine transport, use or disposal of hazardous materials or reasonably foreseeable upset and/or accidental release of hazardous materials, including within 0.25 mile of a school, would be less than significant.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

Hazardous Materials Site Risks

Significance Criterion d:	Would the proposed project be located on a site that is included on a list of hazardous material sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?

Impact HAZ-2 CONSTRUCTION AND OPERATION OF PROJECT COMPONENTS MAY RESULT IN THE DISTURBANCE OF SITES CONTAMINATED WITH HAZARDOUS MATERIALS. HOWEVER, COMPLIANCE WITH APPLICABLE REGULATIONS RELATING TO SITE REMEDIATION AND IMPLEMENTATION OF MITIGATION MEASURES WOULD MINIMIZE IMPACTS FROM CONSTRUCTION ACTIVITIES ON CONTAMINATED SITES, RESULTING IN A LESS THAN SIGNIFICANT IMPACT WITH MITIGATION INCORPORATED.

The following databases were reviewed in December 2024 for known hazardous materials contamination within the MICUP Place of Use:

- The State Water Resources Control Board's (SWRCB) GeoTracker database[41]
- SWRCB's list of solid waste disposal sites with waste constituents above hazardous waste levels outside the waste management unit[42]
- The California Department of Toxic Substances Control's (DTSC) EnviroStor database[43]
- The Superfund Enterprise Management System (SEMS) database[44]
- CalEPA Active Cease and Desist Orders (CDOs) and Cleanup Abatement Orders (CAOs)[45]
- List of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code[46]

Based on a review of the listed databases, and as shown in Figure 4.8-1, listed hazardous materials sites are primarily located within the City of Stockton limits and extend south to the cities of Lathrop and Manteca. A list of all hazardous materials sites is included in Appendix H. There are also several listed hazardous materials sites located within the NSJWCD, and SEWD areas, although these areas are not as concentrated with listed hazardous materials sites as the City of Stockton and southern area of the MICUP Place of Use.

[41] State Water Resources Control Board. 2024. Geotracker. https://geotracker.waterboards.ca.gov/ (accessed December 2024)
[42] CalEPA.2024. "Cortese" list of solid waste disposal sites identified with waste constituents above hazardous waste levels outside the waste management unit. Available: http://www.calepa.ca.gov/files/2016/10/SiteCleanup-CorteseList-CurrentList.pdf. (accessed December 2024)
[43] Department of Toxic Substances Control. 2024. EnviroStor. https://www.envirostor.dtsc.ca.gov/public/ (accessed December 2024).
[44] United States Environmental Protection Agency. 2024. SEMS Search. https://enviro.epa.gov/envirofacts/sems/search (accessed December 2024).
[45] CalEPA. 2024. "Cortese" list of State Water Board sites with active Cease and Desist Orders or Cleanup Abatement Orders. Available: http://www.calepa.ca.gov/files/2016/10/SiteCleanup-CorteseList-CDOCAOList.xlsx. (accessed December 2024).
[46] CalEPA. 2024. "Cortese" list of sites subject to Corrective Action pursuant to Health and Safety Code 25187.5. Available: https://www.calepa.ca.gov/sitecleanup/corteselist/section-65962-5a/. (accessed December 2024)

Construction

North San Joaquin Water Conservation District

As discussed in Section 4.8.2, there are four Cortese sites and thirteen listed sites including several evaluation sites, remediation sites, and tiered permit sites within the NSJWCD area. The three listed Cortese sites are located within the proposed recharge area in the NSJWCD area. Proposed pump stations are not located on a listed hazardous material site. However, there is potential for the proposed project components to uncover contaminated soil or contaminated groundwater during grading or excavation activities. Additionally, prior to the construction of project components, a review of the aforementioned databases would be required to be conducted to identify potential hazards on project component sites. Therefore, contaminated soil or groundwater may be encountered in the subsurface during construction and could result in a significant hazard to the public and/or construction worker safety. In the event that a project component would be constructed on or near a contaminated site, construction of the project components would represent a potentially significant hazard to the public or the environment during construction activities.

Implementation of Mitigation Measure HAZ-1 would be required at project sites within or near a hazardous material site. Mitigation Measure HAZ-1 would require the preparation of a Phase I, and potentially a Phase II, Environmental Site Assessment, preparation of a soil and groundwater management plan if impacted soils or groundwater are encountered on a project site, and voluntary oversight with a regulatory agency if hazardous wastes are encountered on a project component site. Therefore, NSJWCD construction impacts related to hazardous materials sites risk would be less than significant with mitigation.

Stockton East Water District

As discussed in Section 4.8.2, there is one Cortese site and approximately sixteen listed sites including several active investigation sites, remediation sites, and tiered permit sites within the SEWD area. There are four cleanup program sites located within the proposed recharge areas in the SEWD area. The proposed Beckman ASR Well is not located on a hazardous material site. However, there is potential for the proposed project components to uncover contaminated soil, contaminated groundwater, or impacted wastes during grading or excavation activities. Additionally, prior to the construction of project components, a review of the aforementioned databases would be conducted to identify potential hazards on project component sites. Therefore, contaminated soil or groundwater may be encountered in the subsurface during construction and could result in a significant hazard to the public and/or construction worker safety. If a project component were constructed on or near a contaminated site, construction of the project components would represent a potentially significant hazard to the public or the environment during construction activities.

Implementation of Mitigation Measure HAZ-1 would be required at project sites within or near a hazardous material site. Mitigation Measures HAZ-1 requires preparation of a Phase I, and potentially a Phase II, Environmental Site Assessment, require preparation of a soil and groundwater management plan if impacted soils or groundwater are encountered on a project site, and voluntary oversight with a regulatory agency if hazardous wastes are encountered on a project component site. Therefore, SEWD construction impacts related to hazardous materials sites risk would be less than significant with mitigation.

City of Stockton

The City of Stockton would utilize existing or currently designed infrastructure to convey water to the Delta Water Treatment Plant (DWTP). Proposed recharge basins and dry wells would be constructed on the DWTP site. The DWTP site is not listed as a hazardous material site. However, there are several closed contamination sites within 0.5-mile of the DWTP, and additional hazardous material sites may be located near proposed pipeline and additional offsite recharge basins. There are also several listed hazardous material sites within the proposed pipeline and offsite recharge basin area. However, listed hazardous material sites typically within 0.5-mile of a project component would be preceded by investigation, remediation and cleanup under the supervision of the Regional Water Quality Control Board, the City of Stockton Local Oversight Program, or DTSC, before construction activities could begin. There remains potential for the proposed project components to uncover contaminated soil and/or contaminated groundwater during grading or excavation activities. Therefore, contaminated soil or groundwater may be encountered in the subsurface during construction and could result in a significant hazard to the public and/or construction worker safety. If a project component were constructed on or near a contaminated site, construction of the project components would represent a potentially significant hazard to the public or the environment during construction activities.

Implementation of Mitigation Measure HAZ-1 would be required at project sites within or near a hazardous material site. Mitigation Measures HAZ-1 would require the preparation of a Phase I, and potentially a Phase II, Environmental Site Assessment, require preparation of a soil and groundwater management plan if impacted soils or groundwater are encountered on a project site, and voluntary oversight with a regulatory agency if hazardous wastes are encountered on a project component site. Therefore, City of Stockton construction impacts related to hazardous materials sites risk would be less than significant with mitigation.

Operation

All Districts

The risk of hazardous materials creating a significant hazard to the public or the environment would occur during construction of a project as potential on-site contamination is disturbed. Once a project is operational, the contaminated media would have already been removed, contained, or capped and would no longer pose a risk. Therefore, no project operational impact would occur with regard to hazardous materials site risk.

Mitigation Measures

HAZ-1 Prepare Phase I and Phase II ESAs prior to Construction

For project components located within or near a hazardous materials site, prior to the start of construction activities involving ground disturbance, the applicable Partner Agency, shall retain a qualified environmental professional (EP), as defined by ASTM E-1527 to prepare a project-specific Phase I Environmental Site Assessment (ESA) in accordance with standard ASTM methodologies, to assess the land use history of the project component site.

If the Phase I ESA identifies recognized environmental conditions or potential areas of concern, the applicable Partner Agency shall retain a qualified environmental consultant, California Professional Geologist (PG) or California Professional Engineer (PE), to prepare a Phase II ESA for the project site to determine whether the soil or groundwater has been impacted at concentrations exceeding

regulatory screening levels. The Phase II ESA shall be completed prior to the issuance of building permit(s) authorizing construction and shall be based on the results of the Phase I ESA.

If the Phase II ESA for the project component site indicates that contaminants are present at concentrations exceeding hazardous waste screening thresholds for contaminants in soil and/or groundwater (California Code of Regulations [CCR] Title 22, Section 66261.24 Characteristics of Toxicity), the applicable Partner Agency shall take appropriate steps to protect site workers and the public. This may include the completion of remediation and require regulatory agency oversight.

Based on the results of the Phase I and Phase II ESAs, the applicable Partner Agency shall comply all regulatory requirements related to hazardous materials and coordination with oversight agencies, which may include DTSC, SWRCB, or the San Joaquin County Environmental Health Department. The applicable Partner Agency also may be required to enter into voluntary agreements with the applicable oversight agencies and/or prepare and implement a Soil and Groundwater Management Plan, which includes an environmental health and safety plan for contractors.

Level of Significance

Less Than Significant with Mitigation

Aviation Hazards

Significance Criterion e:	For location within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed project result in a safety hazard or excessive noise for people residing or working in the project areas?

Impact HAZ-3 THE MICUP PROJECT COMPONENTS WOULD NOT BE LOCATED WITHIN AN AIRPORT LAND USE PLAN NOR WITHIN TWO MILES OF A PUBLIC OR PRIVATE AIRSTRIP AND SO WOULD NOT CONTRIBUTE TO A SAFETY HAZARD OR RESULT IN EXCESSIVE NOISE TO PEOPLE RESIDING OR WORKING IN THE PLACE OF USE. THERE WOULD BE NO IMPACT.

Construction

As described below, the MICUP project components are not located within airport land use plan or safety zones or within two miles of a public airport; therefore, construction of the MICUP project components would not result in safety hazards or excessive noise within two miles of an airport land use plan. No impacts would occur.

Operation

North San Joaquin Water Conservation District

The closest airports to the MICUP components in NJSWCD are the Lodi Airport – located approximately 3.0 and 5.0 miles from the North System and South System Recharge Areas, respectively – and Kingdon Airpark – located approximately 8.5 and 6.75 miles from the North System and South System Recharge Areas, respectively.[47] The NSJWCD project components would not be located within the noise contours of either airport according to the land use compatibility

[47] San Joaquin County Council of Governments. 2009. San Joaquin County Aviation System Airport Land Use Compatibility Plan. https://www.sjcog.org/DocumentCenter/View/17/2009-San-Joaquin-County-ALUCP---Amended-January-2018?bidId= (accessed January 2025)

plan for both airports. As such, Lodi Airport and Kingdon Airpark activity could not expose residents and workers in the NSJWCD area to excessive noise levels, nor would operation of the NSJWCD project components result in any new residents or workers that could be exposed to an airport safety or noise hazard. Therefore, there would be no NSJWCD operational impact related to aviation hazards.

Stockton East Water District

The closest airports to the MICUP components in SEWD are the Lodi Airport – located approximately 11 miles from the project component areas – and the Kingdon Airpark – located approximately 11.5 miles from project component areas, respectively. None of the SEWD project components would be located within the noise contours of either airport according to the land use compatibility plan for both airports.[48] As such, Lodi Airport and Kingdon Airpark activity could not expose residents and workers in the SEWD area to excessive noise levels, nor would operation of the SEWD project components result in any new residents or workers that could be exposed to an airport safety or noise hazard. Therefore, there would be no SEWD operational impact related to aviation hazards.

City of Stockton

The closest airport to the City of Stockton project component area is the Kingdon Airpark, located approximately two miles northwest of the Delta Water Treatment Plant and approximately 1.5-miles from the proposed pipeline and recharge basin area. Project components would not be located within the noise contours of this airport according to the land use compatibility plan for the airport.[49] As such, Kingdon Airpark activity could not expose residents and workers in the City of Stockton area to excessive noise levels, nor would operation of the City of Stockton project components result in any new residents or workers that could be exposed to an airport safety or noise hazard. Therefore, there would be no City of Stockton operational impact related to aviation hazards.

Mitigation Measures

No mitigation is required.

Level of Significance

No Impact

[48] *Ibid.*
[49] *Ibid.*

Emergency Response and Evacuation Plans Consistency

Significance Criterion f:	Would the proposed project impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?
Significance Criterion h:	If located in or near State responsibility areas or lands classified as very high fire hazard severity zones, would the proposed project: 1. Substantially impair an adopted emergency response plan or emergency evacuation plan?

Impact HAZ-4 PROJECT CONSTRUCTION COULD TEMPORARILY RESULT IN CHANGES TO EMERGENCY EVACUATION ROUTES SUCH THAT THE USE OF AN EVACUATION ROUTE WOULD BE HINDERED DURING CONSTRUCTION ACTIVITIES. IMPLEMENTATION OF A CONSTRUCTION TRANSPORTATION MANAGEMENT PLAN WOULD REDUCE POTENTIALLY SIGNIFICANT IMPACTS TO A LESS THAN SIGNIFICANT LEVEL.

San Joaquin County has created a Fire Hazard Reduction Burning program, which outlines various methods to reduce vegetation density and create defensible space to maintain properties in a fire safe condition.[50] Additionally, the San Joaquin County Multi-Jurisdictional Hazard Mitigation Plan includes fire mitigation and an action plan, to reduce the risk of wildfires in the County and cities within San Joaquin County. MICUP project components that would include the construction of any structure would be required to maintain vegetation surrounding the structure and create defensible space. MICUP would not increase the population of the area and, as such, would be consistent with the San Joaquin County Multi-Jurisdictional Hazard Mitigation Plan prioritizing not putting people at risk.

Construction

As described in 4.8.2, *Environmental Setting,* the Place of Use is not located within a Very High Fire Hazard Severity Zone within an SRA or LRA. The eastern portion of the Place of Use is partially located within a Moderate FHSZ within an SRA. Construction activities associated with implementation of project components could have temporary effects on lane configurations due to potential lane and/or road closures during construction. Construction activities could also temporarily block access to some roadways and driveways that are currently used by emergency response vehicles or in emergency evacuations.

North San Joaquin Water Conservation District

State Route 12 within the NSJWCD area is identified as an evacuation route. Construction of project components could result in temporary inadequate access to this evacuation route. Constructing or improving pipelines may occur beneath or adjacent to this identified evacuation route, and temporary lane closures within the Lockeford and River Acampo Evacuation Zones could temporarily result in inadequate emergency vehicle access and impair evacuation routes. As such, construction impacts related to emergency vehicle access and evacuation plans would be potentially significant.

However, with implementation of Mitigation Measure TRA-1, as described in Section 4.12, *Transportation*, emergency vehicle access and evacuation routes would be preserved throughout the construction period, and notices would be provided to relevant emergency service providers

[50] San Joaquin Valley Air Pollution Control District. 2025. Hazard Reduction Burning. https://ww2.valleyair.org/compliance/hazard-reduction-burning/ (accessed February 2025)

prior to the commencement of construction activities. Therefore, NSJWCD construction impacts related to impairment of emergency vehicle access or an adopted emergency response or evacuation plan would be less than significant with mitigation.

Stockton East Water District

Construction of SEWD project components, specifically pipelines, have the potential to be constructed beneath or adjacent to identified evacuation routes, Duncan Road and SR 26, and result in temporary lane closures on nearby roadways that could result in inadequate emergency vehicle access to evacuation routes. As such, construction impacts related to emergency vehicle access would be potentially significant.

However, with implementation of Mitigation Measure TRA-1, as described in Section 4.12, *Transportation*, emergency vehicle access would be preserved throughout the construction period, and notices would be provided to relevant emergency services prior to the commencement of construction activities. Therefore, SEWD construction impacts related to impairment of emergency vehicle access or an adopted emergency response or evacuation plan would be less than significant with mitigation.

City of Stockton

The City of Stockton would construct new direct surface recharge areas and dry wells on the existing DWTP site. There would be additional vehicle trips to the DWTP site during the construction of the project components. However, the increase in vehicle trips to the DWTP site would be minimal and would not result in such a substantial increase in vehicle trips that it would physically impede vehicle access along identified evacuation routes, namely Eight Mile Road, Lower Sacramento Road, Thornton Road, Davis Road, West Lane, Morada Lane, and Hutchins Street, and would not affect emergency response.

Construction of additional recharge basins would require additional vehicle trips to project component areas during construction. However, the increase in vehicle trips would be minimal and would not result in such a substantial increase in vehicle trips that it would physically impede vehicle access along identified evacuation routes and would not affect emergency response.

Construction of City of Stockton project components, specifically pipelines, have the potential to be constructed beneath or adjacent to identified evacuation routes, Haney Lane, Eight Mile Road, and SR 99, and result in temporary lane closures on nearby roadways that could result in inadequate emergency vehicle access to evacuation routes. As such, construction impacts related to emergency vehicle access would be potentially significant.

However, with implementation of Mitigation Measure TRA-1, as described in Section 4.12, *Transportation*, emergency vehicle access would be preserved throughout the construction period, and notices would be provided to relevant emergency services prior to the commencement of construction activities. Therefore, City of Stockton construction impacts related to impairment of emergency vehicle access or an adopted emergency response or evacuation plan would be less than significant with mitigation.

Operation

All Districts

Operation and maintenance (O&M) activities associated with MICUP may result in the addition of vehicle trips within the Place of Use. However, MICUP O&M would not require additional employees for the Partner Agencies. As such, there would be no substantial change in vehicle trips within the Place of Use, and MICUP O&M would not result in a substantial increase in vehicle trips such that it could impede traffic flow along identified evacuation routes or impair emergency access. Furthermore, the San Joaquin County Multi-Jurisdictional Hazard Mitigation Plan includes evacuation strategies to reduce the risk associated with wildfires in the County and cities within San Joaquin County. Therefore, project operational impacts related to impairment of emergency vehicle access or an adopted emergency response or evacuation plan would be less than significant.

Mitigation Measures

Implement Mitigation Measure TRA-1.

Level of Significance

Less Than Significant with Mitigation

Wildfire Exposure/Exacerbation Risk

Significance Criterion g:	Would the proposed project expose people or structures, either directly or indirectly, to a significant risk of loss, injury, or death involving wildland fires?
Significance Criterion h:	If located in or near State responsibility areas or lands classified as very high fire hazard severity zones, would the proposed project: 2. Due to slope, prevailing winds, and other factors, exacerbate wildfire risks and thereby expose project occupants to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire? 3. Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment? 4. Expose people or structures to significant risks, including downslopes or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

Impact HAZ-5 MICUP WOULD NOT EXPOSE PEOPLE OR STRUCTURES TO SIGNIFICANT RISK, LOSS, INJURY OF DEATH INVOLVING WILDLAND FIRES, INCLUDING DOWNSLOPES OR DOWNSTREAM FLOODING. THE PROJECT WOULD ALSO NOT EXACERBATE FIRE RISK. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

All Districts

Within the MICUP Place of Use, there is no forest-covered land, but there are areas of brush- and grass-covered land that may be susceptible to potential for wildfire to occur. However, construction

of the project components across the three Partner Agency areas would adhere to California Public Resources Code Sections 4442 and 4428 that mandates the use of spark arrestors and requires construction contractors to maintain fire suppression equipment during the highest fire danger period (April 1 to December 1) when operating on or near any brush-covered or grass-covered land. As such, construction vehicle and equipment activities would not substantially increase existing fire risk. Therefore, construction impacts would be less than significant.

Operation

North San Joaquin Water Conservation District

The northeastern portion of the NSJWCD area is located within a Moderate Fire Hazard Severity Zone. The nearest Very High Fire Hazard Severity Zone (VHFHSZ) within a State Responsibility Area (SRA) is located approximately 4 miles east of the NSJWCD northeastern boundary.[51] Neither MICUP nor NSJWCD project components are located within a VHFHSZ but could be considered near a VHFHSZ.

Operational use and maintenance of the NSJWCD project components could expose employees to pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire due to the fire-prone landscape consisting of dry vegetation near which the NSJWCD area is located. The NSJWCD area is mostly flat and would not exacerbate fires due to slope. Further, project components would not result in habitable structures or infrastructure such as roads, fuel breaks, emergency water sources, power lines or other utilities that would exacerbate fire risk.

Vegetation on hillslopes helps to stabilize soil, slow water flow, and support percolation into the soil. Severe wildfires damage trees, the shrub canopy, vegetation, and soil. Once vegetation burns, a greater surface area of soil is exposed to the elements, and the lack of roots decreases the structural integrity of the soil. In general, steep, hilly areas are especially vulnerable after a wildfire and areas burned at moderate to high severity are of greatest concern due to lack of cover and the development of water repellent layers. Thus, wildfire burn areas typically endure an increased runoff after intense rainfall, which can put residences and structures downslope of a burned area at risk of localized floods and landslides. Operation of the project components would not result in new habitable structures, nor would project components result in infrastructure that would alter the existing landscape such that it would result in significant risks associated with downslopes or downstream flooding or landslides.

Overall, the project would also increase water supply for use in agricultural land use irrigation across the NSJWCD area, thereby reducing potentially dry vegetated areas (i.e., wildfire fuel load). Therefore, NSJWCD operational impacts related to wildfire risk would be less than significant.

Stockton East Water District

The eastern portion of the SEWD area is located within a Moderate Fire Hazard Severity Zone. The nearest VHFHSZ within an SRA is located approximately 10-miles east of the SEWD eastern boundary.[52] As such, no impact would occur.

[51] California Department of Forestry and Fire Protection. 2024. Fire Hazard Severity Zones in State Responsibility Area [map]. https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones (accessed January 2025).
[52] California Department of Forestry and Fire Protection. 2024. Fire Hazard Severity Zones in State Responsibility Area [map]. https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones (accessed January 2025).

City of Stockton

The City of Stockton is not located near a VHFHSZ within a SRA. The nearest VHFHSZ within an SRA is located approximately 15-miles east of the City of Stockton's easternmost boundary.[53] As such, no impact would occur.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

4.8.5 Cumulative Impacts

The geographic scope of the cumulative hazards, hazardous materials, and wildfire analysis is San Joaquin County. The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1 (refer to Chapter 4.0, *Environmental Impact Analysis*) located in San Joaquin County and surrounding areas in addition to the proposed project.

Hazards and Hazardous Materials Exposure Risk

Past, present, and reasonably foreseeable future projects, including the plans and projects listed in Table 4-1, would have the potential to expose residents, employees, and visitors of San Joaquin County to hazards and hazardous materials. However, the magnitude of hazards for individual projects would depend upon the location, type, and size of development and the specific hazards associated with individual sites. Hazard evaluations would be completed on a case-by-case basis for all future development. Compliance with applicable regulations and implementation of appropriate mitigation measures, including remedial action on contaminated sites, would address impacts related to these hazards and hazardous materials associated with future development. Therefore, cumulative projects would have a less-than-significant cumulative impact, involving the transport, use, and disposal of hazardous materials; accidental release of hazardous materials; release of hazardous materials within 0.25 mile of a school; and creation of a hazard to the public or environment from listed hazardous material sites.

The locations of proposed project components are not located within an airport land use plan or within two miles of a of a public airport or public use airport. Therefore, the project cannot contribute to a cumulative impact related to a safety hazard related to aircraft operations.

All cumulative projects would be required to adhere to the San Joaquin County Multi-Jurisdictional Hazard Mitigation Plan, which includes actions to reduce risks from hazards, including emergency response. Past, present, and reasonably foreseeable future projects, including the plans and projects listed in Table 4-1, would not impair implementation of or physically interfere with evacuation plans. Therefore, cumulative impacts related to hazards, hazardous materials, and related emergency evacuation and response would be less than significant and the project's contribution to these impacts would not be cumulatively considerable

[53] California Department of Forestry and Fire Protection. 2024. Fire Hazard Severity Zones in State Responsibility Area [map]. https://osfm.fire.ca.gov/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones (accessed January 2025).

Wildfire Exposure and Exacerbation Risk

A combination of federal, State, and local regulations limit or minimize the potential for exposure to wildfires by reducing the amount of development in wildland urban interface areas, requiring that cumulative projects are developed according to California Building Code and California Fire Code, and incorporating requirements for fire-safe construction into the land use planning. There are no designated High Fire Hazard Zones located within the Place of Use. Cumulative projects are also not located within designated High Fire Hazard Zones. Plans and projects would be located in areas that are already developed, do not contain significant levels of dry fuel susceptible to ignition, or significantly high average wind speed. Cumulative projects construction would adhere to respective city or County building codes designed to minimize potential for uncontrolled fires. Adherence to respective city or County building codes would require that California Fire Code standards of automatic sprinkler systems are included. Further, the larger San Joaquin County area is not designated as being within a High or Very High FHSZ and, as such, the cumulative impact related to wildfire exposure risk would be less than significant and the project's contribution to these impacts would not be cumulatively considerable.

Overall Level of Cumulative Significance

Less Than Significant

4.9 Hydrology and Water Quality: Surface Water

4.9.1 Introduction

This section describes the existing surface water hydrology and water quality setting in the region as well as the relevant regulatory framework. This section also evaluates the possible impacts related to surface water hydrology and quality that could result from implementation of the proposed project. A complete discussion of groundwater resources and potential impacts is provided in Section 4.10, *Hydrology and Water Quality: Groundwater*. Additionally, water supply is discussed in Section 4.13, *Utilities and Service Systems*.

The information in this section is based on existing 2035 San Joaquin County and City of Stockton and Lodi General Plans, the East Bay Municipal Utility District (EBMUD) 2020 Urban Water Management Plan, the Central Valley Regional Water Quality Control Board (CVRWQCB) Sacramento River Basin and the San Joaquin River Basin Water Quality Control Plan, and the National Pollutant Discharge Elimination System (NPDES) permit and associated Stormwater Pollution Prevention Plan (SWPPP) and Waste Discharge Requirements (WDRs). Other supporting documentation includes water quality sampling data from EBMUD, the City of Lodi's Lower Mokelumne River Watershed Sanitary Survey (WSS), water quality sampling submitted to the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW), as well as the *Updated Water Availability Analysis for Application 29835*.

4.9.2 Environmental Setting

This section identifies and maps existing watersheds and surface water features within the entire Place of Use. However, the description of the environmental setting focuses primarily on conditions within areas that could be impacted by construction and operation of project components for each Mokelumne River Integrated Conjunctive Use Program (MICUP) partner agency – primarily the Mokelumne and Calaveras rivers. This approach is used, because outside of the project component locations, changes to the environment from MICUP within the Place of Use are limited to providing additional groundwater for existing beneficial uses that rely on pumping of groundwater pumping and temporarily providing surface water for existing agricultural irrigation uses that currently rely on groundwater.

Surface Water Hydrology and Drainage

Definitions

The following terminology is used in this section to describe surface water hydrology.

- **Watershed** - A watershed is an area of land that channels rainfall and snowmelt to creeks, streams, and rivers, and eventually to outflow points such as reservoirs, bays, and the ocean. The size of a watershed is defined on several scales, referred to as its hydrologic unit codes (HUCs), based on the geography that is most relevant to its specific area. A watershed can be small, such as a large lake or a single county, or encompass thousands of square miles. Water from creeks, streams, and rivers flow from higher ground to rivers that eventually wind up in a larger water body (for example, a lake, reservoir, bay, or ocean). As water flows, it often picks

up and transports pollutants, which may impact the hydrology, ecology, and quality of the watershed and ultimately, the reservoir, bay, or ocean where it drains to (NOAA 2024a[1]).

However, not all water flows directly to a lake, reservoir, bay, or ocean, because when rain events occur, water can infiltrate to the ground. This water can remain in the soil, where it will eventually seep into the nearest waterway. Depending on where the water falls or is collected, some water may infiltrate much deeper into underground reservoirs called aquifers (refer to Section 4.9, *Hydrology and Water Quality: Groundwater*, for more details on aquifers and groundwater resources). Depending on the soil properties and permeability of the area, little water may infiltrate, particularly in areas containing hard clay (NOAA 2024a[2]).

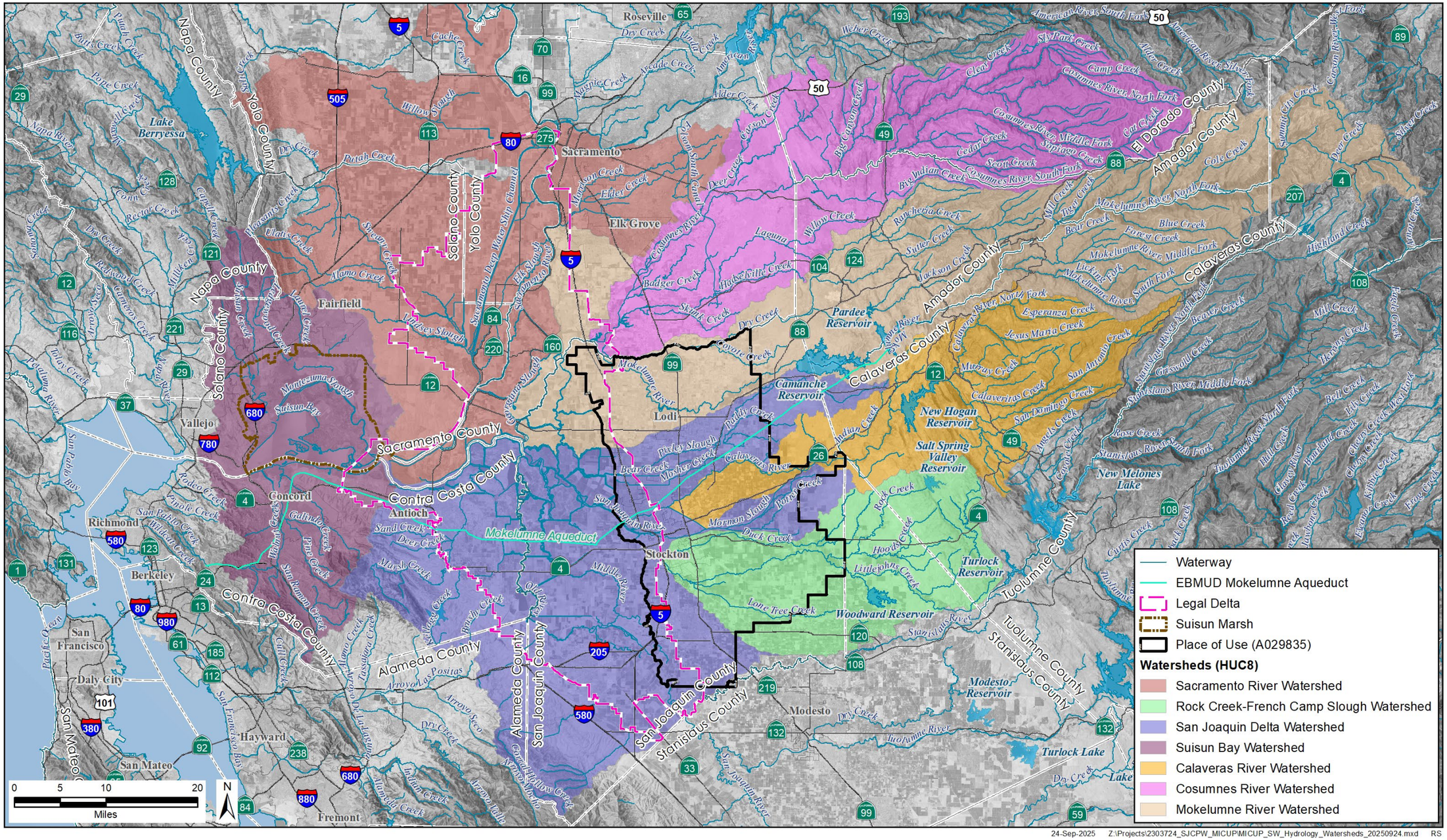
During periods of heavy rain and snowfall, water may fall or run on/off impervious surfaces because it has nowhere else to go. Impervious surfaces transport water based off topography or erosional features that may occur in the specific area. Excess water volume in the form of impervious surface runoff can quickly overwhelm creeks, streams, and rivers, causing them to overflow and possible result in flooding (NOAA 2024a[3]).

- **Hydrologic Unit** – Hydrologic units (HUs) define the areal extent of surface water drainage. A hydrologic unit may represent all or part of the total drainage area. HUs provide a mechanism for reporting on water resource information including water availability, water quality, point source or non-point source data within a unit, and a variety of other applications.[4]

Figure 4.9-1 illustrates the watersheds that are within and around the Place of Use, as well as most surface waters in the Place of Use vicinity. This figure also illustrates the location of surface waters in relation to the legal boundaries of the Sacramento-San Joaquin River Delta (Delta)/Suisan Marsh area. As shown in Figure 4.9-1, the Place of Use is in the Mokelumne River, Calaveras River, San Joaquin Delta, and Rock Creek-French Camp Slough watersheds. Below, the discussion focuses on the Mokelumne and Calaveras River Watersheds because the primary surface water features within these watersheds, the Mokelumne and Calaveras Rivers, respectively, would be impacted by implementation of the proposed MICUP components within these watersheds.

[1] National Oceanic and Atmospheric Administration (NOAA). 2024a. What is a watershed? Available: https://oceanservice.noaa.gov/facts/watershed.html. Accessed January 19, 2025.
[2] *Ibid*.
[3] National Oceanic and Atmospheric Administration (NOAA). 2024a. What is a watershed? Available: https://oceanservice.noaa.gov/facts/watershed.html. Accessed January 19, 2025.
[4] United States Geologic Survey. 2025. Hydrologic Units of the United States. Available: https://water.usgs.gov/themes/hydrologic-units/. Accessed January 23, 2025.

Figure 4.9-1 Surface Water Hydrology and Watersheds in the Project Region



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Mokelumne River Watershed

The Mokelumne River Watershed (Figure 4.9-1) is divided into the upper Mokelumne River Watershed, which stretches from the headwaters to Pardee and Camanche Reservoirs in the Sierra foothills, and the lower Mokelumne River Watershed, which refers to the portion of the river below Camanche Dam that flows westward to the eastern edge of the Delta, where it combines with the Consumnes River. The Mokelumne River Watershed is bound by the Cosumnes River Watershed and Sacramento River Watershed to the north; Calaveras River, Rock Creek-French Camp Slough, and San Joaquin Delta Watersheds to the south; and Suisan Bay Watershed to the west. There is a large range of elevations in the Mokelumne River Watershed including 235 feet above mean sea level (MSL) at Camanche Dam and up to 10,000 feet AMSL in the headwater region[5].

The upper watershed – upstream of Camanche Dam – is relatively narrow, steep, and is located northeast of the Delta on the western slope of the Sierra Nevada. Above Camanche Dam, the upper watershed drains about 627 square miles of mountains and foothills. Annual precipitation, temperature, and stream flow in the Upper Mokelumne River Watershed (upstream of Camanche Dam) are extremely variable from month to month and from year to year. Normally, most precipitation falls between November and May and very little falls between late spring and early fall. Average runoff is highest between the months of February to June.

The lower watershed – downstream of Camanche Dam – is flatter and extends through agricultural areas and to the north of the City of Lodi. The lower watershed is approximately 80 square miles in size and drains to the confluence of the Mokelumne and Consumnes rivers. The lower watershed includes portions of San Joaquin, Amador, and Sacramento counties.[6]

Snowmelt from parts of neighboring Alpine, Amador, and Calaveras counties contributes to the Mokelumne River runoff. The primary tributaries are the North, Middle and South Forks of the Mokelumne River, with the North Fork tributary draining over 80 percent of the Mokelumne Watershed (refer to Figure 4.9-1). Smaller tributaries include Summit Creek, Bear Creek, Cole Creek, Moore Creek, Blue Creek, Tiger Creek, Panther Creek, Forest Creek, and Licking Fork. Peak flows in the Mokelumne River normally occur during winter storms or during the spring snow melt season from March through June. These flows decrease to a minimum in late summer or fall.[7]

The Mokelumne River Watershed runoff is modified by various diversions and regulated by reservoir storage operations including a network of facilities operated by Pacific Gas & Electric and EBMUD. EBMUD diverts Mokelumne stream flow at Pardee and Camanche reservoirs. A portion of the water diverted at Pardee Reservoir is then conveyed to the EBMUD service area via the Mokelumne Aqueduct, and a portion of the stored water is released along with water that is allowed to pass directly through the reservoirs to meet downstream flow obligations.[8]

EBMUD's Mokelumne River flow commitments are determined by hydrology, water rights priorities, agreements with state and federal regulatory agencies, SWRCB orders and decisions, federal directives, court decrees, and numerous agreements between EBMUD and other Mokelumne River users, both upstream and downstream of EBMUD's Mokelumne River facilities (refer to Section 4.13, *Utilities and Service Systems* for more details about water supply.[9]

[5] East Bay Municipal Water Utility District (EBMUD). 2021. *Urban Water Management Plan 2020*. June 2021.
[6] San Joaquin County Resource Conservation District, Lower Mokelumne River Watershed Stewardship Planning Committee. 2002. Lower Mokelumne River Watershed Stewardship Plan. Available: http://sjcrcd.com/articles/MokP.pdf. Accessed January 21, 2025.
[7] *Ibid*.
[8] *Ibid*.
[9] EBMUD. 2021. *Urban Water Management Plan 2020*. June 2021.

Figure 4.9-2 provides information regarding EBMUD's flow commitments, including maximum flows that could be required and flows during a typical dry year. For comparison, the figure also provides information on the average runoff for various periods of historical records, EBMUD's maximum water rights appropriations, and other pertinent information that illustrate the complex nature of agreements and uses on the Mokelumne River. [10]

To comply with the requirements of the 1998 Joint Settlement Agreement (JSA) among EBMUD, United States Fish and Wildlife Service (USFWS), and the California Department of Fish and Wildlife (CDFW), EBMUD continues to meet its flow commitment to protect the lower Mokelumne River by providing in-stream flow releases from EBMUD's Camanche Dam to improve fishery conditions (refer to Section 4.4, *Biological Resources* for more detailed information regarding fisheries conditions and reliance on flow requirements for sustainable habitat.[11]

As shown in Figure 4.9-2, EBMUD provides Mokelumne River in-stream flows via the Camanche Reservoir, as well as surface water from the Pardee Reservoir via the Mokelumne Aqueduct, summarized further below.

CAMANCHE RESERVOIR

Owned and operated by EBMUD, Camanche Reservoir has a capacity of 417,120-acre feet (AF). Camanche Reservoir is primarily operated for flood control and to meet downstream flow requirements and riparian needs. Hydroelectric power generation also occurs at the Camanche Reservoir. The reservoir regulates Mokelumne River water flows pursuant to agreements and entitlements held by the North San Joaquin Water Conservation District (NSJWCD) and other water districts.[12]

PARDEE RESERVOIR

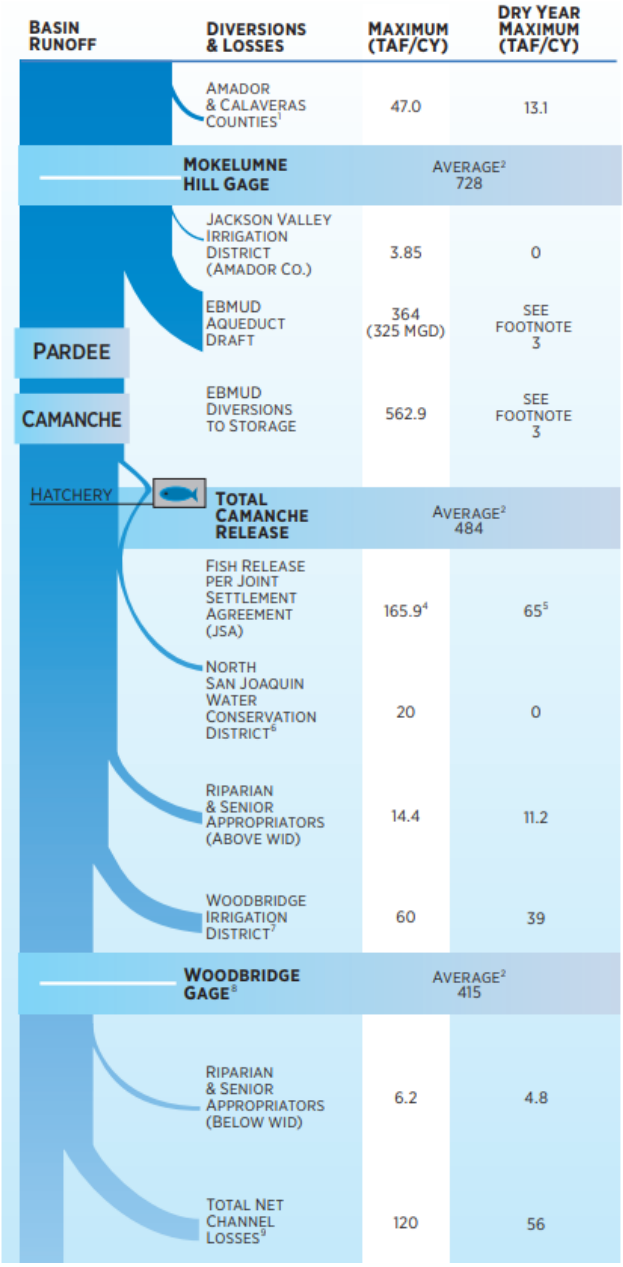
The Pardee Reservoir is owned and operated by EBMUD. The reservoir has a capacity of 197,950- AF and is operated as a water supply reservoir. Water from Pardee is conveyed by the Mokelumne Aqueducts to the EBMUD service area approximately 91 miles west.[13] Hydroelectric power generation (30 megawatts) is produced at the Pardee Powerhouse.

Mokelumne Aqueduct System

The Mokelumne Aqueduct System, which includes the Pardee Tunnel, Mokelumne Aqueducts and Lafayette Aqueducts, transports untreated water from Pardee Reservoir and the Sacramento River to EBMUD's service area. These three steel pipelines have a combined total capacity of 325 million gallons a day.[14] The Mokelumne Aqueduct System originates at EBMUD's Pardee Reservoir in the Sierra Foothills and extends from the Pardee Center in Campo Seco for approximately 90 miles through the Central Valley, along the Calaveras River and the Delta, to water treatment plants and terminal reservoirs in the EBMUD service area in the East Bay.[15]

[10] *Ibid*
[11] *Ibid*
[12] *Ibid*.
[13] Woodward & Curran. 2018. Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update. Available: https://www.umrwa.org/mac-plan-3e23d30. Accessed January 21, 2025.
[14] EBMUD. 2022. Mokelumne Aqueducts Resiliency Project Initial Study Checklist. Available: https://www.ebmud.com/about-us/construction-and-maintenance/construction-my-neighborhood/mokelumne-aqueducts-resiliency-project-marp. Accessed January 21, 2025.
[15] *Ibid*.

Figure 4.9-2 East Bay Municipal Utility District Flow Commitments



Notes: TAF = thousands of acre-feet

1. Amador County has 15 TAF of pre-14 rights, which could be exercised in dry years if there is sufficient runoff.
2. Average data provided for the various periods of historical record.
3. Varies with runoff and storage conditions.
4. Water releases committed by EBMUD to protect fishery per "Normal and Above" water year type under JSA criteria.
5. Water releases committed by EBMUD to protect fishery per "Dry" water year type under JSA criteria. In critically dry years, the minimum releases could be as low as 22.5 TAF.
6. May be "0" if no water is available surplus to EBMUD needs.
7. EBMUD's obligation to release water to the Woodbridge Irrigation District is governed by a series of water rights settlement agreements to a maximum of 60 TAF/yr when inflow to Pardee is greater than 375 TAF.
8. Includes local runoff between Camanche and Woodbridge Irrigation District.
9. "Net Channel Loss" is defined as all met additions and losses in a river system. This includes components such as flow to and from adjacent groundwater, overland flow, direct precipitation to and evaporation from the channel, plant transpiration, and seepage losses to underlying groundwater.

Calaveras River Watershed

The 470-square mile Calaveras River Watershed contains lands located in Calaveras and San Joaquin counties. The majority of the watershed lies in Calaveras County with the smaller western-most portion of the watershed located in San Joaquin County. Its headwaters are high (approximately 5,000 feet in elevation) in the Sierra Nevada mountains, and it flows generally westward until it joins the San Joaquin River in western Stockton. Flow in the Calaveras River is primarily derived from rainfall with small contributions by snowmelt.[16]

Approximately 36 miles upstream of its confluence with the San Joaquin River, Calaveras River flows are regulated by New Hogan Dam. Approximately 18 miles upstream of the San Joaquin River, the Bellota Weir splits the river into two channels: Mormon Slough and the historic Calaveras River channel. The Lower Calaveras River-Mormon Slough area is below New Hogan Dam. The watershed for this portion of the Calaveras River encompasses approximately 115,000 acres and receives up to 90,000 AF of surface water supply from the Calaveras River.[17] The four main tributaries below New Hogan are Cosgrove Creek, South Gulch, Indian Creek, and Duck Creek. Cosgrove Creek contributes the most flow to the Calaveras River, which has been as much as 8,500 AF in some years.[18]

Project Area and Beneficial Uses

The project area is made up of three different MICUP partner agency areas that contain surface waters. The primary surface waters within each of the three MICUP partner agency areas are discussed below. Both the Mokelumne and Calaveras Rivers are the surface waters that would be impacted by implementation of MICUP components. Additional information about existing facilities that convey surface water throughout the project area is included in Section 4.13, *Utilities and Service Systems*.

The project area is located within the jurisdiction of the CVRWQCB's Sacramento River Basin and the San Joaquin River Basin Water Quality Control Plan (Basin Plan), which includes the entire area of the Sacramento and San Joaquin River drainage basins, bound by the crests of the Sierra Nevada on the east and the coast Range and Klamath Mountains on the west. These basins extend approximately 400 miles from the State/Oregon border southward to the headwaters of the San Joaquin River, right in the immediate area of the project.

The CVRWQCB outlines beneficial uses of surface water within its jurisdiction, with beneficial uses defined as "California's waters that may be protected against quality degradation to include (and not be limited to) "...domestic; municipal; agricultural and industrial supply; power generation; recreation; aesthetic enjoyment; navigation; and preservation and enhancement of fish, wildlife, and other aquatic resources or preserves" (Water Code Section 13050(f)). Beneficial uses and water quality objectives are reviewed every three years[19].

Table 4.9-1 provides a description of beneficial uses described in the Basin Plan and Table 4.9-2 provides an overview of the existing and potential beneficial uses identified in the Basin Plan for project area waterways.

[16] *Ibid*.
[17] Woodward & Curran. 2018. Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan Update. Available: https://www.umrwa.org/mac-plan-3e23d30. Accessed January 21, 2025.
[18] *Ibid*.
[19] Central Valley Regional Water Quality Control Board. 2019. Water Quality Control Plan (Basin Plan) Fifth Edition. Available: https://www.waterboards.ca.gov/rwqcb5/water_issues/basin_plans/sacsjr_201902.pdf. Accessed January 14, 2025.

Table 4.9-1 Description of Beneficial Uses Identified in the Basin Plan[20]

Use and Abbreviation	Description
AGR – Agricultural Supply	Uses of water for farming, horticulture, or ranching.
COLD – Cold Freshwater Habitat	Uses of water that support cold water ecosystems.
IND – Industrial Service Supply	Uses of water for industrial activities that do not depend primarily on water quality.
MIGR – Migration of Aquatic Organisms	Uses of water that support habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish.
MUN – Municipal and Domestic Supply	Uses of water for community, military, or individual water supply systems.
NAV – Navigation	Uses of water for shipping, travel, or other transportation by private, military, or commercial vessels.
POW – Hydropower Generation	Uses of water for hydropower generation.
PROC – Industrial Process Supply	Uses of water for industrial activities that depend primarily on water quality.
REC-1 – Water Contact Recreation	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonable possible.
REC-2 – Non-Contact Water Recreation	Uses of water for recreational activities involving proximity to water, but where no body contact with water, nor any likelihood of ingestion of water.
SPWN – Spawning, Reproduction, and/or Early Development	Uses of water that support high quality aquatic habitats suitable for reproduction and early development of fish.
WARM – Warm Freshwater Habitat	Uses of water that support warm water ecosystems.
WILD – Wildlife Habitat	Uses of water that support terrestrial or wetland ecosystems.

Table 4.9-2 Beneficial Uses of the Mokelumne River and Calaveras River Reaches[21]

River Reach	Existing Beneficial Uses
Mokelumne River	
Sources to the Pardee Reservoir	MUN, POW, REC-1, REC-2, WARM, COLD, MIGR, SPWN, WILD
Paradee Reservoir	MUN, POW, REC-1, REC-2, WARM, COLD, SPWN, WILD
Camanche Reservoir	MUN, AGR, REC-1, REC-2, WARM, COLD, SPWN, WILD
Camanche Reservoir to the Delta	AGR, REC-1, REC-2, WARM, COLD, MIGR, SPWN, WILD
Calaveras River	
New Hogan Reservoir to the Delta	MUN, AGR, POW, REC-1, REC-2, WARM, COLD, SPWN, WILD

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The NSJWCD area is located in the northeast region of the project area within HU numbers 31.11, 31.20, and 31.3. Beneficial uses for these units include irrigation, stock watering, contact recreation, canoeing and rafting, other no contact recreation, freshwater habitat, migration habitat, spawning habitat, wildlife habitat, and municipal and domestic supply. The NSJWCD area includes a portion of the Mokelumne River which flows southwest from the Camanche Reservoir. The NSJWCD area also includes a portion of the Mokelumne Aqueduct which flows southwest through the NSJWCD area from Pardee Reservoir, which is located to the northeast.

[20] *Ibid.*
[21] *Ibid*

STOCKTON EAST WATER DISTRICT

The Stockton East Water District (SEWD) area is located in the eastern central region of the project area, with scattered areas in the western portion. The SEWD area is located within HU numbers 31.2, 31.3, 31.4, 35.1. Beneficial uses for these units include irrigation, stock watering, contact recreation, canoeing and rafting, other no contact recreation, freshwater habitat, migration habitat, spawning habitat, wildlife habitat, and municipal and domestic supply. The largest river in this area is the Calaveras River, which flows west from New Hogan Reservoir outside of SEWD area and the project area to the San Joaquin River. Additional parcels of land in the western region of the project area that are within the SEWD area overlap a small portion of French Camp Slough. The Mokelumne Aqueduct transverses the northern portion of the SEWD area.

CITY OF STOCKTON

The City of Stockton area is located within the western central region of the project area within HU numbers 44.00, 31.2, 31.3, 31.4, 35.1. Beneficial uses for these units include irrigation, stock watering, contact recreation, canoeing and rafting, other no contact recreation, freshwater habitat, migration habitat, spawning habitat, wildlife habitat, municipal and domestic supply, industry process and service supply, and navigation. The City of Stockton area is intersected by the Mokelumne Aqueduct, Calaveras River, French Camp Slough, and Duck Creek, which all flow from east to west. The City of Stockton area is partially bordered by the San Joaquin River.

Sacramento-San Joaquin River Delta

The Delta is made up of two river systems, the Sacramento River in the north and the San Joaquin River in the south that meet and flow into its tributaries, the Suisan Marsh and San Francisco Bay (refer to Figure 4.9-1). The Delta includes the cities of Sacramento and Stockton to the north and south, respectively, and covers a large area of waterways, islands, and wetlands, with a comprehensive levee system. It is a vital water source for the State and a significant region for agriculture and recreation use and supports a wide variety of aquatic habitat. Both the Mokelumne and Calaveras Rivers, as well as numerous other surface water flows impact the hydrology of the Delta. The Delta's beneficial uses and water quality constituents of concern (discussed in the section below) are detailed in the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta watershed (Bay-Delta), which is consistent with the Basin Plan (refer to Section 4.9.3, Water Quality Control Plan for the Bay-Delta for more information).

Surface Water Quality

Definitions

The following terminology is used in the surface water quality setting.

- **Basin Plan Water Quality Objectives** – Water quality objectives as defined by the Basin Plan, refer to the specific set of standards within the CVRWQCB's Basin Plan that define the acceptable levels of pollutants (refer to water quality constituents below) in a body of water, aiming to protect designated beneficial uses. Specific water quality objectives for surface waters in the project area are discussed below under *Mokelumne River* and more broadly for the entire Place of Use below under *303(d) Listed Impaired Waters*.
- **Water Quality Constituents** – Water quality constituents include chemical and biological factors that determine the health of a body of water. Several constituents that are either currently

impacting surface water or have the potential to impact it in the future are discussed further beneath for the Mokelumne River.

- **Measurable Contaminate Levels (MCLs)** – MCLs refer to a set of water quality standards which specifies the maximum allowed concentration of certain contaminants in water designated for a specific beneficial use.
- **Secondary Maximum Contaminate Levels (SMCLs)** – SMCLs outline the amount or range of acceptable levels of contaminants in water. Unlike MCLs, these levels are not enforceable but serve as guidelines for water quality management.

This following section discusses water quality of the Mokelumne River only because under MICUP, surface water from Mokelumne River would be recharged using various methods via proposed components. The Calaveras River water quality is not discussed because while the Calaveras River may be impacted by construction of the project components, (refer to Section 4.9.4, I*mpacts and Mitigation Measures*) surface water from the Calaveras River would not be recharged (or used) with implementation of MICUP.

Mokelumne River

Water quality along the Mokelumne River varies substantially from its headwaters to below Camanche Dam. Water quality at and below Pardee Reservoir is affected by natural and regulated inflows along the upper Mokelumne River and its tributaries, reservoir impoundments, and runoff associated with agriculture and urban land uses, including urban wastewater discharges. As described above, the lower Mokelumne River is supplied water from Camanche and Pardee Reservoirs. Water from these reservoirs is used for drinking, irrigation, environmental, and recreation. EBMUD regularly monitors and collects water quality data at both the Pardee and Camanche reservoirs. Additionally, the City of Lodi receives 50 percent of its water from the Mokelumne River[22] and collects water quality data on the Mokelumne River. Both water quality data from EBMUD and the City of Lodi are included in Table 4.9-3[23][24].

[22] City of Lodi. 2024.Water Supply. Available: https://www.lodi.gov/527/Water-Supply Accessed January 20, 2025.
[23] HDR. 2020. *Lower Mokelumne River Watershed Sanitary Survey, Prepared for the City of Lodi's Surface Treatment Facility*. December 31, 2020.
[24] State Water Resources Control Board, Division of Drinking Water. 2024. CA Drinking Water Watch, Lodi, City of (3910004). All Sampling Results. Available: https://sdwis.waterboards.ca.gov/PDWW/JSP/WSamplingResultsByStoret.jsp?SystemNumber=3910004&tinwsys_is_number=4018&FacilityID=047&WSFNumber=54506&SamplingPointID=047&SystemName=LODI%2C+CITY+OF&SamplingPointName=MOKELUMNE+RIVER++-+RAW&Analyte=&ChemicalName=&begin_date=&end_date=&mDWW=. Accessed January 20, 2025.

Table 4.9-3 Mokelumne River Water Quality Constituents

Parameter	MCLs/ SMCLs[25]	Pardee Reservoir			Camanche Reservoir			Mokelumne River[26]			
		Min	Max	Average	Min	Max	Average	Min	Max	Average	2024[27]
pH	>6.5 and <8.5	6.1	7.5	6.6	6.6	7.9	7.1	4.9	8	7.2	7.06
Electrical Conductivity (µS/cm)	900	27.0	37.0	31.6	47.7	57.3	53.4	–	–	–	39
Turbidity (NTU)	5	7.8	10.2	8.7	6.9	8.8	7.8	1.2	17.6	5.7	1.2
Chloride[1] (mg/L)	250/500	–	–	–	–	–	–	ND	3.4	–	–
Sulfate[1] (mg/L)	250/500	–	–	–	–	–	–	ND	2.9	–	–
Nitrate (mg/L)	10	–	–	–	–	–	–	ND	ND	ND	ND
Arsenic (ug/L)	10	–	–	–	–	–	–	ND	ND	ND	ND

Notes: DDW = Division of Drinking Water; MCLs = maximum contaminant levels; SMCLs = secondary maximum contaminant levels; µS/cm = microsiemens per centimeter; NTU = nephelometric turbidity unit; mg/L = milligrams per liter; ug/L = micrograms per liter; ND = non-detect

[1] SMCLs are measured by MCL ranges. Chloride and Sulfate have a recommended SMCL of 250 mg/L and upper MCL of 500 mg/L

EBMUD collects water quality data for both the Pardee and Camanche Reservoir (downstream Mokelumne River water). Water quality data is collected as depth-discrete points across the reservoir profile at specific water quality stations within each reservoir. Data from the Camanche Reservoir is collected at the Cama and Pen20 water quality stations. Data from the Pardee Reservoir is collected at the Patw station. Depth discrete points are collected from the bottom of the reservoir to the water surface using a YSI Sonde. Data in Table 4.9-3 was compiled from the most recent EBMUD sampling event in July 2024.

The City of Lodi uses the Mokelumne River as a water supply source, and therefore, collects water quality data for a variety of purposes and programs. Water quality data was compiled from the City of Lodi's Lower Mokelumne River Watershed Sanitary Survey (Watershed Sanitary Survey) and from samples submitted to the DDW for drinking water supply purposes. The Watershed Sanitary Survey analyzed water quality data, collected monthly, from 2015 through 2020. Samples were collected at the raw water intake for the City of Lodi's surface water treatment facility. The minimum, maximum, and average values for the City of Lodi, shown in Table 4.9-3, are from the Watershed Sanitary Survey. Water quality data from 2024 are taken from the DDW.

Minimum, maximum, and average values from the water quality profiles of Camanche and Pardee Reservoirs are shown in Table 4.9-3. Water quality constituents of particular interest for MICUP, for the purposes of groundwater recharge include pH, electrical conductivity, and turbidity. These constituents, as well as other measurable water quality constituents are summarized below in accordance with the Basin Plan.

[25] Central Valley Regional Water Quality Control Board. 2019. Water Quality Control Plan (Basin Plan) Fifth Edition. Available: https://www.waterboards.ca.gov/rwqcb5/water_issues/basin_plans/sacsjr_201902.pdf. Accessed January 14, 2025.
[26] *Ibid*
[27] *Ibid*

- **pH**: pH ranged from 6.1 to 7.9, with averages of 6.6 and 7.1 for the Pardee and Camanche Reservoir, respectively. This range is expected for both surface water and groundwater. Water quality results from the City of Lodi show high-quality Mokelumne River water. Most of the pH readings were within the MCL range of greater than 6.5 and lower than 8.5. pH values ranged from 4.9 to 8, with an average of 7.2. While 4.9 is low, this was a single point in the data set and could be considered an outlier.
- **Electrical conductivity (EC)**: EC, which can be used to approximate total dissolved solids (TDS), was between 27 and 37 us/cm, with an average around 32 us/cm. This is lower than the MCL and lower than expected groundwater conditions. Conductivity, collected in 2024, was low at 39 us/cm. Conductivity values indicate high quality water with low salt content.
- **Turbidity**: Turbidity values for both Camanche and Pardee reservoirs, along with City of Lodi sampling, was between 6.9 NTU and 17.6 NTU. These results, while above the MCL for drinking water, are low for surface waters. Furthermore, turbidity, as a measurement of suspended solids, is generally filtered out during recharge events. High turbidity water has a greater impact on recharge infrastructure than groundwater quality.
- **Chloride**: Chloride measurements from the City of Lodi's Watershed Sanitary Survey ranged from non-detect to 3.4 mg/L. These values are below the SMCL. These chloride values indicate high quality water with low salt content.
- **Sulfate**: Sulfate measurements from the City of Lodi's Watershed Sanitary Survey ranged from non-detect to 2.9 mg/L. These values are below the SMCL. These sulfate values indicate high quality water with low salt content.
- **Nitrate**: Nitrate was not detected in either the Watershed Sanitary Survey or DDW sample results, and therefore, below the MCL.
- **Arsenic**: Arsenic was not detected in either the Watershed Sanitary Survey or DDW sample results, and therefore, below the MCL.

303(d) Listed Impaired Waters

The SWRCB is required under Clean Water Act (CWA) Section 303(d) to prepare a list of water bodies (also known as the 303[d] list) that do not meet applicable water quality standards and to develop a priority ranking for development of total maximum daily loads (TMDLs) for each water body. Section 303(d) requires that the State develop a TMDL for each listed pollutant. The TMDL is the amount of loading that the water body can receive and still comply with water quality objectives. The NPDES program permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of the TMDL, the problems that led to placement of a given pollutant on the Section 303(d) list are anticipated to be remediated. TMDLs have different requirement statuses:

- **5A**: A 5A TMDL status indicated that a TMDL is currently being developed or is scheduled to be developed for that water body.
- **5B**: A 5B TMDL means that a review of water quality standards needs to be conducted before a TMDL can be scheduled.
- **5C**: A 5C TMDL indicates a TMDL to be developed, but the TMDL is currently under development or not yet completed for at least one of the pollutants causing the impairment.

The lower Mokelumne River – below Camanche Dam – is included on the CVRWQCB's 303(d) list of impaired water bodies for Zinc (5A), Copper (5A), Toxicity (5A) with unknown sources of pollutants,

and Mercury (5B) from a variety of sources including agricultural return flows, atmospheric deposition, highway runoff, industrial sources, municipal sources, a natural resources and resource extraction. [28] The Delta Methylmercury TMDL was adopted by the CVRWQCB in April 2010, which applies to mercury-impaired bodies in the Mokelumne River.[29]

Additionally, there are multiple other surface waters within the project area that are listed as impaired under the CWA Section 303 (d). Table 4.9-4 provides a list of impaired waters within the project area, within or near areas where MICUP components would be implemented.[30]

Erosion and Sedimentation

Definitions

The following terminology is used in the erosion and sedimentation setting.

- **Topsoil** – Topsoil is the uppermost layer of soil (typically the top one to seven inches of soil) and has the highest concentration of organic matter and microorganisms.

Erosion

Erosion and sedimentation are natural processes driven by surface runoff that can be accelerated by human activities such as construction earthwork activities. During construction, removal of vegetation or impervious areas (concrete, asphalt, etc.) expose soils to precipitation and surface runoff and can accelerate surface soil erosion. The process may result in loss of topsoil, creation of erosional features including rills and gullies, and sediment-filled streams and channels.

Erosion potential is determined by four principal factors: the characteristics of the soil, extent of vegetative cover, topography, and climate. Soil texture and permeability determine the resistance of soil to entrainment by surface runoff. Vegetative cover plays a critical role in controlling erosion by shielding and binding the soil. Slope influences the rate of runoff and is directly correlated with erosion potential where flatter topography has a much lower potential for erosion. The intensity and duration of rainfall determines the extent and the capacity for flowing water to detach and transport soil particles.

[28] California State Water Resources Control Board. 2024. Appendix A: Proposed Final 2024 303(d) List. Available: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2024-integrated-report.html#:~:text=The%202024%20California%20Integrated%20Report%20was%20partially%20approved%20and%20partially,the%20303(d)%20list. Accessed: February 17, 2025.
[29] Central Valley Regional Water Quality Control Board. 2025. Sacramento-San Joaquin Delta Methylmercury TMDL. Available: https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/delta_hg/. Accessed February 17, 2025.
[30] California State Water Resources Control Board. 2024. Appendix A: Proposed Final 2024 303(d) List. Available: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2024-integrated-report.html#:~:text=The%202024%20California%20Integrated%20Report%20was%20partially%20approved%20and%20partially,the%20303(d)%20list. Accessed: February 17, 2025.

Table 4.9-4 Impaired Waterways within the Project Area[31]

Waterbody Name	Pollutant	Pollutant Category	Final Listing Decision	TMDL Requirement Status
Bear Creek (San Joaquin and Calaveras Counties; outside Delta Waterways)	Indicator Bacteria	Pathogens	Do Not Delist from 303(d) list (TMDL required list)	5A
Bear Creek (San Joaquin and Calaveras Counties; outside Delta Waterways)	Low Dissolved Oxygen	Nutrients	Do Not Delist from 303(d) list (TMDL required list)	5A
Bear Creek (San Joaquin and Calaveras Counties; outside Delta Waterways)	Copper	Metals	List on 303(d) list (TMDL required list)	5A
Bear Creek (San Joaquin and Calaveras Counties; outside Delta Waterways)	Oxygen, Dissolved	Nutrients	List on 303(d) list (TMDL required list)	5A
Calaveras River, Lower (from Bellota Weir to Stockton Diverting Canal)	Toxicity	Total Toxics	List on 303(d) list (TMDL required list)	5A
Calaveras River, Lower (from Stockton Diverting Canal to the Delta Waterways)	Indicator Bacteria	Pathogens	Do Not Delist from 303(d) list (being addressed with USEPA approved TMDL)	5B
Duck Creek (San Joaquin County)	Indicator Bacteria	Pathogens	Do Not Delist from 303(d) list (TMDL required list)	5A
Duck Creek (San Joaquin County)	Chlorpyrifos	Pesticides	Do Not Delist from 303(d) list (being addressed with action other than TMDL)	5C
Duck Creek (San Joaquin County)	Lead	Metals	List on 303(d) list (TMDL required list)	5A
Duck Creek (San Joaquin County)	Mercury	Metals	List on 303(d) list (TMDL required list)	5A
Duck Creek (San Joaquin County)	Oxygen, Dissolved	Nutrients	List on 303(d) list (TMDL required list)	5A
Duck Creek (San Joaquin County)	Toxicity	Total Toxics	List on 303(d) list (TMDL required list)	5A
Littlejohns Creek	Indicator Bacteria	Pathogens	Do Not Delist from 303(d) list (TMDL required list)	5A
Littlejohns Creek	Toxicity	Total Toxics	Do Not Delist from 303(d) list (TMDL required list)	5A
Littlejohns Creek	Chlorpyrifos	Pesticides	Do Not Delist from 303(d) list (being addressed with action other than TMDL)	5C
Littlejohns Creek	Oxygen, Dissolved	Nutrients	List on 303(d) list (TMDL required list)	5A
Mokelumne River, Lower (San Joaquin County, outside Delta Waterways)	Copper	Metals	Do Not Delist from 303(d) list (TMDL required list)	5A
Mokelumne River, Lower (San Joaquin County, outside Delta Waterways)	Toxicity	Total Toxics	Do Not Delist from 303(d) list (TMDL required list)	5A
Mokelumne River, Lower (San Joaquin County, outside Delta Waterways)	Zinc	Metals	Do Not Delist from 303(d) list (TMDL required list)	5A
Mokelumne River, Lower (San Joaquin County, outside Delta Waterways)	Mercury	Metals	Do Not Delist from 303(d) list (being addressed with USEPA approved TMDL)	5B
Mormon Slough (Commerce Street to Stockton Deep Water Channel; partly in Delta Waterways, eastern portion)	Organic Enrichment/Low Dissolved Oxygen	Nutrients	Do Not Delist from 303(d) list (TMDL required list)	5A
Mormon Slough (Commerce Street to Stockton Deep Water Channel; partly in Delta Waterways, eastern portion)	Indicator Bacteria	Pathogens	List on 303(d) list (being addressed by USEPA approved TMDL)	5B
Mormon Slough (from Stockton Diverting Canal to Bellota Weir--Calaveras River)	Toxicity	Total Toxics	Do Not Delist from 303(d) list (TMDL required list)	5A
Mormon Slough (from Stockton Diverting Canal to Bellota Weir--Calaveras River)	Chlorpyrifos	Pesticides	Do Not Delist from 303(d) list (being addressed with action other than TMDL)	5C
Mormon Slough (from Stockton Diverting Canal to Bellota Weir--Calaveras River)	Oxygen, Dissolved	Nutrients	List on 303(d) list (TMDL required list)	5A
Mormon Slough (from Stockton Diverting Canal to Bellota Weir--Calaveras River)	pH	Other Cause	List on 303(d) list (TMDL required list)	5A
Mormon Slough (San Joaquin County; outside Delta Boundary)	Indicator Bacteria	Pathogens	Do Not Delist from 303(d) list (TMDL required list)	5A
Mosher Slough (outside Delta Waterways)	Indicator Bacteria	Pathogens	List on 303(d) list (being addressed by USEPA approved TMDL)	5B
Pixley Slough (San Joaquin County; outside Delta Waterways)	Oxygen, Dissolved	Nutrients	Do Not Delist from 303(d) list (TMDL required list)	5A
Pixley Slough (San Joaquin County; outside Delta Waterways)	Chlorpyrifos	Pesticides	Do Not Delist from 303(d) list (being addressed with action other than TMDL)	5C
Pixley Slough (San Joaquin County; outside Delta Waterways)	Diazinon	Pesticides	Do Not Delist from 303(d) list (being addressed with action other than TMDL)	5C
Pixley Slough (San Joaquin County; outside Delta Waterways)	Disulfoton	Pesticides	List on 303(d) list (TMDL required list)	5A
Pixley Slough (San Joaquin County; outside Delta Waterways)	Indicator Bacteria	Pathogens	List on 303(d) list (TMDL required list)	5A
Pixley Slough (San Joaquin County; outside Delta Waterways)	Toxicity	Total Toxics	List on 303(d) list (TMDL required list)	5A

[31] California State Water Resources Control Board. 2024. Appendix A: Proposed Final 2024 303(d) List. Available: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2024-integrated-report.html#:~:text=The%202024%20California%20Integrated%20Report%20was%20partially%20approved%20and%20partially,the%20303(d)%20list. Accessed: February 17, 2025.

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Excessive sedimentation may reduce channel or basin capacities and require increased dredging or cleaning of channels. Erosion along stream banks can erode nearby property, causing a loss of land or possibly increased flooding. Increased sedimentation can also restrict storm drains and channels and lead to flooding during storms that the drainage system should capably handle. In addition, development can increase the likelihood of erosion and sedimentation along unlined drainage channels as a result of increased storm water flows. In general, granular soils with relatively low cohesion and soils located on steep topography have a higher potential for erosion. The majority of soils in the project area are very deep and well-drained, and typically, the surface layer and subsoil are moderately coarse textured, which makes for soils less prone to erosion.[32] Other soil series in the project area have a low runoff capacity, are somewhat poorly to well drained, and have a low to moderate susceptibility to wind or water driven erosion.[33] As previously discussed in Section 4.6, *Geology and Soils*, the topography of the project area is nearly flat, resulting in little potential for erosion by water. Areas of bare soil may by susceptible to erosion by wind.

Flood Hazard Areas

Definitions

The following terminology is used in the flood hazards setting.

- **FIRM** - A Flood Insurance Rate Map (FIRM) is the official map of a community prepared by the Federal Emergency Management Agency (FEMA) to delineate both the special flood hazard areas and the flood risk premium zones applicable to a community.
- **Seiche** - A seiche is a stationary wave in a large, enclosed body of water, caused by atmospheric conditions (typically on very large water bodies) or seismic displacement in the vicinity of the water body (such as a reservoir). A seiche occurs due to natural processes associated with atmospheric or seismic events and cannot be predicted or prevented.[34]
- **Tsunami** - A tsunami is an ocean wave caused by a sudden displacement of the ocean floor, most often due to earthquakes.

Flood Mapping

FEMA has designated various 100-year and 500-year flood zones within the project area, which are generally associated with creeks and drainages. A 100-year flood has a 1 percent chance of occurring in a given year, while a 500-year flood has a 0.2 percent chance. FEMA designates flood zones using a series of letters, for example, Zone A indicate areas of the 100-year flood where base flood elevations are not known; Zone AE areas are those where 100-year flood elevations have been calculated; and Zone X areas that experience minimal flooding.

[32] NRCS. 1992. Soil Survey of San Joaquin County, California. Available: https://archive.org/details/usda-general-soil-map-soil-survey-of-san-joaquin-county-california. Accessed December 30, 2024.
[33] *Ibid*
[34] National Oceanic and Atmospheric Administration. 2024b. What is a seiche? Available: https://oceanservice.noaa.gov/facts/seiche.html. Accessed January 20, 2025.

Project Area

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

In the northern area of the NSJWCD area, the Mokelumne River is designated as Flood Zone A. Portions of the Mokelumne River connecting from the Camanche Reservoir and flowing west, are designated as Flood Zone AE, X, and A.[35]

STOCKTON EAST WATER DISTRICT

The SEWD area contains flood zones designated as A, AE, and X.[36]

CITY OF STOCKTON

The City of Stockton area contains flood zones designated as AE and X near the Calaveras River.[37]

Other Flood Risks

DAM INUNDATION

Numerous dams in or adjacent to San Joaquin County (county) provide beneficial water supply storage, hydroelectric generation, and flood control storage space. Dam safety is evaluated and managed by the regulatory agencies – either the Federal Energy Regulatory Commission (FERC) or California Division of Safety of Dams, depending on the dam – to verify structural integrity, including resistance to stresses that could result from local or regional earthquakes. However, in the unlikely event of a dam failure, large volumes of water could inundate areas of the county. Dam failure could occur as a result of various natural or human causes, related to design and structural engineering problems, or lack of maintenance. The resulting effects could include loss of life, damage to property, and other related hazards, along with displacement of residents and/or damage to water resource and other infrastructure facilities (e.g., irrigation, electric power generation or transmission, transportation).

Camanche Dam on the Mokelumne River has the potential to flood a large area of San Joaquin County and would affect the largest population, in both unincorporated communities and cities. A failure of Camanche Dam or the Camanche North and South Dike systems would result in rapid inundation of the northeast portion of the county, arriving at Clements and nearby communities in about one-half hour. With failure of the Camanche Dam, water depths would range from a few inches to up to 15 to 16 feet in the Stockton area.[38] In addition to Camanche Dam, there are multiple regional dams in the project vicinity that have potential to inundate the project area. The estimated areal extent of inundation as well as the communities potentially affected from potential dam failures in the project area are listed in Table 4.9-5.

[35] Federal Emergency Management Agency (FEMA). 2024. FEMA's National Flood Hazard Layer (NFHL) Viewer. Available: https://msc.fema.gov/nfhl. Accessed January 14, 2025
[36] *Ibid*
[37] *Ibid*
[38] San Joaquin County. 2014. San Joaquin County 2035 General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed January 15, 2025.

Table 4.9-5 Dam Failure Inundation Data for the Project Area

Dam	Location (County)	River	Storage (acre feet)	Owner	Inundation Area (square miles)	Affected Communities
Camanche	San Joaquin	Mokelumne	417,120	EBMUD	243	Clements, Victor, Coopers Corner, Acampo, Collerville, Woodbridge, Morada, Glenwood, Lockeford, Lodi, Stockton
Camanche South Dikes	San Joaquin	Mokelumne	36,400	EBMUD	n/a	Clements, Lockeford, Victor, Woodbridge, Lockeford, Lodi, Stockton
Camanche North Dikes	Calaveras	Mokelumne	14,800	EBMUD	n/a	Clements, Lockeford, Victor, Woodbridge, Lockeford, Lodi, Stockton
New Hogan	Calaveras	Calaveras	317,000	US Army Corps of Engineers	402	Linden, Noble Acres, Gleenwood, Morada, Lockeford, Linden Lodi, Stockton, Thorton, Delta
New Melones	Calaveras	Calaveras	2,400,000	US Bureau of Reclamation	507	French Camp, Mountain House, Escalon, Ripon, Manteca, Tracy, Lathrop, Mountain House, Delta, Stockton, Thornton
Pardee	Amador	Mokelumne	189,950	EBMUD	117	Clements, Victor, Coopers Corner, Acampo, Collerville, Woodbridge, Collierville, Lockeford, Lodi, Thorton, Stockton
Pine Flat Lake	Fresno	Kings	1,000,000	US Army Corps of Engineers	186	Manteca, Tracy, Lathrop, Stockton, Delta
Salt Spring Reservoir	Amador	Mokelumne	139,400	Pacific Gas & Electric	131	Clements, Coopers Corner, Acampo, Woodbridge, Thorton, Lockeford, Lodi, Stockton

Notes: EBMUD = East Bay Municipal Utility District

Source: San Joaquin County 2014[39], California Department of Water Resources 2025[40]

SEICHE

According to the United States Geological Survey (USGS), a seiche was recorded just northeast of the project area, within the Bear Valley headwaters in the Sierra Nevada Mountains. Two of six gages on the Mokelumne River in California showed a slight fluctuation caused by the December 20, 1932, earthquake in the city of Lodi.[41] Therefore, it is possible for bodies of water within and

[39] San Joaquin County. 2014. San Joaquin County 2035 General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed January 15, 2025.
[40] California Department of Water Resources. 2025. Dam Breach Inundation Map Web Publisher. Available: https://fmds.water.ca.gov/webgis/?appid=dam_prototype_v2. Accessed January 16, 2025.
[41] United State Geologic Survey (USGS). 2025. Earthquake Hazards Program, Seismic Seiches. Available: https://www.usgs.gov/programs/earthquake-hazards/seismic-seiches. Accessed January 20, 2025.

adjacent to the project area, such as Lake Lodi and the Camanche Reservoir, to experience flood hazards associated with a seiche.

TSUNAMI

The project area is not located within a tsunami inundation zone. The California Department of Conservation, California Geological Survey (CGS) Tsunami Hazard Area Map shows the project area is located over 40 miles east of the nearest tsunami hazard zone, which is located in the Delta between the counties of Solano and Contra Costa.[42]

4.9.3 Regulatory Framework

Federal Regulations

Clean Water Act

The federal CWA and subsequent amendments, under the enforcement authority of the United States Environmental Protection Agency (EPA), was enacted "to restore and maintain the chemical, physical, and biological integrity of the Nation's waters." The CWA requires States to develop and implement state water plans and policies. The CWA gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry, although state programs can assume this responsibility if the EPA deems the State program, and the resulting standards, sufficiently protective. In California, NPDES implementation and enforcement are conducted through the SWRCB and the nine RWQCBs under California's Porter-Cologne Water Quality Control Act.

CWA SECTION 401

Under CWA Section 401, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless the applicable permitting authority issues a Section 401 water quality certification or waives its right to act. States and authorized Tribes where the discharge would originate are generally responsible for issuing water quality certifications. In cases where a State or Tribe does not have authority, EPA is responsible for issuing certification.[43] In making decisions to grant, grant with conditions, or deny certification requests, the issuing agency must consider whether the federally licensed or permitted activity will comply with applicable water quality standards, effluent limitations, new source performance standards, toxic pollutants restrictions, and other appropriate water quality requirements of State or tribal law. Any water quality certification issued must set forth any effluent limitations and other limitations, and monitoring requirements necessary to assure that the applicant for a federal license or permit will comply with all applicable effluent limitations and other limitations. Refer to Section 4.4, *Biological Resources*, for additional information.

CWA SECTION 402

CWA Section 402 regulates discharges through NPDES and State waste discharge requirements (WDRs). SWRCB and CVRWQCB have adopted specific NPDES permits for a variety of activities that have the potential to discharge wastes (including sediment) to waters of the state. SWRCB's *NPDES*

[42] California Department of Conservation, California Geological Survey (CGS). 2025. Tsunami Hazard Area Map. Available: https://maps.conservation.ca.gov/cgs/informationwarehouse/ts_evacuation/. Accessed January 20, 20205.
[43] United States Environmental Protection Agency (EPA). 2024. Clean Water Act Section 401: Ste Certification of Water Quality. Available: https://www.epa.gov/cwa-401/clean-water-act-section-401-state-certification-water-quality. Accessed January 20, 2025.

General Permit of Stormwater Discharges Associates with Construction and Land Disturbance Activities (Order WQ 2022-0057-DWQ, NPDES No. CAS000002) is applicable to all land-disturbing construction activities that would disturb 1 acre of land or more. Compliance with the NPDES permit requires submittal to the CVRWQCB of Notices of Intent to discharge, and implementation of SWPPPs that include best management practices (BMPs) to minimize water quality degradation during construction activities (see below under *State Regulations* for more information).

CWA SECTION 404

The United States Army Corps of Engineers (USACE) administers CWA Section 404, which regulates discharge of dredged and fill materials into waters of the United States. If a project discharges any fill materials into waters of the United States, including wetlands, then a CWA Section 404 permit must be obtained from USACE. Refer to Section 4.4, *Biological Resources*, for additional information.

CWA SECTION 303(D)

As discussed previously, the CWA Section 303(d) requires adoption of water quality standards for all surface waters of the United States. In California, EPA has delegated responsibility to SWRCB and its nine RWQCBs for identifying beneficial uses and adopting applicable water quality objectives. California exercises this authority under the provisions of the Porter-Cologne Water Quality Control Act. CWA Section 303(d) requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards (that is, impaired water bodies). The affected water body, and associated pollutant or stressor, is prioritized in the 303(d) List, and a TMDL must be identified.

Rivers and Harbors Act of 1899

The Rivers and Harbors Act of 1899 regulates the quality and hydrology of navigable waters and their tributaries through permitting administered by USACE. Pursuant to this Act, any discharge of refuse matter into navigable waters and/or their tributaries without a permit is prohibited. Additionally, the Rivers and Harbors Act requires a permit to excavate, fill, or alter the condition, or capacity of any navigable water or federal levee. The Mokelumne River and Calaveras River are both federally navigable waterways.

National Flood Insurance Program

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were intended to reduce the need for large, publicly funded flood risk management structures and disaster relief by restricting development on floodplains. FEMA administers the National Flood Insurance Program (NFIP) to subsidize flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA issues Federal Insurance Rate Maps for communities participating in the NFIP. These maps delineate flood hazard zones in the community. These maps are designed for flood insurance purposes only and do not necessarily show all areas subject to flooding. The maps designate lands likely to be inundated during a 100-year event and flooding elevations. They also depict areas between the limits affected by 100- and 500-year events and areas of minimal flooding. These maps often are used to establish structure pad elevations to reduce risk to new development from flooding effects. Areas mapped into certain flood zones may be eligible for flood insurance. FEMA-mapped flood hazard areas and levee certifications also affect flood repair reimbursement for post-disaster relief and repairs.

Safe Drinking Water Act

The federal Safe Drinking Water Act establishes drinking water standards to safeguard public health. The law focuses on all above and below ground water sources actually or potentially used for drinking water. The Act authorizes EPA to establish minimum standards to protect tap water and requires all owners or operators of public water systems to comply with these primary (health related) standards. The Safe Drinking Water Act targets treatment, distribution, and source water protection to assure drinking water quality.

State Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act established a program to protect water quality as well as beneficial uses of water. This Act applies to surface water, groundwater, wetlands, and both point and nonpoint sources of pollution. The Act requires the adoption of water quality control plans to manage and protect the water resources of California. EPA has approved California's program under Porter-Cologne, and this is used by the State to implement its authorities under the CWA.

National Pollutant Discharge Elimination System

GENERAL PERMIT OF STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION AND LAND DISTURBANCE ACTIVITIES (ORDER WQ 2022-0057-DWQ, NPDES NO. CAS000002)

Construction associated with the proposed project would disturb more than 1 acre of land surface. Some of the project components would, therefore, be subject to the *NPDES General Permit of Stormwater Discharges Associated with Construction and Land Disturbance Activities* (Order WQ 2022-0057-DWQ, NPDES No. CAS000002). The Construction General Permit (CGP) regulates discharges of pollutants in stormwater associated with construction activity from construction sites that disturb 1 acre or more of land surface, or that are part of a common plan of development or sale that disturbs more than 1 acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines.

The CGP requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving waters risk level reflects the risk to the receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

- Effluent standards;
- Good site management “housekeeping;”
- Non-stormwater management;
- Erosion and sediment controls;
- Run-on and runoff controls;

- Inspection, maintenance, and repair; or
- Monitoring and reporting requirements.

The CGP requires the development and implementation of a SWPPP that includes specific BMPs designed to prevent sediment and pollutants from contacting stormwater from moving offsite into receiving waters. The BMPs fall into several categories, including erosion control, sediment control, waste management and good housekeeping, and are intended to protect surface water quality by preventing the off-site migration of eroded soil and construction-related pollutants from the construction area. Routine inspection of all BMPs is required under the provisions of the CGP.

The SWPPP must be prepared before the construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as vehicle and equipment washing and fueling. The CGP also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following construction).

LIMITED THREAT DISCHARGES TO SURFACE WATERS (ORDER R5-2022-0006-04)

Additionally, the CVRWQCB has adopted General WDRs and NPDES Permit for *Limited Threat Discharges to Surface Waters* (Order R5-2022-0006-04) which apply to various categories of construction activities, including dewatering. Discharges include individuals, public agencies, private businesses, and other legal entities discharging the following:

- Clean or relatively pollutant-free wastewaters that pose little or no threat to water quality.
- Discharges that may contain toxic organic constituents, volatile organic compounds, petroleum fuel pollution constituents, pesticides, inorganic constituents, chlorine, and/or other chemical constituents that require treatment prior to discharge.
- Discharges of clean or treated drainage from mines (also known as liquid mine waste).

California Toxics Rule and State Implementation Policy

The California Toxics Rule and State Implementation Policy (CTR) was promulgated in 2000 in response to requirements of the EPA National Toxics Rule (NTR). The NTR and CTR address inland surface waters, enclosed bays, and estuaries in California that are subject to regulation pursuant to Section 303(c) of the CWA. The NTR and CTR include criteria to protect aquatic life and human health. Human health criteria (water and organisms) apply to all waters with a "Municipal and Domestic Water Supply" beneficial use designation, as indicated in the RWQCBs' Basin Plans. The *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California*, also known as the State Implementation Policy, establishes a standardized approach for permitting discharges of toxic pollutants to non-ocean surface waters in a manner that promotes statewide consistency.

Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin (Basin Plan)

The Water Quality Control Plan for the Sacramento River Basin and San Joaquin River Basin (Basin Plan) is required by the California Water Code (Section 13240) and supported by the CWA. The most recent update to the Basin Plan was completed by the CVRWQCB in 2018. The Basin Plan describes officially designated beneficial uses for specific surface water and groundwater resources and enforceable water quality objectives for physical and chemical water quality constituents to protect those beneficial uses. The RWQCB's primary method of ensuring Basin Plan conformance is to issue waste discharge requirements that specify terms and conditions for implementation and operation for projects that may discharge wastes to land or water.

WATER QUALITY CONTROL PLAN FOR THE BAY-DELTA

The San Francisco Bay/Sacramento-San Joaquin Delta watershed (Bay-Delta watershed or Bay-Delta) encompasses California's two major river systems, the Sacramento and San Joaquin Rivers, as well as numerous other tributaries to those rivers, the Delta and tributaries, Suisun Marsh, and San Francisco Bay. This plan is complementary to the Sacramento River Basin and the San Joaquin River Basin (Basin Plan), discussed above, and provides reasonable protection for the Bay-Delta watershed's beneficial uses that require control of salinity (caused by saltwater intrusion, municipal discharges, and agricultural drainage), instream flows and Delta outflows, and water project operations (limits on diversions and associated operations and management). This plan supersedes the Basin Plan to the extent of any conflict between this plan and the regional water quality control plans. The Basin Plan (discussed above) establishes water quality objectives and requirements for parameters, such as toxic chemicals, bacterial contamination, and other parameters which have the potential to impair beneficial uses or cause nuisance. Most of the objectives in the Bay-Delta Plan have historically been, and will continue to be, implemented by water right holders because the parameters to be controlled are primarily impacted by flows and water diversions.

The Bay-Delta Plan is periodically updated. The most recent updates to the plan (in draft form [December 2025]) focus on the reasonable protection of fish and wildlife beneficial uses of water in the Sacramento River and its tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne Rivers), and the Delta. Water quality objectives for the Mokelumne River within the Bay-Delta Plan (2018) are consistent with the Basin Plan discussed throughout Section 4.9.[44]

The December 2025 draft of the updated Bay-Delta Plan includes actions that would, if approved, be required to implement the Health Rivers and Landscapes (HRL) commitments for certain water rights and claims over an 8-year term, with the possibility of extension, in lieu of implementing other provisions. The HRL actions are intended to contribute to the implementation of the Sacramento/Delta tributary inflow, Sacramento/Delta cold water habitat, narrative Delta outflow, inflow-based Delta outflow, salmon protection, and fish viability objectives. The Mokelumne River HRL participants, including EBMUD, must preserve existing instream flows above the 1998 Lower Mokelumne River Joint Settlement Agreement (JSA) minimum instream flow requirement by 10, 20, and 45 thousand acre feet (TAF) per year for dry, below normal, and normal and above JSA water year types, respectively, to provide an estimated increase of 5, 5, and 7 TAF of additional Delta

[44] State Water Resource Control Board. 2025. December 2025 Draft Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Watershed Available: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/2025/h/dec2025-rev-draft-sacdelta-bdplan.pdf. Accessed March 26, 2026.

inflow and associated Delta outflows above base conditions in dry, below normal, and above normal Sacramento Valley Index years based on long-term modeling.[45]

Water Rights Decision 1641

In the *Revised Water Rights Decision 1641* (D-1641), SWRCB amended the water right license and permits for the State Water Project (SWP) and Central Valley Project (CVP) to require those projects to meet certain objectives in the Bay-Delta Plan. Specifically, D-1641 places responsibility on the California Department of Water Resources and the U.S. Bureau of Reclamation for measures to ensure that specified water quality objectives are met.[46] D-1641 identifies locations in the Delta where water quality objectives need to be maintained, including salinity water quality objectives for fish and wildlife and agriculture at specified compliance locations and chloride water quality objectives at specified water intakes. Additional information on compliance locations, water intakes, and water quality objectives in D-1641 is provided in the *Delta Water Quality Modeling* section below in this chapter.

EBMUD stores water in Camanche Reservoir under Water Right Permits 10479 (issued in 1953) and 10478 (issued in 1956), which existed prior to D-1641. D-1641 amended Permit 10478 requiring releases from Camanche in accordance with a specified minimum flow schedule depending on the water year type, consistent with JSA flows. However, D-1641 did not add terms to Permit 10478 or other EBMUD water rights to satisfy Delta water quality objectives specified in D-1641.[47]

Term 91: Stored Water Bypass Requirements

The SWRCB's Standard Term 91 requires permits and licenses granted after 1965 in the Delta watershed to cease diverting when the SWRCB gives notice that water is not available for diversion under those permits and licenses. This occurs at times when the CVP and SWP are releasing previously stored water to meet water quality and flow requirements in the Delta and the Delta is termed to be in "balanced conditions." The SWRCB will also give notice when Term 91 is no longer in effect. When the CVP and SWP are not releasing previously stored water to meet water quality and flow requirements, the Delta is termed to be in "excess conditions."[48] Term 91 would be required for A029835, and therefore, is included as part of MICUP.

Delta Protection Commission's Land Use and Resource Management Plan

The Delta Protection Commission (DPC) was created by the State legislature in 1992 with the goal of developing regional policies for the Delta to protect and enhance the existing land uses (e.g., agriculture, wildlife habitat, and recreation) in the primary zone of the Delta. The DPC adopted the Land Use and Resource Management Plan for the Primary Zone of the Delta initially in 1995 and amended it most recently in 2010. A large portion of the project area is within the Primary Zone of

[45] *Ibid.*
[46] State Water Resources Control Board. 2000. *Revised Water Right Decision 1641*. In the Matter of: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project. December 29, 1999. Revised in Accordance with Order WR 2000-02. March 15, 2000.
[47] [47] State Water Resources Control Board. 2000. *Revised Water Right Decision 1641*. In the Matter of: Implementation of Water Quality Objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary; A Petition to Change Points of Diversion of the Central Valley Project and the State Water Project in the Southern Delta; and A Petition to Change Places of Use and Purposes of Use of the Central Valley Project. December 29, 1999. Revised in Accordance with Order WR 2000-02. March 15, 2000.
[48] State Water Resources Control Board. 2012. State Water Resources Control Board, Board Meeting Session – Office of Delta Watermaster, December 4, 2012. Available: https://h8b186.p3cdn2.secureserver.net/wp-content/uploads/2012/04/120412_10.pdf. Accessed January 20, 2025.

the Delta.[49] The DPC's Land Use and Resource Management Plan for the Primary Zone of the Delta states the following goal related to water[50]: Protect and enhance long-term water quality in the Delta for agriculture, municipal, industrial, water-contact recreation, and fish and wildlife habitat uses, as well as all other beneficial uses.

The DPC's Land Use and Resource Management Plan for the Primary Zone of the Delta also includes the following policies related to water:

- State, federal and local agencies shall be strongly encouraged to preserve and protect the water quality of the Delta both for in-stream purposes and for human use and consumption.
- Ensure that Delta water rights and water contracts are respected and protected, including area-of-origin water rights and riparian water rights.

California Department of Pesticide Regulation – Restricted Materials Permits and Pesticide Use Report

The California Department of Pesticide Regulation (CDPR) is dedicated to protect human health and the environment by regulating pesticide sales and use, and by fostering reduced-risk pest management. The State of California maintains a list of pesticides that are especially dangerous to human health or the environment if used incorrectly, commonly called restricted materials. These pesticides are listed in 3 California Code of Regulations (CCR) Section 6400. CDPR puts special controls and limitations on these pesticides; furthermore, the purchase or use of restricted materials for agricultural purposes requires a permit from the CAC. Use requirements for these pesticides are given in 3 CCR Sections 6445 through 6489.[51]

CDPR maintains a list of registered pesticides known to cause groundwater contamination in California; these pesticides are listed in Title 3, California Code of Regulations (3 CCR), Section 6800(a): atrazine, bantazon, bromacil, diuron, norflurazon, prometon, simazine. Section 6800(a) pesticides have certain use restrictions. Section 6800(a) pesticides are prohibited below the high water mark inside artificial recharge basins unless the pesticide is applied six months or more before the basin is used to recharge groundwater (3 CCR Section 6487.1). CDPR also maintains a list of pesticides that have the potential to move to, but are not currently found in groundwater, listed in 3 CCR Section 6800(b). Section 6800(b) pesticides are not prohibited for use in artificial recharge basins.[52] CDPR also has regulations pertaining to wellhead protection and the use of pesticides, as listed in 3 CCR Section 6609 (CDPR 2025c[53]). These measures apply to all wells (irrigation, domestic, municipal, monitoring, abandoned, dry, or drainage wells) where pesticides are mixed, loaded, rinsed, or otherwise used within 100 feet of the well. The following management measures are given by CDPR to protect wellheads:

[49] Delta Protection Commission. 2020. Sacramento-San Joaquin Delta. Available: https://delta.ca.gov/wp-content/uploads/2020/09/Delta-Map-2020-508.pdf. Accessed January 20, 2025.
[50] Delta Protection Commission . 2010. Delta Protection Commission, Land Use and Resources Management Plan for the Primary Zone of the Delta. Available: https://delta.ca.gov/wp-content/uploads/2019/12/Land-Use-and-Resource-Management-Plan-2.25.10_-m508.pdf. Accessed January 20, 2025.
[51] California Department of Pesticide Regulation. 2025a.Restricted Materials Use Requirements. Available: https://www.cdpr.ca.gov/docs/enforce/permitting.htm. Accessed January 20, 2025.
[52] California Department of Pesticide Regulation . 2025b. California Code of Regulations (T3. Food and Agriculture) Division 6. Pesticides and Prest control Operations. Available: https://www.cdpr.ca.gov/docs/enforce/permitting.htm. Accessed January 20, 2025.
[53] California Department of Pesticide Regulation. 2025c. Regulations. Available: https://www.cdpr.ca.gov/docs/emon/grndwtr/gwp_regs.htm#:~:text=Wellhead%20protection&text=Restricts%20pesticide%20handling%20practices%20within,a%20berm%20and%20the%20wellhead.&text=Wellhead%20Protection%203CCR%20section%206609. Accessed January 20, 2025.

- Wells protected from runoff:
  - The well should be sited so that no surface water runoff can contact the wellhead including the concrete base, or;
  - A berm should be constructed adjacent to the wellhead to prevent movement of surface water to the wellhead. Preemergent herbicides from the 6800(a) and 6800 (b) lists are prohibited between the berm and the wellhead.
- Wells not protected from runoff: The following activities are prohibited within 100 feet of an unprotected well:
  - Mixing, loading, and storing pesticides,
  - Rinsing of spray equipment or pesticide containers,
  - Maintenance of spray equipment that could result in a pesticide or pesticide residue spill,
  - Application of preemergent herbicides from the Section 6800(a) and Section 6800 (b) lists.

California became the first state to require full reporting of agricultural pesticide use in response to demands for more realistic and comprehensive pesticide use data. Under the PUR program, all agricultural pesticide use must be reported monthly to county agricultural commissioners, who in turn, report the data to CDPR.

Regional and Local Regulations

In addition to the regional and local regulations, below, each MICUP partner agency either has an Urban Water Management Plan (UWMP) and/or strategic plan. These plans contain goals and policies related to surface water supply. Refer to Section 4.13, *Utilities and Service Systems*, for specific details regarding water supply. Furthermore, MICUP would be required to conduct Phase I Environmental Site Assessments (Phase I ESAs) according to local regulations pertaining to hazardous materials. Refer to a discussion of Phase I ESAs in Section 4.9, *Hazards and Hazardous Materials*.

Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan

The Upper Mokelumne River Watershed Authority (UMRWA) prepared an update to the Mokelumne/Amador/Calaveras Integrated Regional Water Management Plan. EBMUD, as an UMRWA member, participated in that effort. The plan is both an account of the region's water resource conditions, geography, and needs, and a set of projects which if implemented will help fulfill the plan's four main policies:

- Maintain and improve water quality;
- Improve water supply reliability and ensure long-term balance of supply and demand;
- Practice resource stewardship; and
- Focus on areas of common ground and avoid prolonged conflict.

These regional policies, along with related sets of water resource goals, objectives and performance measures, were developed by a stakeholder group comprised of 14 agencies and organizations called the Regional Participants Committee (including EBMUD). The goals contained within the plan or relevant to the upper portion of the Mokelumne River Watershed (areas north of Camanche Reservoir), and therefore, are not applicable to MICUP's Place of Use; however, the four main

policies are relevant to MICUP as a whole throughout the entire project area as all surface waters are interconnected within the Mokelumne River and Calaveras Watersheds.[54]

San Joaquin County General Plan

The County's 2035 General Plan includes a comprehensive framework for the County's physical, economic, and social development and environmental resource preservation. The following goals and policies from the 2035 General Plan may be relevant to the proposed project (San Joaquin County 2016[55]).

NATURAL AND CULTURAL RESOURCES ELEMENT

- **Goal NCR-3**: To ensure the quality of water for municipal and industrial uses, agriculture, recreation, and fish and wildlife.
  - **NCR-3.4** Eliminate Pollution: The County shall support efforts to eliminate sources of pollution and clean up the County's waterways and groundwater. (PSP)
  - **NCR-3.8** Support Sufficient River Flows: The County support properly timed flows of sufficient quality in local waterways necessary to sustain healthy fisheries. (PSP)
  - **NCR-3.9** Require Water Projects to Mitigate Impacts: The County shall require water projects to incorporate safeguards for fish and wildlife and mitigate erosion and seepage to adjacent lands. (RDR)
  - **NCR-3.10** Coordination for Waterway Protection: The County shall coordinate with city, State, and Federal agencies to implement policies regarding protection and enhancement of waterways and levees. (IGC)

DELTA ELEMENT

- **Goal D-6**: To protect Delta water supplies for agricultural uses and ecosystem enhancement and improve overall Delta water quality.
  - **D-6.1** Delta Water Quality Improvement Projects: The County shall support projects that protect and improve the quality and quantity of water in the Delta region for local agricultural, municipal, and industrial uses and maintain appropriate outflow for a healthy estuary. (PSP)
  - **D-6.5** Water Storage Options: The County shall advocate for the study of above- and below-ground storage options as part of a statewide improved flood management and water supply system. (IGC/PSR)

City of Stockton General Plan

The City of Stockton 2024 General Plan is the City's primary planning tool to guide physical change within the city limit, and, in some cases beyond it in a Sphere of Influence where City services may someday be provided (areas currently governed by the County). The following goals and policies from the 2040 General Plan may be relevant to the proposed project.[56]

[54] Woodward Curran. 2018. Integrated Regional Water Management Plan Update. Available: https://www.umrwa.org/files/fc2c3c04c/MAC+Plan+Update_Combined.pdf. Accessed February 17, 2025.
[55] San Joaquin County. 2016. San Joaquin County General Plan Policy Document. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf. Accessed January 20, 2025.
[56] City of Stockton. 2018. Envision Stockton 2040 General Plan. Available: https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/Stockton_General_Plan_Adopted.pdf. Accessed January 20, 2025.

LAND USE ELEMENT

- **Goal LU-5** Protected Resources: Protect, maintain, and restore natural and cultural resources.
  - **Policy LU-5.2**: Protect natural resources areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other cultural/historic resources form encroachment or destruction by incompatible development.

City of Lodi General Plan

The City of Lodi 2010 General Plan is a planning document that outlines the City's vision for long-term physical and economic development and community enhancement, strategies and implementation actions to achieve the vision. The following policies from the 2010 General Plan may be relevant to the proposed project.

CONSERVATION ELEMENT

- **C-P26**: Monitor water quality regularly to ensure that safe drinking water standards are met and maintained in accordance with State and EPA regulations and take necessary measures to prevent contamination. Comply with the requirements of the Clean Water Act with the intent of minimizing the discharge of pollutants to surface waters.
- **C-P27**: Monitor the water quality of the Mokelumne River and Lodi Lake, in coordination with San Joaquin County, to determine when the coliform bacterial standard for contact recreation and the maximum concentration levels of priority pollutants, established by the California Department of Health Services, are exceeded. Monitor the presence of pollutants and variables that could cause harm to fish, wildlife, and plant species in the Mokelumne River and Lodi Lake. Post signs at areas used by water recreationists warning users of health risks whenever the coliform bacteria standard for contact recreation is exceeded. Require new industrial development to not adversely affect water quality in the Mokelumne River or in the area's groundwater basin. Control use of potential water contaminants through inventorying hazardous materials used in City and industrial operations.
- **C-P30**: Require, as part of watershed drainage plans, Best Management Practices, to reduce pollutants to the maximum extent practicable.
- **C-P33**: Require use of stormwater management techniques to improve water quality and reduce impact on municipal water treatment facilities.

San Joaquin County, Flood Control and Water Conservation District, Floodplain Management Program

San Joaquin County's Floodplain Management Program, administered though the Department of Public Works includes a community program of corrective and preventive measures for reducing flood damage to properties, intends to protect public health and safety, reduce flood damage to buildings and contents, prevents increases in flood damage from new construction, and reduces the risk of damage by erosion. Additionally, the program provides an opportunity for entities to purchase federal flood insurance through the NFIP (discussed above).[57]

[57] San Joaquin County. 2025. Floodplain Management. Available: https://www.sjwater.org/Flood-Management/Floodplain-Management. Accessed January 20 ,2205.

San Joaquin County Local Hazard Mitigation Plan

The San Joaquin County Local Hazard Mitigation Plan (HMP) provides strategies for the County and other local jurisdictions to identify and implement mitigation actions for reducing damages from various natural and technological disasters. The Local HMP develops an ongoing process for mitigating damage before and after a disaster. Revisions of the General Plan(s) of the County will include specific suggestions and planning guidance for hazard mitigation goals, objectives, actions, and implementation strategies (refer to Section 4.8, *Hazards and Hazardous Materials*, for more detailed information).[58]

4.9.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2024 *CEQA Guidelines* Appendix G significance criteria questions related to surface water hydrology water quality.

Would the proposed project:

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality?

b) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:

   i. result in a substantial erosion or siltation on- or off-site?

   ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite?

   iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?

   iv. impede or redirect flood flows?

c) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation?

d) Conflict with or obstruct implementation of a water quality control plan?

Approach to Analysis

This analysis addresses the potential impacts related to surface water hydrology and water quality that could result from construction and operation and maintenance activities associated with MICUP project components within the project area. The analysis is based on a review of the following information: the description of the proposed project provided in Chapter 3, *Project Description*; a review of available literature (surface water hydrology and quality reports and maps); and review of the existing conditions of the project area, as described above in Section 4.9.2, *Environmental Setting*.

[58] San Joaquin County. 2023. San Joaquin County Local Hazard Mitigation Plan. Available: https://www.sjgov.org/docs/default-source/office-of-emergency-services-documents/lhmp/documents/2022-lhmp-10.18.22-version.pdf?sfvrsn=b7a69798_5. Accessed January 20, 2025.

MICUP would be regulated by the various laws, regulations, and policies summarized above in Section 4.9.2, *Regulatory Framework*. Compliance by MICUP with applicable federal, state, and local laws and regulations is assumed in this analysis and local and state agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with some regulations is a condition of permit and project approval.

After considering the implementation of MICUP described in Chapter 3, *Project Description*, and compliance with the required regulatory requirements, the environmental analysis below identifies if the defined significance thresholds are exceeded, and therefore, a significant impact would occur. For those impacts considered to be significant, mitigation measures are proposed to the extent feasible to reduce the identified impacts.

Construction

Construction activities include ground disturbance, in-water work, surface water dewatering in the areas of the Mokelumne and Calaveras Rivers and groundwater dewatering throughout the project area in areas with a shallower aquifer, dewatering discharges, and use of chemicals onsite, along with potential changes in project site conditions and surface water hydrology due to these activities.

Operation and Maintenance

Operational activities include direct diversion of water from the Mokelumne River under A029835, rediversion from storage in Camanche Reservoir, and operation of project components including recharge using surface water via the proposed recharge methods (in-lieu recharge, direct surface recharge, aquifer storage and recovery [ASR] wells, and Flood-MAR) within each of the three MICUP agency jurisdictions. Existing water right holders for Mokelumne River water include NSJWCD, Amador County, Calaveras County, EBMUD, WID, and riparian and pre-1914 appropriative rights along the river. The proposed MICUP diversions would be junior to all existing water rights on the Mokelumne River. MICUP would not change existing beneficial uses of water within the Place of Use. Instead, MICUP would provide additional recharge to the ESJGSB to increase groundwater levels and storage to support existing beneficial uses within the Place of Use that are supplied by groundwater, primarily consisting of agricultural irrigation.

To evaluate operational water quality impacts from MICUP diversions, modeling was conducted to identify and evaluate changes in flow in the lower Mokelumne River, resulting changes in Mokelumne River outflow to the Delta, and potential changes in Delta salinity. This modeling is discussed further below in the Lower Mokelumne River Flow Modeling and Delta Salinity Modeling sections. Modeling conducted to support the operational analysis for MICUP does not directly consider implementation of SWRCB's Standard Term 91; however, the modeling assumptions regarding when MICUP water would be directly diverted were compared to the last twenty years of data regarding when Term 91 was in effect and the comparison revealed that MICUP was not assumed to operate in any months that Term 91 was in effect. This is consistent with the assumption that Term 91 will be included in, and operate as a limit on MICUP direct diversions under, any permit issued on A029835.

Maintenance activities evaluated for impacts to surface water hydrology and quality include management of the proposed pumps/pump stations, pipelines, ASR and dry wells, Flood-MAR, and recharge basins.

FLOW MODELING METHODOLOGY

The methodology used to estimate flows in the Lower Mokelumne River is provided in Appendix I-3 and summarized in this section. Hydrologic conditions in the Mokelumne River system are simulated using the Mokelumne-Calaveras Rivers Simulation Model (MOCASIM), which represents streamflows, reservoir operations, diversions, and regulatory requirements based on historical hydrology and system operations. The model incorporates key system components including Pardee Reservoir, Camanche Reservoir, the Mokelumne Aqueduct, and major diversion points throughout the watershed. Output from MOCASIM is processed using the Water Availability Analysis Tool (WAAT), which accounts for water rights, operational constraints, and diversion limitations to estimate Water Available for Diversion (WAD) for MICUP. This process results in a monthly timeseries of WAD representing available supply under modeled hydrologic conditions.

MOCASIM is a basin-specific hydrologic and operations model developed to simulate the complex flow system of the Mokelumne and Calaveras rivers. The model represents both unimpaired and regulated stream flows by incorporating historical hydrology, stream gage records, reservoir storage and release patterns, major diversions, and senior water rights.

These generally include:

- **Upstream Diversions (Amador and Calaveras Counties):** Portions of the Mokelumne flow are diverted upstream before reaching Pardee Reservoir, reducing inflows to the lower system.
- **Pardee Reservoir and Mokelumne Aqueduct:** Pardee stores inflows and conveys water through the Mokelumne Aqueducts. These facilities support EBMUD demands and provide a source of supply for MICUP diversions.
- **Camanche Reservoir Releases:** Downstream of Pardee, Camanche Reservoir regulates flood control, instream flow requirements, and operational diversions. These releases sustain flows in the Lower Mokelumne which support riparian diversions, fish flows, groundwater recharge, and other beneficial uses, and provide water that can be allocated to MICUP diversions.
- **Mokelumne Outflows:** After passing through the Lower Mokelumne system, Mokelumne outflows continue into the Delta system.

In addition to water supply operations, MOCASIM accounts for environmental requirements and regulatory obligations, including instream fish flow requirements (fish flows) under the JSA and draft HRL Program (previously called Voluntary Agreement or VA) under development for the Mokelumne River. This ensures that simulated flows reflect both physical hydrology and management commitments relevant to the Mokelumne River system. By integrating system-specific operations with observed and historical hydrology, MOCASIM produces a reliable timeseries of flows and reservoir conditions that form the hydrologic foundation for subsequent allocation and availability analyses carried out through the WAAT.

Flow changes in the lower Mokelumne River were evaluated at three locations:

1) **Releases from Camanche Dam.** Flows released from Camanche Dam into the lower Mokelumne River. This is the upstream compliance point for minimum flow requirements.
2) **Flows below WDD.** Flows after diversions from the WDD and other points upstream to Camanche Dam. This is the downstream compliance point for minimum flow requirements.

3) **Lower Mokelumne River Outflow to the Delta.** Flows downstream of the I-5 crossing that reach the Delta. These flows are from the Mokelumne River only before addition of flows from the Consumnes River or other streams.

Flow levels are different at these three locations due to MICUP diversions from the lower Mokelumne River below Camanche, channel losses, and diversions by other existing water rights.

Water Diversions and Demand

The flow modeling incorporates all senior water right holders in the Mokelumne River system including diverters upstream of Pardee Reservoir (Calaveras and Amador counties), EBMUD at Pardee and Camanche reservoirs, and diverters downstream of Camanche Dam to I-5 (WID, NSJWCD, City of Lodi, riparian water diverters, etc.). This analysis considers diversion of water consistent with existing (2025) water demands for each senior water right holder. To account for WID's pre-1914 water rights for direct diversions at the Woodbridge Diversion Dam (WDD), the modeling assumed WID diversions in excess of its Regulated Base Supply consistent with WID's 2017 operations, which reflect WID's largest diversions in recent years. Refer to Appendix I-3 for assumptions, including 2025 level of demand, used in the flow modeling.

Minimum Flow Requirements

MOCASIM accounts for environmental requirements and regulatory obligations, including instream fish flow requirements under the JSA and draft HRL Program (previously called Voluntary Agreement or VA) under development for the Mokelumne River. This ensures that simulated flows reflect both physical hydrology and management commitments relevant to the Mokelumne River system. Consistent with EBMUD's regulatory obligations and operations, MOCASIM allocates water releases to satisfy flow requirements at two designated compliance points: 1) release of water from Camanche Dam and 2) flows below WDD. HRL flows are added to JSA flow requirements below WDD. Refer to Appendix I-3 for the JSA and HRL flow rates used.

MICUP Scenario

The MICUP Scenario reflects the Baseline Condition flows as modified by the additional diversions for MICUP. The MICUP Scenario considers direct diversion of up to 110,000 AFY between December 1st and June 30th and rediversion from storage in Camanche Reservoir of up to 48,000 AFY between July 1st and October 31st.

Following determination of WAD, available water is distributed across the 17 MICUP project components using the Project Component Distribution Tool. The tool applies capacity-based allocation assumptions, diversion window constraints, and system-specific prioritization rules to distribute WAD between project components receiving water from the Mokelumne River and those receiving water through the Mokelumne Aqueduct. The distribution approach maintains separation between diversion sources and applies monthly capacity-based ratios to allocate water proportionally across available project components. The resulting output is a project component–level timeseries of water deliveries that reflects planning-level operational assumptions. Refer to Appendix I-3 for more information on how MICUP diversions were allocated.

For the City of Stockton, MICUP water was diverted from the lower Mokelumne River at WDD and not City's POD in the Delta. This approach provides a maximum estimate of flow reductions from the City's diversions under MICUP because additional water would remain in the river if the City used its existing POD in the Delta.

Annual diversions of water modeled for MICUP are shown in Figure 4.9-3. Annual diversions are equivalent to diversions made from December through October with December being the prior year. For example, 1969 diversions are the total of diversions from December 1968 to November 1969.

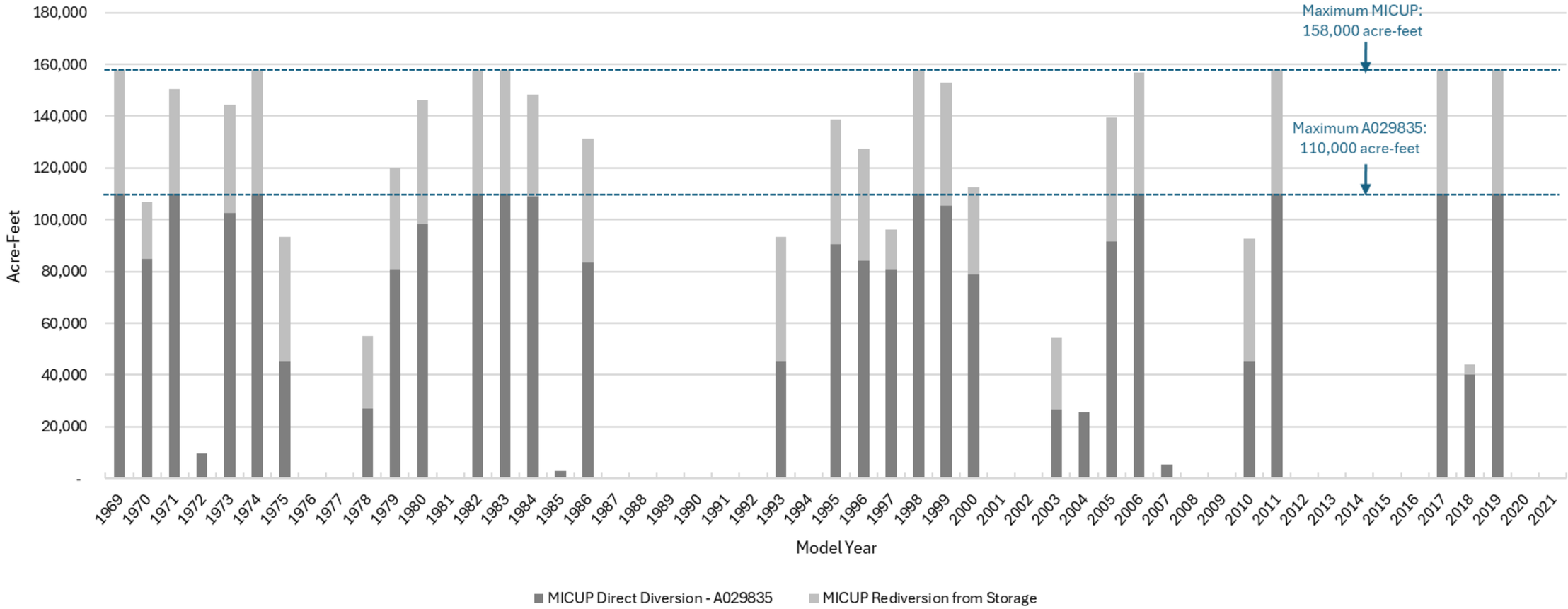
Seepage/Channel Losses

Under the Baseline Condition, the lower Mokelumne River functions as a losing reach, contributing flow to the groundwater system and reducing surface flow in the stream. MOCASIM estimates channel losses depending on the total annual release from Camanche Dam. Refer to Appendix I-3 for more details on how channel losses were allocated. EBMUD, under existing agreements with other water users on the river, is obligated to release sufficient water to ensure that entitlements are delivered to the users at their points of diversion. Channel losses deplete the amount of water in the river, thus requiring EBMUD to increase the releases from Camanche Dam to compensate for the losses.

Under the MICUP Scenario, elevated groundwater levels would diminish these losses by reducing the driving head difference between the stream and aquifer. Groundwater modelling indicates that implementation of MICUP results in increased groundwater elevations adjacent to affected stream reaches. The higher groundwater levels reduce the hydraulic gradient between the stream stage and the adjacent aquifer. Because stream-to-aquifer seepage is driven by this hydraulic gradient (i.e., the difference between stream stage and groundwater elevation), a reduction in gradient results in decreased stream seepage losses from the streams relative to baseline conditions. A decrease in stream seepage means that more surface water is remaining in the stream with MICUP compared to baseline conditions. Additional discussion of the effects of MICUP on reductions in seepage is provided in Section 4.10, *Hydrology and Water Quality: Groundwater* and Appendix I-1. Refer to Appendix I-3 for additional details on flow increases from reduced seepage under MICUP that were used in flow modeling.

Under the MICUP Scenario, Mokelumne River outflow to the Delta was first estimated in MOCASIM using the same approach as the Baseline Condition, meaning that channel losses were not adjusted in the WAAT for the reduced total annual release from Camanche Dam when MICUP diversions occur. This approach provides a conservative, high end estimate of channel losses (and resulting flow reductions) at WDD and for Mokelumne River outflow to the Delta under MICUP. Mokelumne River outflow to the Delta was then adjusted to account for increases in flow from reductions in seepage estimated for the Mokelumne River from MICUP. The modeling assumes that reduce seepage begins the first month of the modeling period in 1969. It was not possible to adjust flows for increases from reduced seepage at WDD because flow increases from seepage reductions were estimated on a reach basis. Therefore, flow levels estimated at WDD for MICUP are lower than would be expected.

Figure 4.9-3 Annual MICUP Diversions Through the 53-Year Modeling Period (acre-feet)



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FLOW MODELING RESULTS

Annual and monthly flow volumes are provided in Appendix I-3 and summarized in this section. Flow changes in the lower Mokelumne River were evaluated at the three locations discussed above. Flow levels are different at these three locations due to MICUP diversions from the lower Mokelumne River after release from Camanche, diversions by other senior water rights, and channel losses due to seepage. Both annual and monthly flow results are evaluated below.

Annual Results

A comparison of annual flows for releases from Camanche Dam and lower Mokelumne River outflow to the Delta under Baseline Conditions and MICUP is provided in Figure 4.9-4a and for flows below WDD is provided in Figure 4.9-4b. These figures also include annual MICUP diversions for comparison with annual flow levels. Water was diverted under MICUP resulting in reduced lower Mokelumne River flows in 31 years (58 percent) of the 53-year modeling period.

In the remaining, drier 22 years (42 percent) of the modeling period water was not available to be diverted for MICUP; however, lower Mokelumne River outflow to the Delta increased under MICUP compared to Baseline Conditions. This beneficial effect is attributed to increased flows due to reduced seepage in the lower Mokelumne River channel that occurs because of groundwater recharge under MICUP. For example, MICUP operated in 1969-71, but not in 1972; and the modeling showed an increase of 6,487 acre-feet in lower Mokelumne River flows in 1972 due to the reduced seepage in the river channel attributed to groundwater level improvement from MICUP operations in the prior three years. Increases in outflow to the Delta in the remaining 21 years when water was not diverted under MICUP were larger, ranging from a low of 13 percent in 2009 and 2021 to a high of 36 percent in 1992. The largest annual increase in volume of flow was 16,684 acre-feet in 2001. The cumulative increases in outflow to the Delta during prolonged dry periods are also notable, with an increase of 72,079 acre-feet in the six years from 1987 to 1992, 44,942 acre-feet in the three years from 2007-2009, and 50,974 acre-feet from 2012-2015.

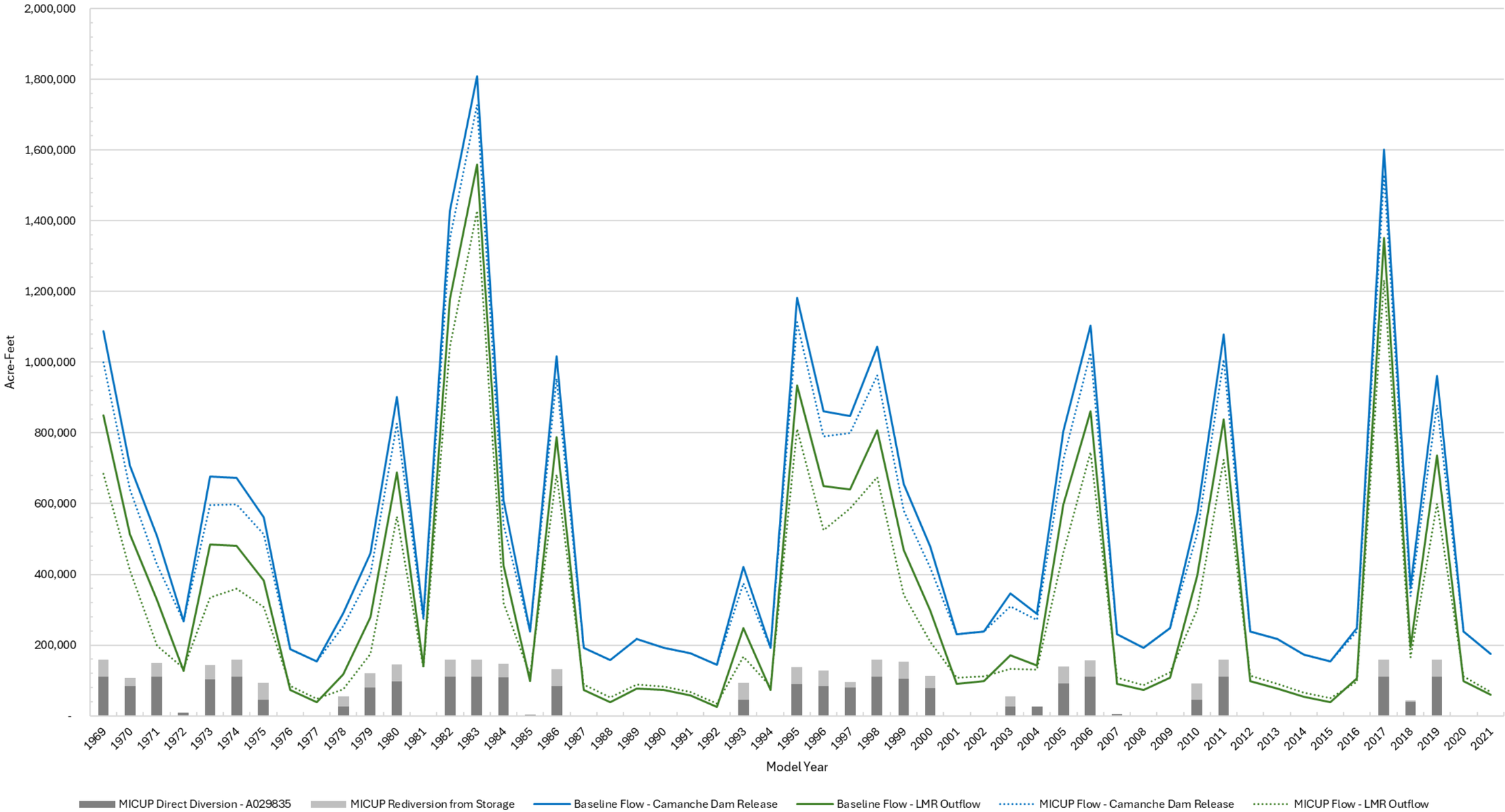
Monthly Results

As expected, minimum flow requirements are maintained during all months under MICUP. MICUP diverted the full amount of water possible under MICUP in 10 years of the modeling, representing the wettest years including 1969 and 2019. A comparison of monthly flows for 1969 is provided in Figure 4.9-5 and for 2019 is provided in Figure 4.9-6. It is useful to look at monthly flow changes during these years because they show effects of the maximum diversion of water. Based on the flow modeling conducted, 1978 was the largest proportional reduction from MICUP for releases from Camanche Dam and flow below WDD and second largest (by 1 percent) for lower Mokelumne River outflow to the Delta. A comparison of monthly flows for 1978 is provided in Figure 4.9-7.

Flow modeling assumes MICUP uses the maximum amount of water available each month. As discussed, WAD by MICUP is based on several factors including 2025 levels of water demand. As EBMUD and senior water right holder demands increase in the future, MICUP would use less water if the full amount is not available after EBMUD and senior water right holders demands are satisfied. As a result, in months with large proportional flow reductions where MICUP does not use the maximum amount of water, like in 1978, estimated flow reductions would not change in the future as water demands increase. This occurs because an increased amount of water would be diverted by EBMUD and senior water right holders and MICUP would be limited to any remaining available water.

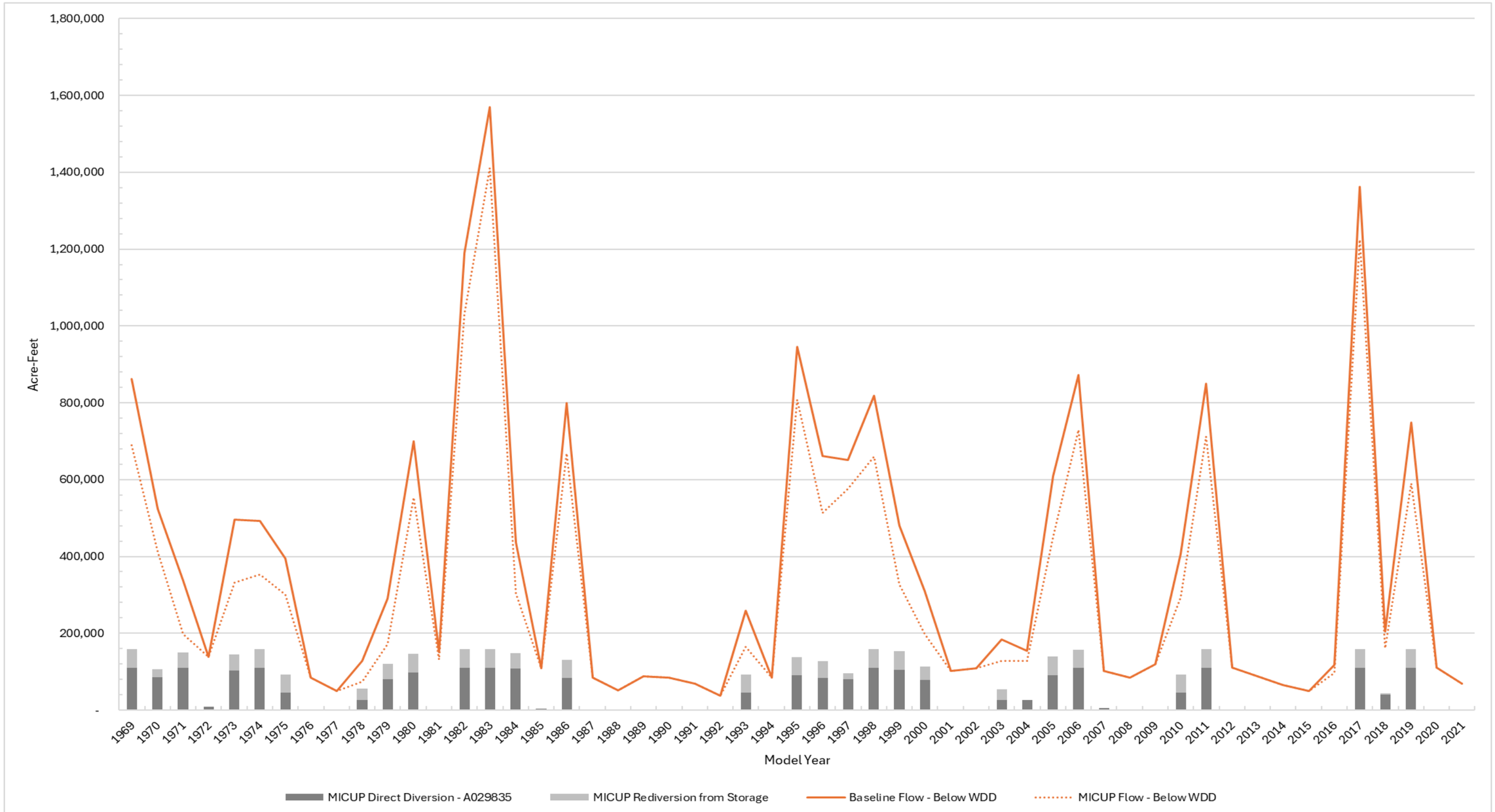
The benefit of increasing flows due to reduced seepage from MICUP occurs to some degree in all months of the 53-year modeling period after groundwater recharge begins. While reduced seepage provides the benefit of increased flow in all months once MICUP begins, these benefits are most notable in months when MICUP does not divert water because flows are increased compared to Baseline Conditions. In months when there was no water for MICUP, outflow to the Delta increased by an average of 1,104 acre-feet per month and up to 2,153 acre-feet in June 1983. An example of this flow increase occurs is 2020, a recent dry year. A comparison of monthly flows for 2020 is provided in Figure 4.9-8. Under the Baseline Condition, modeling shows that the lower Mokelumne River provides no outflow to the Delta in some dry months, which occurs due to seepage over the 12 miles of river downstream from WDD to this modeling point. However, under MICUP, there is always some level of measurable outflow to the Delta due to the benefits of reduced river seepage attributable to the higher groundwater levels from prior year MICUP operations.

Figure 4.9-4a MICUP Annual Flow Changes Throughout The 53-Year Modeling Period - Releases from Camanche Dam and Lower Mokelumne River Outflow to Delta



Notes: LRM = Lower Mokelumne River
MICUP - LMR Outflow to Delta includes increased flows due to seepage reductions under MICUP.

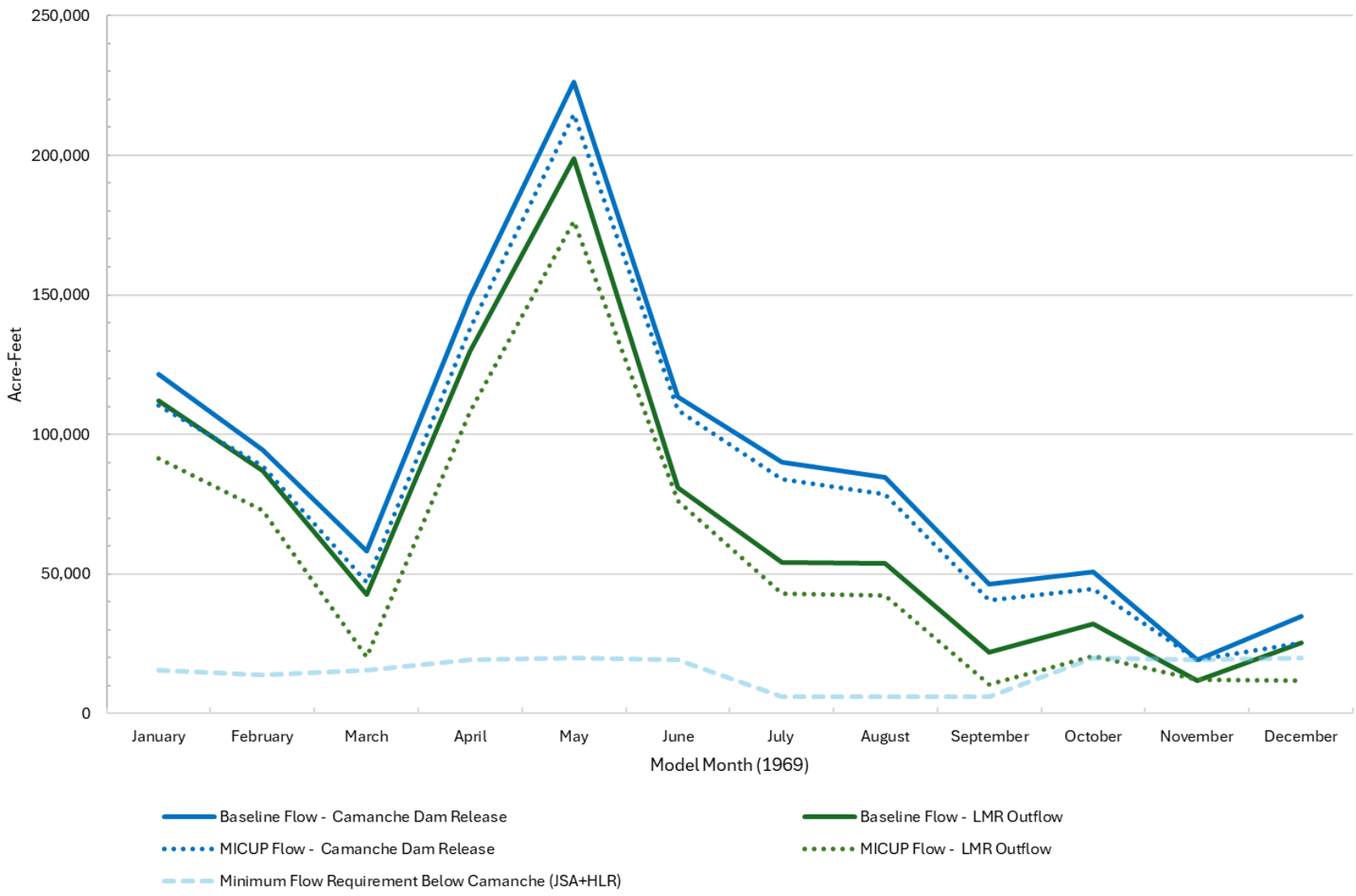
Figure 4.9-4b MICUP Annual Flow Changes Throughout the 53-Year Modeling Period – Flows Below WDD



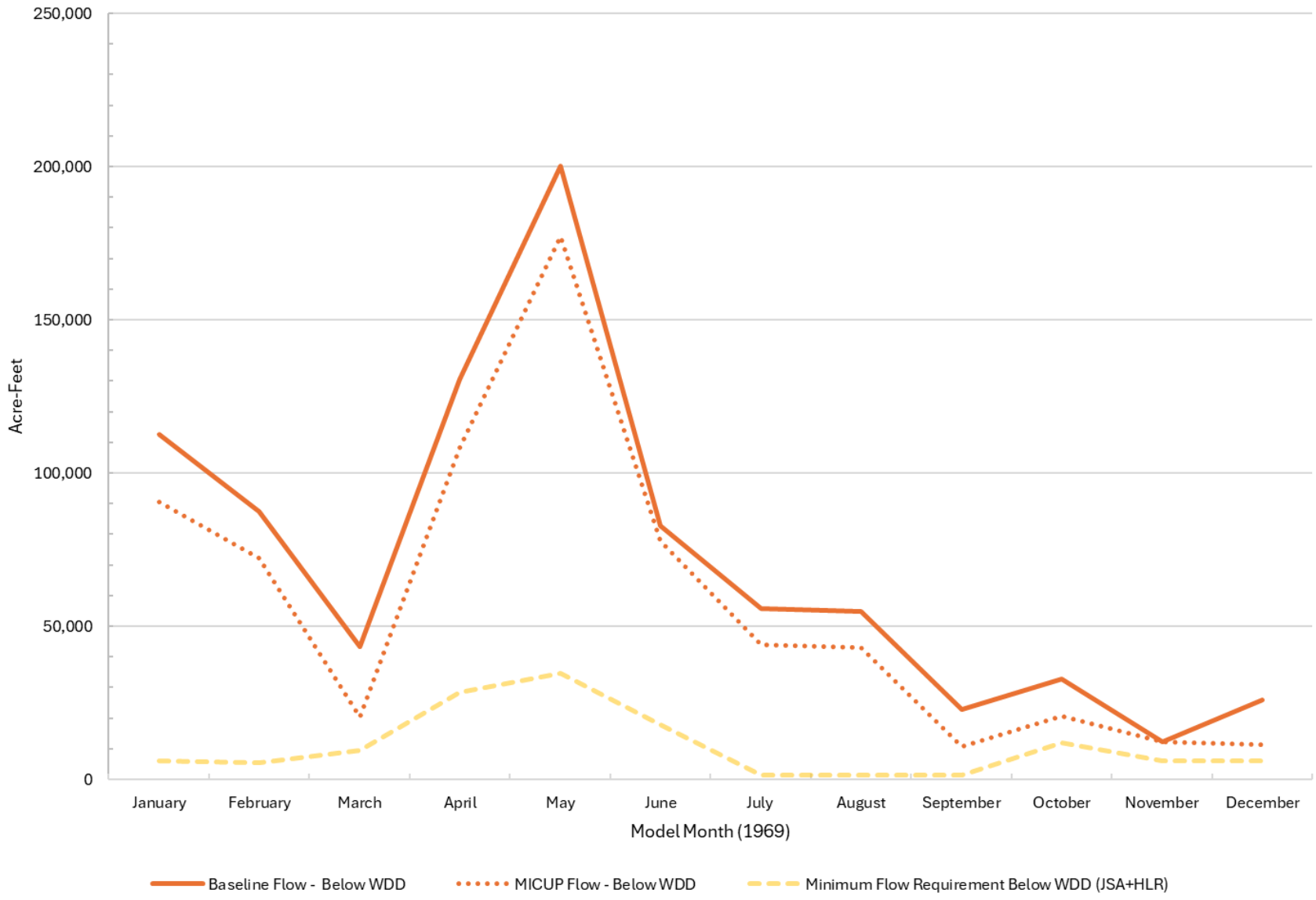
Notes: WDD = Woodbridge Diversion Dam
MICUP – Flow Below WDD does not account for increased flows due to seepage reductions under MICUP between Camanche Dam and WDD.

Figure 4.9-5 Monthly Flow Changes for Maximum MICUP Water Use (1969)

Releases from Camanche Dam and Lower Mokelumne River Outflow



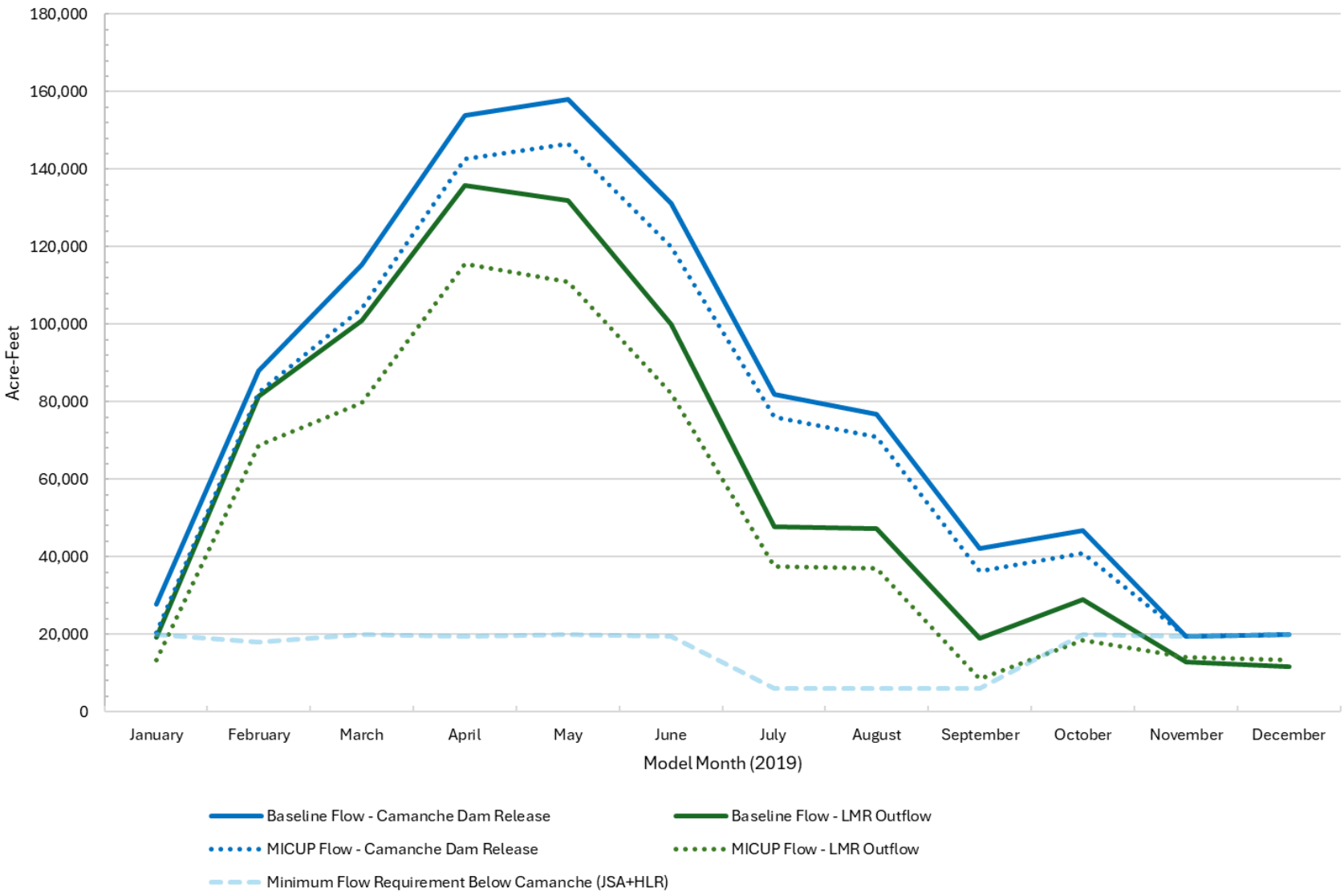
Flows Below WDD



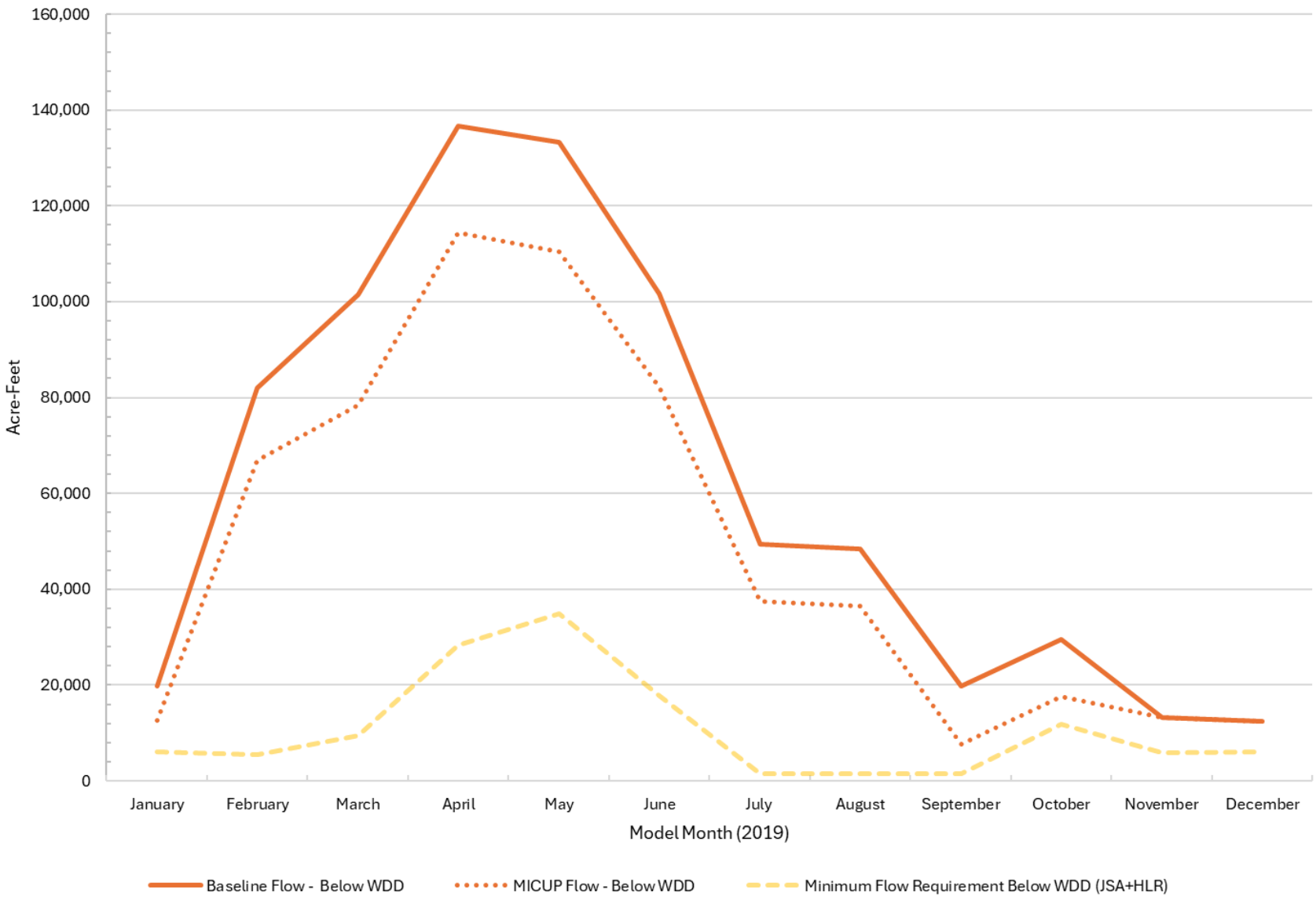
Notes: MICUP – Flow Below WDD does not account for increased flows due to seepage reductions under MICUP between Camanche Dam and WDD.

Figure 4.9-6 Monthly Flow Changes for Maximum MICUP Water Use (2019)

Releases from Camanche Dam and Lower Mokelumne River Outflow



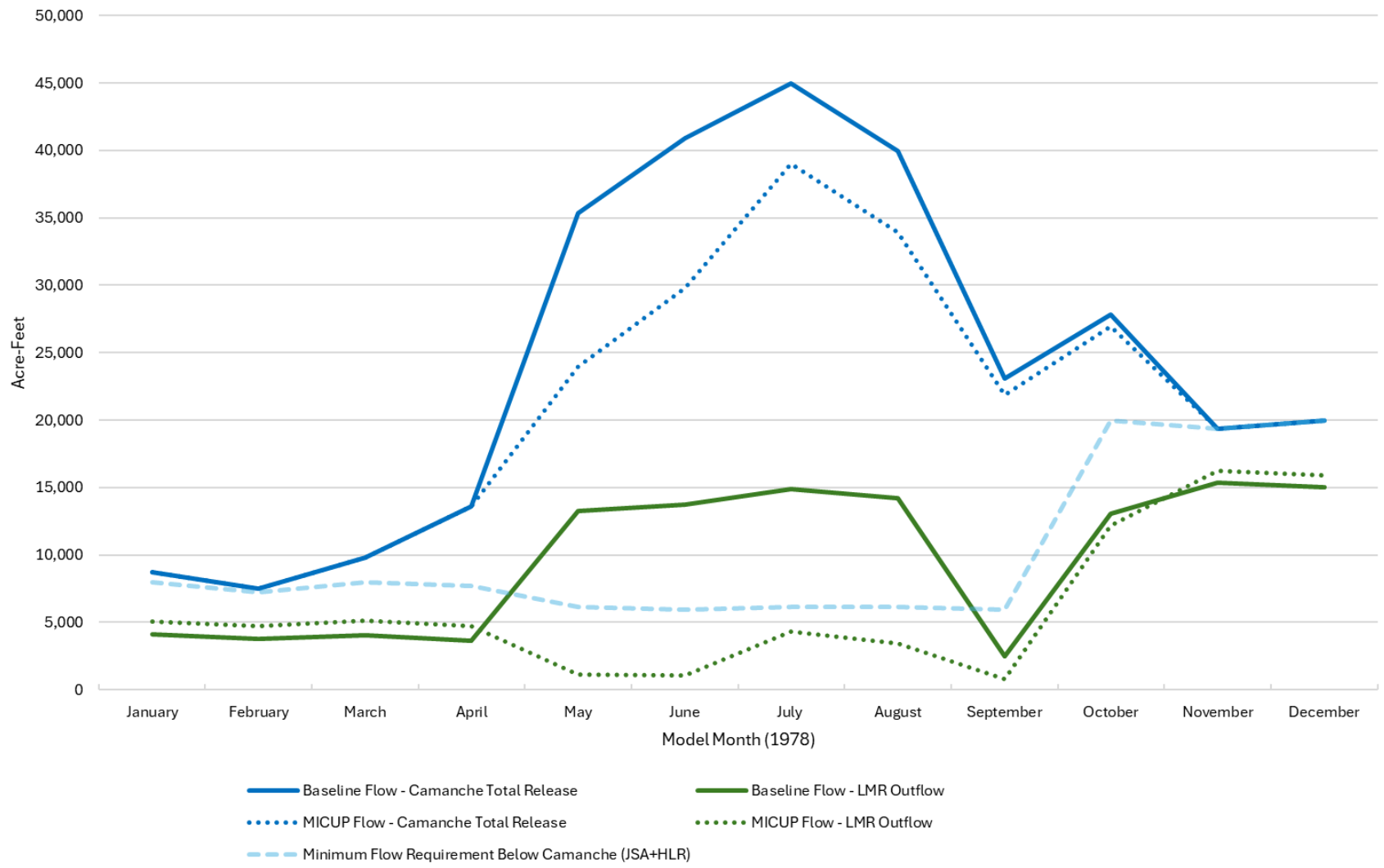
Flows Below WDD



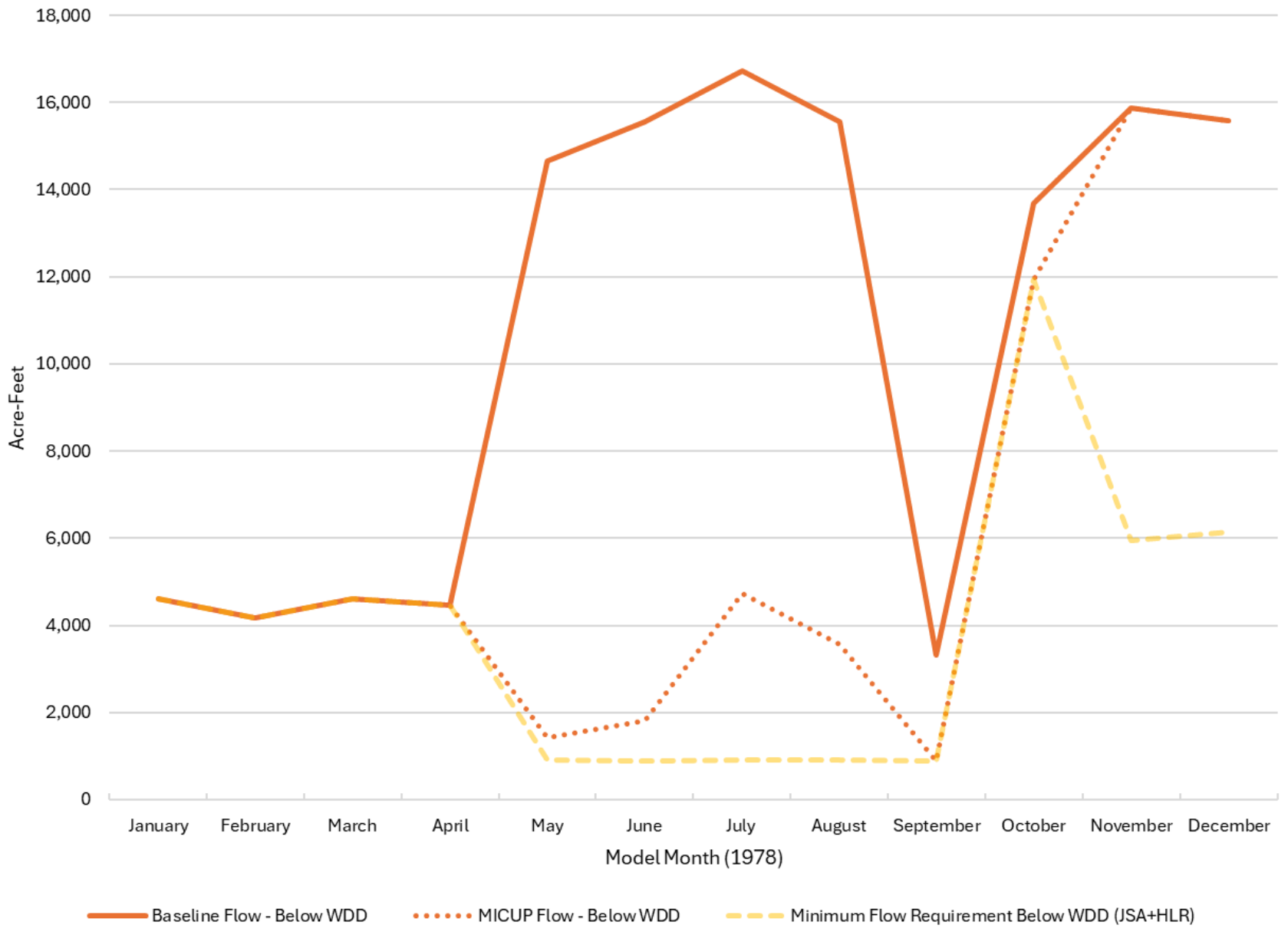
Notes: MICUP – Flow Below WDD does not account for increased flows due to seepage reductions under MICUP between Camanche Dam and WDD.

Figure 4.9-7 Largest Proportional Monthly Flow Reductions Estimated for MICUP (1978)

Releases from Camanche Dam and Lower Mokelumne River Outflow



Flows Below WDD

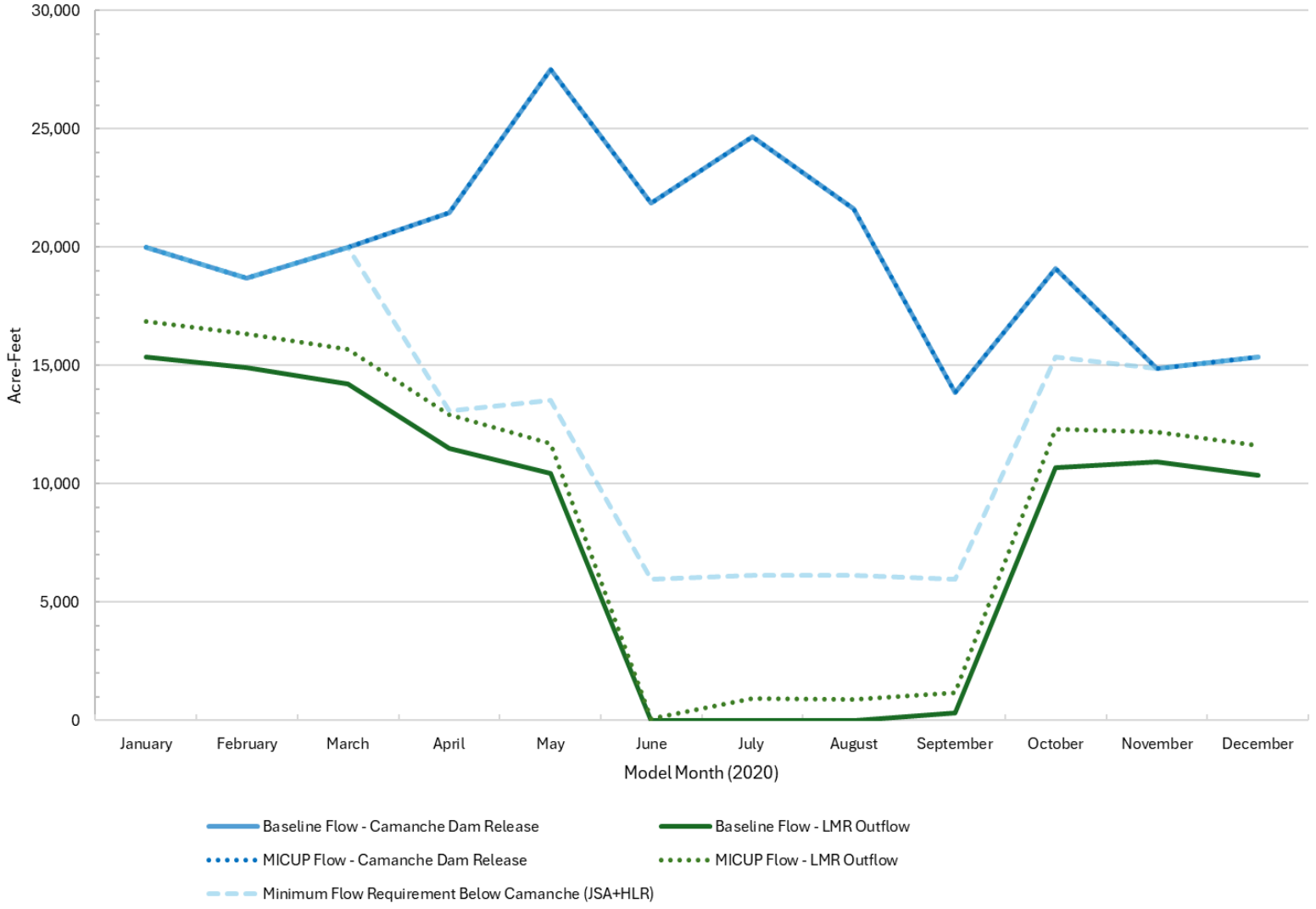


Notes: MICUP – Flow Below WDD does not account for increased flows due to seepage reductions under MICUP between Camanche Dam and WDD.

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Figure 4.9-8 Monthly Flow Changes for During Dry Year With No MICUP Water Use (2020)

Releases from Camanche Dam and Lower Mokelumne River Outflow



Delta Water Quality Modeling

DELTA MODELING METHODOLOGY

The model methodology used to estimate Delta water quality is discussed in detail in Appendix I-2 and summarized in this section. Appendix I also provides a discussion of model limitations. The Delta Simulation Model 2 (DSM2) was applied to the Baseline Condition and MICUP flow scenarios over a 53-year modeling period to assess potential impacts on Delta water quality. DSM2 is a one-dimensional mathematical model for dynamic simulation of tidal hydraulics, water quality, and particle tracking in a network of riverine or estuarine channels. DWR has developed a Delta version of the DSM2 model, that they and other agencies have applied for Delta hydrodynamic and water quality studies for over 20 years.

The Delta modeling conducted for this analysis estimates water quality for two scenarios:

- **Baseline Condition** – Existing modeled Delta water quality, as discussed below.
- **MICUP** – Changes to Baseline Condition Delta water quality after diversion of water for MICUP, including direct diversions from December 1st to June 30th under A029835 and rediversion from storage in Camanche Reservoir between July 1st to October 31, and MICUP project operations with diverted water.

To perform the analysis, the DSM2 Delta Model requires a time series of Delta inflows, flow diversions, gate operations and salinity boundary conditions. The Baseline Condition Delta boundary conditions were provided by the CalSim 3 model output from the 2023 State Water Project Delivery Capability Report[59]. The MICUP scenario Delta boundary conditions were provided by the same CalSim 3 output, with adjustments to reflect changes in lower Mokelumne River outflow to the Delta under MICUP, as discussed further below.

CalSim 3 is the modeling platform used to simulate California water operations for water resources planning. The CalSim 3 water operations model and the DSM2 Delta hydrodynamic and water quality model are commonly linked to perform planning studies to support the EIR/EIS related to the State Water Project and the Central Valley Project. Examples include the EIS for the Long-term operations of the federal Central Valley Project and State Water Project[60], and the EIR for the proposed Delta Conveyance Project[61].

For the MICUP scenario, the DSM2 Delta inflows, exports, EC boundary conditions, and gate operations were principally set by the CalSim 3 Delivery Capability Report (DCR) 2023 outputs. For the MICUP scenario, Mokelumne River, Calaveras River and San Joaquin River flows were modified (1) to reflect increases in flows entering the Delta due to reductions in stream seepage associated with the higher groundwater elevations resulting from MICUP operations in the Eastern San Joaquin Subbasin, and (2) reductions in Mokelumne River flows due to MICUP diversions. In summary, out of the 636-month analysis period, the MICUP scenario included reductions in Mokelumne River outflows to the Delta during 243 months and increases during 390 months; Calaveras River outflows

[59] DWR. 2024. State Water Project Delivery Capability Report 2023. State of California, Natural Resources Agency, Department of Water Resources. July 2024. https://data.cnra.ca.gov/dataset/a3bb1ddd-624b-4c3d-95e7-2aa6b3bf2b5b/resource/92356681-957a-48ee-97c4-529d25b9dbb2/download/final_dcr2023_v2.pdf
[60] Reclamation. 2023. Long-Term Operation of the Central Valley Project and State Water Project Draft EIS, Appendix F – Modeling. November 2023. https://deltacouncil.ca.gov/pdf/science-program/review-documents/2023-12-27-appendix-f-modeling.pdf
[61] DWR. 2023a. Delta Conveyance Project, Final EIR. Appendix 5A, Section C Modeling Technical Appendix – One-Dimensional Delta Hydrodynamics and Water Quality Modeling Results. December 2023. https://cadwr.box.com/s/wteau2t7c1zb9cvq96tscio6l1fcup6r

to the Delta increased during 597 months and decreased during 36 months; and San Joaquin River flows increased during 607 months and decreased during 26 months.

For the MICUP flow scenario, Calsim 3 boundary condition flows were adjusted to reflect MICUP operations. Mokelumne River flows were adjusted to reflect the net effects of MICUP, including diversions that reduce outflows to the Delta and increased flows resulting from higher groundwater levels in the Eastern San Joaquin Groundwater Subbasin due to groundwater recharge, which reduces stream losses in the Mokelumne River. The magnitude of changes in lower Mokelumne River outflow to the Delta was estimated using MOCASIM and WAAT, as discussed in the *Lower Mokelumne River Flow Modeling* section above. Calsim 3 boundary condition flows for the Calaveras and San Joaquin River were also adjusted to reflect increased flows that occur from MICUP groundwater recharge reducing stream losses in those streams.

The salinity transport component of the DSM2 model (measured as EC) is used to evaluate the potential salinity changes at select D-1641 compliance locations and water intake locations, as shown in Figure 4.9-4a and Figure 4.9-4b and listed in Table 4.9-6. Chloride changes were also analyzed at water intakes. These locations were selected to provide coverage to assess the potential for the project to affect salinity intrusion in the Delta and assess if the project has the potential to result in non-compliance with the D-1641 Municipal, Agriculture and Fish and Wildlife water quality objectives. The stations selections additionally evaluate the project impacts on water quality for Delta export locations. For our other project studies (e.g., Lookout Slough), additional D-1641 stations were included at the north Delta intakes, the North Bay Aqueduct in Barker Slough (SLBAR3), and the City of Vallejo Intake in upper Cache Slough (C19); however, the DSM2 model results showed no change at these locations for MICUP and they are not discussed further. The salinity model also evaluated X2, which is discussed in Section 4.4, *Biological Resources*.

Results for Sacramento River at Emmaton (D22), San Joaquin River at Jersey Point (D15), and San Joquin River at Prisoners Point (D29) were analyzed related to D-1641 water quality objectives for agriculture, and fish and wildlife (Table 4.9-7). Compliance at Sacramento River at Emmaton (D22), San Joaquin River at Jersey Point (D15), and San Joquin River at Prisoners Point (D29) is determined from the 14-day running average of mean daily EC. The compliance period begins on April 1 and ends August 15 for the Emmaton and Jersey Point stations and ends May 31 for the Prisoners Point station. Results at the water intakes were evaluated relative to the D-1641 chloride objectives (Table 4.9-8).

Figure 4.9-9 D-1641 Compliance Locations and Water Intakes Used to Evalute Salinity Changes in the Delta

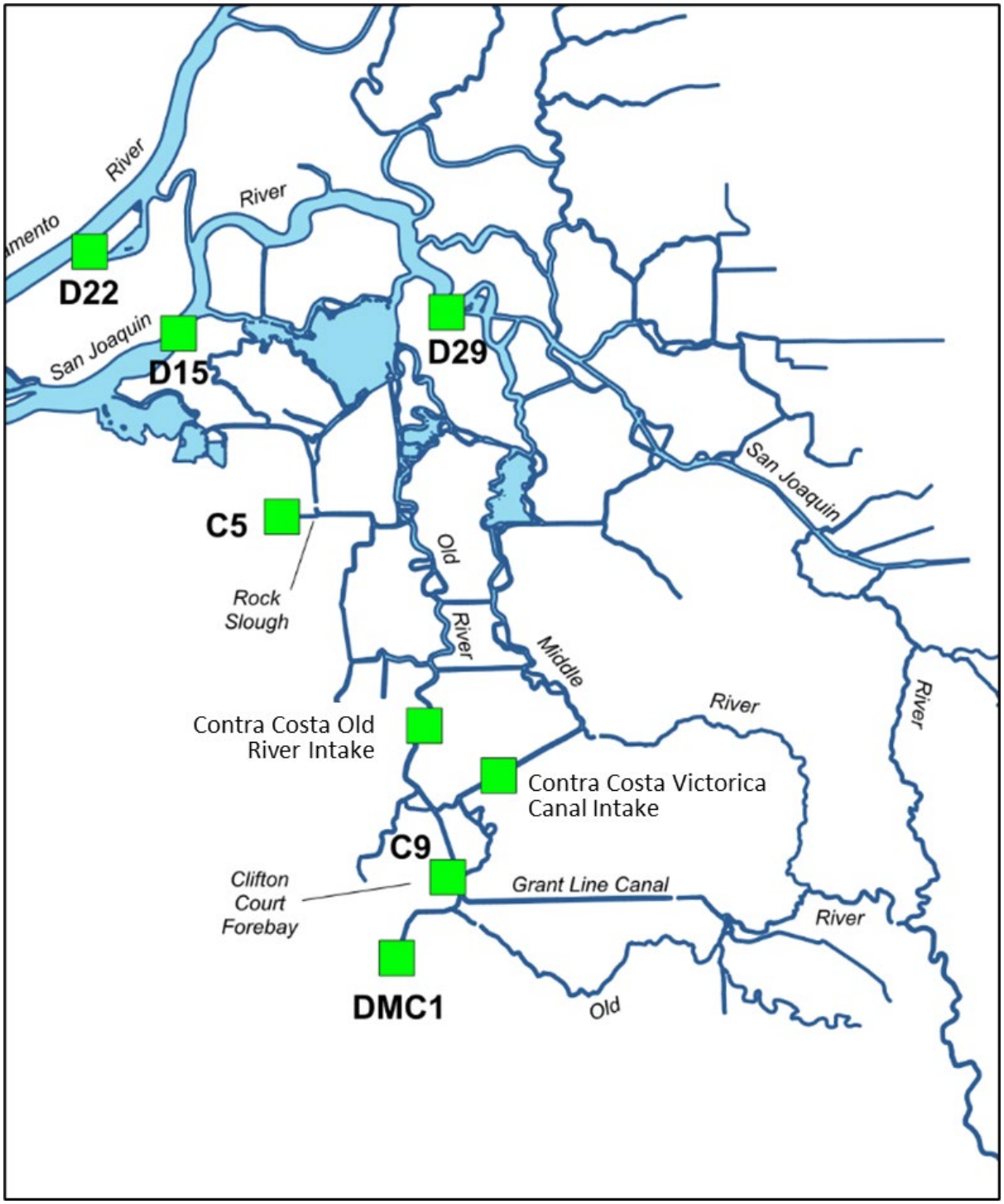


Table 4.9-6 D-1641 Compliance Locations and Water Intakes Used to Evaluate Salinity Changes in the Delta

D-1641 Station ID	Location
D22	Sacramento River at Emmaton
D15	San Joaquin River at Jersey Point
D29	San Joaquin River at Prisoner Point
C9	Clifton Court Forebay Intake
DMC1	Delta-Mendota Canal at Tracy Pumping Plant
C5	Contra Costa Rock Slough Intake
	Contra Costa Water District Old River Intake
	Contra Costa Water District Victoria Canal Intake

Table 4.9-7 D-1641 Station Salinity Water Quality Objectives for Fish and Wildlife and Agriculture

Station	Water Year Type[62]	Number of Days Standards Apply	Fish and Wildlife		Agriculture			
			Value[63]	Time Period	Value[63]	Time Period	Value[63]	Time Period
D22 – Sacramento at Emmaton	Wet	167	Not applicable		0.45	Apr 1 – Aug 15	Not applicable	
	Above Normal	167			0.45	Apr 1 – Jun 30	0.63	Jul 1 – Aug 15
	Below Normal	167			0.45	Apr 1 – Jun 19	1.14	Jun 20 – Aug 15
	Dry	167			0.45	Apr 1 – Jun 14	1.67	Jun 15 – Aug 15
	Critical	167			2.78	Apr 1 – Aug 15	Not applicable	
D15 – San Joaquin at Jersey Point	Wet	167	0.44	Apr 1 – May 31	0.45	Apr 1 – Aug 15	Not applicable	
	Above Normal	167	0.44	Apr 1 – May 31	0.45	Apr 1 – Aug 15	Not applicable	
	Below Normal	167	0.44	Apr 1 – May 31	0.45	Apr 1 – Jun 19	0.74	Jun 20 – Aug 15
	Dry	167	0.44	Apr 1 – May 31	0.45	Apr 1 – Jun 14	1.35	Jun 15 – Aug 15
	Critical	167	Not applicable		2.2	Apr 1 – Aug 15		
D29 – San Joaquin at Prisoners Point	Wet, Above Normal, Below Normal, Dry	61	0.44	Apr 1 – May 31	Not applicable			

Note: Standards are presented in mmho/cm (1 mmho/cm = 1000 µS/cm).

[62] Sacramento Valley Water Year Hydrologic Classification
[63] Maximum 14-day running average of mean daily EC (mmho/cm)

Table 4.9-8 D-1641 Chloride Water Quality Objectives for Water Intakes

Compliance Location	Station Number	Criteria Description	Water Year Type	Value
CCWD at Rock Slough or Antioch Intake	C5 or D12	Maximum mean daily Chloride of 150 mg/L for required number of days	Wet Abv Norm. Blw Norm. Dry Critical	# of days*[1] each calendar year ≤ 150 mg/L Cl 240 190 175 165 155
CCWD at Rock Slough -and- West Canal at Clifton Court -and- DMC Canal at Tracy PP -and- Barker Sl -and- Vallejo PP	C5 C9 DMC1 SLBAR3 C19	Maximum mean daily Chloride	All	250 mg/L

Notes: mg/L = milligrams per litre

[1] Number of days must be met in intervals not less than two weeks

DELTA MODELING RESULTS

Salinity Results

Appendix I-2 includes tables for each D-1641 compliance location and water intake that show average monthly EC for the Baseline Condition and changes in EC with MICUP. The results of the salinity analysis for each D-1641 compliance location are summarized in Table 4.9-9 and below.

- **Sacramento River at Emmaton (D22).** At Emmaton, MICUP flows caused an additional 21 days (0.3 percent) of standards violations during the 53-year modeling period, which occurred in 11 different years; meaning there were no standard violations in 79 percent of years and 99.7 percent of days during the modeling period. The violations occurred primarily in August (17 days) but also July (2 days) and June (2 days) and exclusively in wet years (21 days). There were no additional days of standards violations in above normal, below normal, dry, or critical water years.
- **San Joaquin River at Jersey Point (D15).** At Jersey Point, MICUP flows caused an additional 33 days (0.5 percent) of standards violations during the 53-year modeling period, which occurred in 14 different years; meaning there were no standard violations in 74 percent of years and 99.5 percent of days during the modeling period. The violations occurred primarily in August (17 days) but also July (16 days) and primarily in wet (17 days) but also above normal (12 days) and below normal (4 days) water years.
- **San Joaquin River at Prisoners Point (D29).** The MICUP scenario did not result in additional standards violations at Prisoners Point.

Table 4.9-9 Summary of Additional Days of Standards Violation with MICUP Compared to Baseline Conditions

Standard Location	Total Days Modeled with Standard in Effect over 53 years	MICUP Scenario Additional Days of Standard Not Met over 53 years	Percent of Days over 53 years
Emmaton	7,261	21	0.3%
Jersey Point	7,261	33	0.5%
Prisoners Point	3,233	0	0.0%

Source: Appendix I-2

These modeling results assume that the CVP and SWP operations do not change in real time to ensure the standards at Emmaton and Jersey Point are met as required by D1641. In practice, CVP and SWP operations would need minor adjustment to ensure compliance with the standards at all times. The modeling indicates that CVP and SWP operations might need to adjust to dedicate more flow to meeting the Emmaton and Jersey Point standards in 54 days out of 7,261 days. The modeling also indicates that CVP and SWP operations would benefit from the increases in outflows to the Delta after MICUP initiates recharge operations. CVP and SWP could adjust operations to dedicate less flow to meeting standards, in months that MICUP is not operating, which would be in drier years. Out of the 636-month analysis period, the MICUP scenario included increases in Mokelumne River outflows to the Delta during 390 months, Calaveras River outflows to the Delta increased during 597 months, and San Joaquin River flows increased during 607 months.

Chloride Results

Chloride is estimated from the modeled EC results. The modeling indicates that under Baseline Conditions and with MICUP there are no maximum mean daily 250 milligrams per liter (mg/L) chloride standard violations at West Canal at Clifton Court, DMC Canal at Tracy PP, Barker Slough or Vallejo Pumping Plant. At CCWD at Rock Slough, MICUP results in one additional day of chloride standard violation during December of a below normal water year. Since the 250 mg/L chloride standard applies year-round, compliance with this standard was maintained during 99.9 percent of days during the modeling period under MICUP.

The 150 mg/L Chloride standards need to be met at Rock Slough or Antioch. At Rock Slough, MICUP flows do not cause any additional chloride standards violations. The only year when standards are not met at either location is 1976. The additional flows contributed to the Delta under the MICUP scenario reduce the number of days of non-compliance by two during this year; however, it is assumed that standards violations in the Baseline Condition are due to model limitations.

EIR Scoping Comments Consideration

Various comments were submitted during the Environmental Impact Report (EIR) scoping process. Comments related to surface water and hydrology that were taken into consideration when preparing the environmental impact analysis include: potential impacts to flow (loss of surface flows), and injury to senior water rights holders in the Mokelumne River, downstream of the Camanche Reservoir; the need for a water availability analysis that does not presume all unappropriated flows to be excess flows; the investigation of lower flow alternatives (refer to Chapter 6, Alternatives Analysis); the incorporation of climate change's impact on water resources and availability (refer to Chapter 7, Federal Crosscutting); impacts on flood flows or interference with maintenance of floodway facilities; and regulatory consistency with the Sacramento/Delta update to the Bay-Delta Plan.

Specific Thresholds of Significance

For purposes of the following impact analysis, the following thresholds are used to evaluate the significance of surface water hydrology and water quality impacts resulting from implementation of MICUP.

- Violate water quality standards or waste discharge requirements established by the CVRWQCB and the Sacramento River Basin and the San Joaquin River Basin Water Quality Control Plan (Basin Plan).
- Alter an existing drainage pattern through alteration of the course the Mokelumne or Calaveras Rivers, or increased impervious surfaces and resulting in erosion, siltation, or flooding on or off-site.
- Expose people to pollutants due to inundation related to flooding or seiche.
- Conflict with the water quality objectives of the Basin Plan, including salinity and chloride objectives in D-1641.
- Conflict with the Bay-Delta Plan implementation activities related to river flows.

Impact Evaluation

Surface Water Quality and Water Quality Control Consistency

Significance Criterion a:	Would the proposed project violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality?
Significance Criterion d:	Would the proposed project conflict with or obstruct implementation of a water quality control plan?

Impact SW-1 MICUP PROJECT COMPONENTS AND FACILITIES COULD DEGRADE SURFACE WATER QUALITY AND CONFLICT WITH THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER BASIN AND THE SAN JOAQUIN RIVER BASIN (BASIN PLAN) DURING CONSTRUCTION IF THE MOBILIZATION OF SEDIMENT, CONTAMINATION, OR INADVERTENT SPILLS OR LEAKS OCCUR. HOWEVER, IMPLEMENTATION OF EROSION AND WATER POLLUTION CONTROL PLANS, AND ADDITIONAL BMPS FOR IN-WATER WORK WOULD REDUCE IMPACTS. IMPACTS WOULD BE LESS-THAN-SIGNIFICANT WITH MITIGATION. OPERATION AND MAINTENANCE ACTIVITIES ASSOCIATED WITH MICUP PROJECT COMPONENTS AND FACILITIES COULD DEGRADE SURFACE WATER QUALITY OR CONFLICT WITH THE BASIN PLAN. HOWEVER, IMPLEMENTATION OF FLOOD-MAR INITIAL SITE ASSESSMENTS AND HAZARDOUS SOIL REMEDIATION ACTIVITIES, PRE-OPERATIONAL FLOOD-MAR DESIGN STRATEGIES, AS WELL AS THE PREPARATION AND IMPLEMENTATION OF A MICUP OPERATIONS PLAN WOULD REDUCE IMPACTS. OPERATION IMPACTS WOULD BE LESS-THAN- SIGNIFICANT WITH MITIGATION.

Construction

This impact analysis discusses water quality impacts related to construction of project components within each of the three MICUP partner agencies. The analysis is organized by the general types of activities that could impair water quality during construction: ground disturbance and in-water work, discharge of contaminants, and discharge of dewatering effluents. These issues are first broadly evaluated below, and then, potential impacts from construction of project components for each of MICUP partner agencies is evaluated.

GROUND DISTURBANCE AND IN-WATER WORK

As discussed in the construction analysis for Impact GEO-3, construction activities would involve earthmoving, excavation, stockpiling, and grading for most project components; all of which could loosen and expose soils to erosion processes, such as stormwater runoff, particularly during the winter months, which in turn could result in soil erosion, loss of topsoil, and sedimentation to receiving surface waters. Construction in waters or along riverbanks also could directly result in discharge of sediment. Soil and entrained contaminants that enter receiving waters, including through stormwater runoff, can increase turbidity, stimulate algae growth, increase sedimentation of aquatic habitat, lower dissolved oxygen content, and introduce compounds that may be toxic to aquatic organisms.

DISCHARGE OF CONTAMINANTS

Construction could also temporarily impair water quality should construction materials, petroleum products, or construction-related wastes be discharged into surface drainages or onto the ground where they could be carried into receiving waters at a later time even post-construction. Accidental spills of construction-related substances such as oils and fuels could also directly contaminate surface water.

As described in Section 4.8, *Hazards and Hazardous Materials*, there are documented hazardous sites in the project area. Construction of project components in areas that may contain known or unknown contamination could exacerbate degradation of surface waters. Additionally, agricultural sites within the project area may contain pesticides and other chemicals associated with agricultural operations that if disturbed during construction could negatively impact surface water quality, such as by being transported in stormwater runoff.

DISCHARGE OF DEWATERING EFFLUENT

Dewatering may be required during construction of project components in areas of shallow groundwater levels or where deeper excavations would occur. Construction activities within the Mokelumne River for pump station/pump expansions and Calaveras River for pipeline crossings may also require dewatering. Dewatered effluent would be managed with the use of pumped sumps, dewatering wells, and/or settling basins. The discharge of dewatering effluent could directly or indirectly affect surface water quality.

North San Joaquin Water Conservation District

Within the NSJWCD area, construction activities such as vegetation removal, stockpiling of soil, excavation for new and enhanced pipelines and pumps/pump stations, drilling ASR wells, and grading of recharge basins and berms for Flood-MAR would expose soils to precipitation or other construction water sources that could cause an increase in sediment in stormwater runoff, which could negatively impact surface water quality. Additionally, construction activities would also require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff.

Specific project components that would disturb more than 1 acre if land would be subject to the NPDES CGP. Compliance with this permit would require the preparation and implementation of a SWPPP that would identify pollutant sources that may affect the quality of storm water discharge and implement BMPs, such as erosion control and pollution prevention measures, to be used during

the course of construction. The project component SWPPP would include BMPs to minimize the impacts of construction activities to surface water quality. With implementation of the BMP requirements required by the State CGP (managed at the local level by the CVRWQCB), the potential for pollutants and sediment to affect the water quality of runoff from construction areas would be minimized to less-than-significant levels.

However, those project components that may disturb less than 1 acre of land would not be required to prepare and implement a project SWPPP. Therefore, construction activities for these project components have the potential to impact surface water quality if there are no BMPs implemented to control erosion or pollution of surface water runoff during construction. Furthermore, the development of new recharge facilities (recharge basins, ASR wells, or Flood-MAR berms) by NSJWCD could disturb existing or known contamination sites or be in agricultural areas and disturb soils with pesticides and other agricultural chemicals. The mobilization of contaminated sediment at hazardous material sites, or inadvertent spills or leaks of pesticides and other agricultural chemicals in these areas could affect the quality of stormwater runoff.

Upgrades or new construction of pump stations and individual pumps (for Flood-MAR), including fish screens, would take place along the Mokelumne River bank. These activities could require in-water work. Additionally, construction of pipelines, recharge basins, and berms for Flood-MAR may also occur adjacent to tributaries to the Mokelumne River and other drainages. Construction activities within or adjacent to these surface waters increases the potential for direct discharge or discharge of runoff with sediment and contaminants.

Within the NSJWCD area, dewatering and discharge of effluent may be required for the expansion of pump stations and pumps along the Mokelumne River. For ASR wells, dewatered effluent would be tested to evaluate the pump design parameters and to gather data on pumping volume, water quality, and groundwater level (see Section 4.10, *Hydrology and Water Quality: Groundwater*, for more details), and would require discharge.

In conclusion, construction of NSJWCD project components that would impact less than 1 acre of land, or are located within or near hazardous material sites, as well as project's requiring in-water work, have the potential to increase discharge of sediment and contaminants in stormwater runoff and interconnected surface water systems or directly to the Mokelumne River, and discharge dewatering effluent to the Mokelumne River; all of which could substantially degrade surface water quality and conflict with surface water quality objectives in the Basin Plan. Therefore, construction impacts would be considered potentially significant.

However, implementing Mitigation Measures GEO-1, HAZ-1, SW-1, SW-2, and SW-3 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); a Phase I Environmental Site Assessment (ESA) for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); compliance with the CVRWQCB's WDRs for *Limited Threat Discharges to Surface Waters* for discharge of dewatering effluent, onsite treatment prior to disposal or offsite disposal of dewatering effluent that does not meet applicable CVRWQCB standards (in the WDRs) (Mitigation Measure SW-2); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, construction of NSJWCD project components would not violate any water

quality standards or waste discharge requirements, substantially degrade groundwater quality, or conflict with the Basin Plan. Therefore, construction impacts would be less than significant with mitigation.

Stockton East Water District

Within the SEWD area, construction activities such as vegetation removal, stockpiling soil, excavation for new pipelines, Mosher Creek recharge basins, and dry wells, drilling ASR, and grading of the Mosher Creek recharge basins and berms for West Linden Flood-MAR would expose soils to soils to precipitation or other construction water sources that could cause an increase in sediment in stormwater runoff.

Additionally, construction activities would also require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff. Construction of project components that would disturb more than 1 acre of land would be subject to the NPDES CGP, which would require the preparation and implementation of a SWPPP, which would identify and implement BMPs, such as erosion control and pollution prevention measures to be used during the course of construction activities. The SWPPP would include BMPs to minimize the impacts of construction activities to surface waters in the SEWD area. With implementation of the SWPPP's BMP requirements required by the State CGP (managed at the local level by the CVRWQCB), the potential for pollutants and sediment to affect the water quality of runoff from construction sites would be minimized to less-than-significant levels.

However, those project components that may disturb less than 1 acre of land would not be required to prepare and implement a project SWPPP. Therefore, construction activities for these project components have the potential to impact surface water quality through interconnected surface waters if there are no BMPs implemented to control erosion or pollution of surface water runoff during construction. Furthermore, the development of new direct surface water recharge facilities, ASR wells, and Flood-MAR berms by SEWD could disturb existing or known contamination sites or be located in agricultural areas and disturb soils with pesticides and other agricultural chemicals. The mobilization of contaminated sediment at hazardous material sites, or inadvertent spills or leaks of pesticides and other agricultural chemicals in these areas could affect the quality of stormwater runoff.

Construction of three new pipelines would require crossing the Calaveras River and potentially in-water work. Additionally, construction of pipelines, recharge basins, dry wells, ASR wells, and berms for Flood-MAR may also occur adjacent to tributaries to the Calaveras River and other drainages. Construction activities within or adjacent to these surface waters increases the potential for direct discharge or discharge of runoff with sediment and contaminants.

Within SEWD jurisdiction, dewatering and discharge of effluent may be required for the installation of ASR wells and pipelines. For ASR wells, dewatered effluent would be tested to evaluate the pump design parameters and to gather data on pumping volume, water quality, and groundwater level (see Section 4.10, *Hydrology and Water Quality: Groundwater*, for more details).

In conclusion, construction of SEWD project components that would impact less than 1 acre of land, or are located within or near hazardous material sites, as well as project's requiring in-water work, have the potential to increase discharge of sediment and contaminants in stormwater runoff and interconnected surface water systems, or directly to the Calaveras River and other surface waters, and discharge dewatering effluent to the Calaveras River, all of which could substantially degrade

surface water quality and conflict with surface water quality objectives in the Basin Plan. Therefore, construction impacts would be potentially significant.

However, implementing Mitigation Measures GEO-1, HAZ-1, SW-1, SW-2, and SW-3 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); compliance with the CVRWQCB's WDRs for *Limited Threat Discharges to Surface Waters* for discharge of dewatering effluent, onsite treatment prior to disposal or offsite disposal of dewatering effluent that does not meet applicable CVRWQCB standards (in the WDRs) (Mitigation Measure SW-2); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, construction of SEWD project components would not violate any water quality standards or waste discharge requirements, substantially degrade surface water quality, or conflict with the Basin Plan. Therefore, construction impacts would be less than significant with mitigation.

City of Stockton

Within the City of Stockton area, construction activities such as vegetation removal, stockpiling soil, and excavation and grading of recharge basins, dry wells, and new pipelines would expose soils to other construction water sources that could cause an increase in sediment in stormwater runoff.

Additionally, construction activities would also require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff. Construction of project components that would disturb more than 1 acre of land would be subject to the NPDES CGP, which would require the preparation and implementation of a SWPPP, which would identify and implement BMPs, such as erosion control and pollution prevention measures to be used during the course of construction activities. The SWPPP would include BMPs to minimize the impacts of construction activities to water quality of surface waters in the City of Stockton area. With implementation of the SWPPP's BMP requirements required by the State CGP (managed at the local level by the CVRWQCB), the potential for pollutants and sediment to affect the water quality of runoff from construction sites would be minimized to less-than-significant levels.

The development of recharge basins, dry wells, and new pipelines by the City of Stockton could disturb existing or known contamination sites or could contain residual pesticides or other agricultural chemicals. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff.

Within the City of Stockton area, dewatering and discharge of effluent may be required for the installation of recharge facilities in areas of shallow groundwater levels or deeper excavations. Discharge of dewatering effluent could negatively impact surface water quality.

In conclusion, construction of the City of Stockton project components that are located within or near hazardous material sites have the potential to increase discharge of sediment and contaminants in stormwater runoff and surface systems, and discharge dewatering effluent, all of

which could substantially degrade surface quality and conflict with surface water quality objectives in the Basin Plan. Therefore, construction impacts would be potentially significant.

However, implementing Mitigation Measures GEO-1, HAZ-1, and SW-2 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); and compliance with the CVRWQCB's WDRs for *Limited Threat Discharges to Surface Waters* for discharge of dewatering effluent, onsite treatment prior to disposal or offsite disposal of dewatering effluent that does not meet applicable CVRWQCB standards (in the WDRs) (Mitigation Measure SW-2). With implementation of these mitigation measures, construction of the City of Stockton's project components would not violate any water quality standards or waste discharge requirements, substantially degrade surface water quality, or conflict with the Basin Plan. Therefore, construction impacts would be less than significant with mitigation.

Operation

Potential Impacts to Streamflow and Water Quality in the Lower Mokelumne River and Delta from MICUP

This analysis considers impacts to water quality in the lower Mokelumne River and the Delta from MICUP. Potential impacts to water quality from MICUP are attributed to reductions in lower Mokelumne River flow and Mokelumne River outflow to the Delta. Reductions in flow levels from MICUP would occur from direct diversion of water between December 1st and June 30th under A029835 and rediversion of water from storage in Camanche Reservoir between July 1st and October 31st. The modeling to evaluate potential water quality impacts from MICUP is discussed in the *Lower Mokelumne River Flow Modeling* and in the *Delta Water Quality Modeling* sections above.

Changes in Lower Mokelumne River Flows

As discussed in the *Lower Mokelumne River Flow Modeling* section above, MICUP diversions reduce lower Mokelumne River flows in 31 years (58 percent) of the 53-year modeling period (refer to Figure 4.9-4a and Figure 4.9-4b). MICUP diverted the full amount of water possible under MICUP (158,000 acre-feet) in 10 wet years of the modeling, meaning flows were reduced the maximum amount possible in these years. In the remaining 21 years when MICUP used water, flows were reduced by lesser amounts depending on the amount of water available.

Flow changes in the lower Mokelumne River were evaluated at three locations: 1) releases from Camanche Reservoir, 2) below WDD, and 3) outflow to the Delta, as summarized in Figure 4.9-4a through Figure 4.9-8. The flow modeling estimates MICUP would divert water in 31 years of the 53-year modeling period. In the 31 years when MICUP used water, annual flows were reduced an average of 60,885 acre-feet (8 percent) for releases from Camanche Reservoir, 116,505 acre-feet (20 percent) for flow below WDD, and 97,744 (17 percent) for outflow to the Delta. In the 31 years when MICUP used water, monthly flows were reduced an average of 7,704 acre-feet (12 percent) for releases from Camanche Reservoir, 14,741 acre-feet (36 percent) for flow below WDD, and 12,199 (33 percent) for outflow to the Delta. In all years and months, existing water diversions, minimum flow requirements, and proposed HRL flows below WDD were maintained.

The Mokelumne River contributes approximately 2.6 percent of unimpaired flow to the Delta on an average annual basis[64]. Therefore, the reduction of outflow from the lower Mokelumne River with MICUP would reduce a very small proportion of freshwater ultimately conveyed to the Delta. However, as discussed in the *Lower Mokelumne River Flow Modeling* section above (and described further in Section 4.10, *Hydrology and Water Quality – Groundwater*), groundwater recharge under MICUP would increase groundwater levels in the East San Joaquin Groundwater Subbasin resulting in reduce seepage from the lower Mokelumne River channel and a corresponding increase in flow levels. This beneficial effect results in: 1) a smaller reduction in outflow to the Delta when water is diverted for MICUP because some flow reductions are offset by reduced seepage, and 2) increases in outflow to the Delta (compared to Baseline Conditions) in drier months and years when water is not diverted for MICUP but after groundwater recharge has begun for MICUP in wetter years. The flow modeling indicates that outflow would increase throughout the 22 drier years (42 percent) of the modeling period when MICUP does not divert water (Figure 4.9-4a and Figure 4.9-8). In addition, the cumulative increases in outflow to the Delta during prolonged dry periods are notable, with increases in consecutive dry years of up to 72,079 acre-feet in the six years from 1987 to 1992.

Generally, changes in flow volumes and rates could change erosion in the lower Mokelumne River channel and downstream. A reduction in flows in the lower Mokelumne River during periods of MICUP water use, which occurs in relatively wetter years with higher flow volumes (refer to Figure 4.9-4a and Figure 4.9-7), would reduce peak flow volumes and rates which could cause reduced flow velocities and corresponding reductions in channel erosion. Increases in flows with MICUP (compared to Baseline Conditions) due to reduced seepage would occur when MICUP is not using water, which occurs in relatively drier years with lower flow volumes (Figure 4.9-4a and Figure 4.9-8), which would not increase flow volumes and rates close to or above what's already experienced during periods of higher flows, and therefore, is not anticipated to increase channel erosion from what's already experienced.

Reduced flow volumes could create warmer water temperatures, particularly if new low-flow conditions are created compared to existing conditions. However, as discussed above, flows are reduced by MICUP at higher flow volumes and increases in flows occur at lower flow volumes when water temperatures could be elevated, resulting in a beneficial effect compared to Baseline Conditions.

Furthermore, maintaining JSA flow requirements for the lower Mokelumne River that are included in EBMUD's water rights for releases from Camanche and Pardee Reservoirs along with EBMUD's proposed HRL flows below WDD would protect water quality and maintain compliance with applicable water quality standards.

CHANGES IN DELTA SALINITY

Salinity water quality objectives were established in the *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary* (or Bay Delta Plan) to protect fish and wildlife, agricultural, and municipal and industrial beneficial uses, and those objectives and implementation measures were propagated into D-1641. The Delta water quality modeling conducted for the project evaluated the potential for water diverted under A029835 to result in additional days of non-compliance (compared to the Baseline Condition) with the D-1641 water quality objectives. The analysis considered seasonal agriculture and fish and wildlife EC objectives for Sacramento River at Emmaton (D22), San Joaquin River at Jersey Point (D15), and San Joquin River at Prisoners Point

[64] EBMUD. 2017. Comments on the Development of the Program for Implementation for the Phase II Bay-Delta Plan. Available: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/phii_input/20171108_ebmud_comment.pdf

(D29) and chloride objectives at water intakes—Clifton Court Forebay Intake, Delta-Mendota Canal at Tracy Pumping Plant, and CCWD's Rock Slough, Old River, and Victoria Canal intakes.

As discussed in the *Delta Water Quality Modeling* section above, MICUP flow reductions caused no additional salinity standards violations at Prisoners Point. MICUP flow reductions resulted in very small increases (0.3 percent) in days (21) of salinity non-compliance for Sacramento River at Emmaton in wet years. MICUP flow reductions also resulted in very small increase (0.5 percent) in days (33) of salinity non-compliance for Sacramento River at Jersey Point in wet, above normal, and below normal years.

MICUP operations do not impact chloride standard compliance, except for the 250 mg/L standard for CCWD and Rock Slough intake where one additional day (0.01 percent increase) of non-compliance occurred over the 53-year.

Groundwater recharge under MICUP would reduce seepage and increase freshwater flow into the Delta from the Mokelumne, Calaveras, and San Joaquin Rivers. Delta water quality modeling only partially captures this effect, when flow increases to the Delta are included in months before or after MICUP diversions and captured by the 14-day running average of salinity levels. During longer periods when water is not used under MICUP (but after groundwater recharge has begun), particularly prolonged drier periods when salinity tends to be higher in the Delta, increases in freshwater flows to the Delta due to MICUP would have a beneficial impact on salinity to some extent by helping to dilute concentrations and increase the freshwater barrier on the east side of the Delta.

CONCLUSIONS

As demonstrated by flow modeling, flows in the lower Mokelumne River would be reduced when water is diverted/rediverted for MICUP, during wetter years, when ample flow remains to satisfy minimum flow requirements and proposed HRL flows below WDD. In addition, groundwater recharge under MICUP would reduce stream seepage and increase outflows to the Delta, including during periods water is diverted/rediverted for MICUP and drier years when water is not used for MICUP. In reality, MICUP project components would be developed over time and MICUP would not immediately use the full capacity of water. Since modeling assumes the full capacity of MICUP is immediately available, actual flow reductions and increases due to seepage reductions are expected to be less in earlier years of MICUP and ramp up over time as additional capacity (from PODs and project components) is developed.

As demonstrated by Delta water quality modeling, MICUP would not result in additional days of salinity standards violations most of the time, with minimal additional days of non-compliance including a total of 20 days of salinity standard non-compliance and one day of chloride standard non-compliance between December 1st and July 31st[65] throughout the 53-year modeling period, which may be attributed to direct diversion of water under A029835. This analysis assumes MICUP always diverts water and reduces flow when water is available; however, water diverted under A029835 would be subject to Term 91 which limits diversions when the CVP and SWP are releasing previously stored water to meet water quality and flow requirements in the Delta and the Delta is termed to be in balanced conditions. As such, the modeling and analysis overestimates use of water

[65] While direct diversion under A029835 ends on June 30th, the effects of flow changes from A029835 on Delta water quality are dynamic and may persist into July. D-1641 water quality objectives for fish and wildlife and agricultural are measured on a 14-day running average. Therefore, additional days of standards violations for July are considered potentially relevant to MICUP direct diversion under A029835.

for MICUP under A029835, and actual impacts on Delta water quality should be prevented by including Term 91 in A029835.

For the rediversion from storage MICUP operations period (July 1 through October 31), there are a small number of days of standard non-compliance under MICUP operations. As discussed in the *Water Rights Decision 1641* section above, the water rights for the SWP and CVP are subject to meeting water quality standards in the Delta. Therefore, if MICUP has minor impacts on meeting these standards during the July 1 to October 31st period, it could have minor impacts on SWP and CVP operations and these impacts would occur in the wet years when MICUP is operating. Conversely, the additional flows that MICUP adds to the Delta would aid SWP and CVP operations in meeting these standards in all years when MICUP is not operating, which would be the drier years when CVP and SWP operations are more sensitive. The modeling tools are not capable of capturing all of these small operational changes. Overall these impacts are *de minimus*.

As discussed, the reduction in flow in the lower Mokelumne River channel is not anticipated to increase channel erosion or adversely affect water temperatures and would maintain minimum flow requirements. Increases in days of salinity and chloride standard non-compliance from diversion of water under A029835 would be extremely small and likely avoided or at least further reduced with implementation of Term 91 to protect water quality in the Delta. Furthermore, MICUP would increase flows in the lower Mokelumne River and outflow to the Delta from the Mokelumne, Calaveras, and San Joaquin Rivers during critical dry periods resulting in beneficial effects to water quality to some extent. Therefore, operation of MICUP would not violate water quality standards or waste discharge requirements, otherwise substantially degrade surface water quality, or conflict or obstruct implementation of a water quality control plan. This impact would be less than significant.

POTENTIAL IMPACTS TO WATER QUALITY FROM OPERATION AND MAINTENANCE OF MICUP PROJECT COMPONENTS

This impact analysis discusses water quality impacts related to operation and maintenance of project components within each of the three MICUP partner agency areas. This analysis is organized by the type of facility that would be operated and maintained: pumps, pump stations, ASR wells, and pipelines; recharge basins, stormwater detention basins, and dry wells; and Flood-MAR. Mokelumne River water quality and facilities are first broadly evaluated below, and then, potential impacts from operation and maintenance of projects components for each of MICUP partner agencies is evaluated where necessary.

Source Water Discharge During Operations

Operation of MICUP would result in withdrawal of water along the Mokelumne River and Aqueduct, primarily during higher flow periods (as discussed in the evaluation above for Delta Outflows). Lower Mokelumne River water has low salt content including chloride and sulfate, as discussed in Section 4.9.2, *Environmental Setting*. However, the amount of suspended sediments that a river (or aqueduct) can carry increases with flow; and therefore, it is possible that Mokelumne River water diverted during high flow conditions would contain an increased amount of sediment, which would then be transported through infrastructure and discharged during operation of MICUP facilities. Increased sediment loads discharged to surface waters could impair their water quality.

Mokelumne River water would be diverted at pump stations/pumps and conveyed through pipelines to recharge areas. Water would be diverted and applied to recharge areas at a rate suitable for the capacity of the facility or agricultural operations (in the case of Flood-MAR or direct irrigation). Water would be applied to agricultural lands using existing agricultural irrigation systems

for direct irrigation. Water would not be discharged to surface waters for direct surface water recharge or ASR well recharge. Therefore, MICUP would not result in discharge of Mokelumne River water with potentially high levels of suspended sediments to surface waters for these recharge methods.

Flood-MAR may require discharge to agricultural fields using temporary pumps where lands are currently provided water from drip irrigation or other means that would not result in ponding for Flood-MAR recharge. As such, discharge of Mokelumne River water with high suspended sediments to agricultural lands is possible. These sediments may settle out during ponding or be conveyed in runoff. Potential impacts related to runoff from Flood-MAR operations is evaluated further below.

Pumps, Pump Stations, ASR Wells, and Pipelines

Operation of the pumps/pump stations, ASR wells, and pipelines would not create conditions contributing to erosion or sedimentation or discharge of other contaminants. Maintenance activities associated with these project facilities would not result in new ground disturbance, dewatering, or other work that would result in erosion of soil or runoff or discharge of other contaminants.

Recharge Basins, Dry Wells, Stormwater Detention Basins, and Unlined Canals

Proposed recharge basins, dry wells, stormwater detention basins, and unlined canals would contain water during operations, which would inhibit wind erosion; however, during periods of non-recharge of these facilities would contain exposed soil devoid of vegetation that is subject to wind erosion. Since recharge basins, dry wells, and stormwater detention basins would be excavated and/or contained within berms, it is anticipated these facilities would collect stormwater and could experience erosion from runoff. Existing facilities – unlined canals and some recharge basins and stormwater detention basins – would be subject to stormwater runoff the same as under current conditions and no changes would occur when MICUP is not operating. Recharge basins and dry wells would require regular sediment removal/scraping, vegetation management, and debris clearing to maintain their efficiency and recharge rate and prevent blockages, which would provide management of eroded soil collected in the basin. Similarly, stormwater detention basins require maintenance to clean out debris to maintain recharge rates/efficiency. Routine basin and stormwater detention facility maintenance activities and adherence to these conditions would ensure that erosion and siltation runoff is reduced to less-than-significant levels.

Flood-MAR

Lands designated for Flood-MAR would maintain existing agricultural practices during periods when water is not being applied for recharge under MICUP. There is potential for pesticide or other chemicals typically used during agricultural operations to accumulate within lands designated for Flood-MAR. As described in Section 4.8, *Hazards and Hazardous Materials*, the transport, use, and disposal of pesticides associated with past, present and future agricultural activities would continue to be done in accordance with applicable regulatory requirements to protect water quality and public health (see California Department of Pesticide Regulation in Section 4.9.2, *Regulatory Framework*). These agricultural lands are regularly irrigated with water during the irrigation season (late summer to fall) and subject to runoff after precipitation events under existing conditions and times when water is not being applied for recharge under MICUP, which would result in some mobilization of pesticides and other agricultural chemicals through the ground to the groundwater basin and potentially via runoff to receiving surface waters.

Under MICUP, conducting Flood-MAR activities on these lands would result in application of additional water for recharge during the non-irrigation (and wet) season, and could result in ponding and additional runoff, particularly during or soon after storm events and on lands with steep slopes. This could result in additional runoff or sediment loads in runoff transporting pesticides or agricultural chemicals to receiving surface waters. Additionally, if there are stockpiles of pesticides and agricultural chemicals or other contamination on agricultural lands when Flood-MAR activities are conducted, then the potential for transporting these contaminants in runoff increases.

North San Joaquin Water Conservation District

Within the NSJWCD area, as discussed above, operation and maintenance of pump stations/pumps, pipelines, and ASR wells would not result in erosion of soil or runoff or discharge of other contaminants; and while recharge basins could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not violate water quality standards or conflict with the Basin Plan, and impacts would be less than significant.

Large areas of agricultural lands to the north and south of the Mokelumne River within the NSJWCD area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey additional runoff during recharge activities under MICUP. Additionally, there are known hazardous materials sites within the NSJWCD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Since discharge of pesticides and other contaminants could result in conflicts with Basin Plan objectives of receiving waters, operation impacts for Flood-MAR would be considered potentially significant.

However, the implementation of Mitigation Measures SW-3 and SW-5 will reduce this impact for Flood-MAR components on agricultural land. Mitigation Measure SW-3 will ensure waters are contained onsite and do not result in contaminated runoff offsite that could violate water quality standards for receiving waters in the Mokelumne and Calaveras River watersheds, as described in Table 4.9-3. Mitigation Measure SW-5 will ensure Flood-MAR sites are clear of any hazardous materials or contaminated soils prior to applying MICUP water to agricultural lands for recharge, to ensure water quality impacts do not occur by requiring the following for agricultural lands proposed for Flood-MAR: Flood-MAR is not conducted on lands with slopes greater than 15 percent, construction of berms at the downslope end of lands with slopes of 5 percent or greater or on lands with slopes less than 5 percent where runoff could result in localized flooding, a desktop assessment of Flood-MAR agricultural lands for known contamination sites prior to recharge, avoidance of hazardous materials or contamination sites, visual survey for and removal of stockpiles of pesticides and other agricultural chemicals prior to use of the site, and removal of contaminated soils associated with pesticides and chemicals found onsite (and determined through soil sampling) in accordance with appliable federal and state regulations. With implementation of these mitigation measures, NSJWCD's operation of Flood-MAR would not violate surface water quality standards or conflict with the Basin Plan, and operation impacts for Flood-MAR would be less than significant with mitigation.

Stockton East Water District

Within the SEWD area, as discussed above, operation and maintenance of pump stations/pumps, pipelines, and ASR wells would not result in erosion of soil or runoff or discharge of other contaminants; and while recharge basins and dry wells could collect stormwater, maintenance

activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not violate water quality standards or conflict with the Basin Plan, and impacts would be less than significant.

Agricultural lands within the SEWD area in the West Linden area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey additional runoff during recharge activities under MICUP. Additionally, there are known hazardous materials sites within the SEWD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Since discharge of pesticides and other contaminants could result in conflicts with Basin Plan objectives of receiving waters, operation impacts for Flood-MAR would be considered potentially significant.

However, the implementation of Mitigation Measures SW-3 and SW-5 will reduce this impact for Flood-MAR components on agricultural land. Mitigation Measure SW-3 will ensure waters are contained onsite and do not result in contaminated runoff offsite that could violate water quality standards for receiving waters in the Mokelumne and Calaveras River watersheds, as described in Table 4.9-3. Mitigation Measure SW-5 will ensure Flood-MAR sites are clear of any hazardous materials or contaminated soils prior to applying MICUP water to agricultural lands for recharge, to ensure water quality impacts do not occur by requiring the following for agricultural lands proposed for Flood-MAR: Flood-MAR is not conducted on lands with slopes greater than 15 percent, construction of berms at the downslope end of lands with slopes of 5 percent or greater or on lands with slopes less than 5 percent where runoff could result in localized flooding, a desktop assessment of Flood-MAR agricultural lands for known contamination sites prior to recharge, avoidance of hazardous materials or contamination sites, visual survey for and removal of stockpiles of pesticides and other agricultural chemicals prior to use of the site, and removal of contaminated soils associated with pesticides and chemicals found onsite (and determined through soil sampling) in accordance with appliable federal and state regulations. With implementation of these mitigation measures, SEWD's operation of Flood-MAR would not violate surface water quality standards or conflict with the Basin Plan, and operation impacts for Flood-MAR would be less than significant with mitigation.

City of Stockton

Within the City of Stockton area, as discussed above, operation and maintenance of pipelines would not result in erosion of soil or runoff or discharge of other contaminants; and while recharge basins and dry wells could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not violate water quality standards or conflict with the Basin Plan, and impacts would be less than significant.

Mitigation Measures

The following mitigation measures are required for construction activities associated with project components for the NSJWCD, SEWD, and the City of Stockton. Mitigation Measure GEO-1 as described in Section 4.6, Geology and Soils, and Mitigation Measure HAZ-1 as described in Section 4.8, Hazards.

SW-1 Prepare and Implement a Water Pollution Control Plan for Project Components Disturbing Less than 1 Acre During Construction

For MICUP components disturbing less than one acre, prior to and during construction, the agency implementing the project component shall prepare and implement a Water Pollution Control Plan to prevent and control pollution by minimizing and controlling the runoff of pollutants. A copy of the Water Pollution Control Plan shall be kept with the construction crew and modified as necessary to suit specific site conditions. The Water Pollution Control Plan shall identify the activities that may cause pollution of surface waters, and BMPs that will be employed to control runoff during both construction and operation.

SW-2 Obtain Coverage and Comply with Requirements of the NPDES Limited Threat Discharges to Surface Waters Prior to and During Construction

Prior to and during construction dewatering activities, construction involving dewatering would be subject to CVRWQCB's Waste Discharge Requirement (WDR) R5-2022-0006-03 requirements for managing wastewater produced during dewatering activities or drainage collected during construction. To obtain coverage under this Order, which also serves as the NPDES Permit (refer to Mitigation Measure GEO-1), the lead agency must submit a complete Notice of Intent and provide samples for analysis to determine the quality of the discharge (using tiers) and assign appropriate controls that would apply to the permit.

SW-3 Implement Additional Best Management Practices for In-Water Construction

This mitigation measure is required for construction activities associated with new pumps/pump stations and fish screening along the Mokelumne River and pipelines that would cross the Calaveras River.

When applicable, BMPs will be implemented throughout construction for project components within a water feature to protect water quality. BMPs could include but are not limited to the following:

- Except for installation of dewatering components, work to be conducted in the river channels will only be done during dry conditions—when surface water is not flowing or has been conveyed around the construction area.
- Filter fabric will be installed before temporary rip-rap or other materials are installed in the river channel for dewatering.
- An upstream barrier/coffer dam with dewatering components (basins, culverts, pumps, etc.) will be installed to ensure an isolated and dry work area is provided within the river channel throughout construction.
- Culverts and pumps will be sized to manage surface flow resulting from direct runoff into the river during the dry season.
- No work will occur downstream of the dewatering outlet.
- Rock or other material will be temporarily installed at the dewatering outlet to dissipate the velocity of the discharge and prevent erosion/souring of the river channel at the outlet.
- The outlet will be inspected and maintained regularly.
- Turbidity curtains will be installed above the coffer dam/inlet and below the outlet. The screens will be installed before the coffer dam is set in place and removed after the in-water work is done and the coffer dam removed. The curtains will be adjusted as needed with changes in flow

conditions. Discharge back into the wetted portion of the channel will be located upstream of the silt curtain.

- Structures used to isolate the in-water work area and/or diverting the water flow (e.g., coffer dam, geotextile silt curtain) will not be removed until disturbed areas are stabilized.

SW-4 Flood-MAR Design Operational Parameters to Prevent Surface Water Runoff

Prior to the use of lands for Flood-MAR, the following design parameters shall be incorporated into Flood-MAR facilities to prevent surface water runoff on and off-site:

- Avoid Flood-MAR recharge on lands with slopes greater than 15 percent.
- On lands containing slopes greater than 5 percent, berms will be placed at the downslope end of the Flood-MAR area where runoff would be conveyed.
- On lands less with slopes less than 5 percent, if berms are not used, then site runoff shall be evaluated to demonstrate that ponding and runoff would not result in localized flooding to adjacent roadways, properties, and surface waters.
- The height of the berm shall be determined as appropriate for each site based on the amount of ponded water estimated water elevations onsite, such that the berms provide 1-foot of freeboard. The water levels on berms shall be monitored during Flood-MAR recharge and application of recharge water shall be reduced or stopped to maintain 1-foot of freeboard on the berms.
- Berms are not required where it can be demonstrated that ponding and runoff would not be conveyed offsite. Topography, slopes, historic drainage patterns, and property size shall be considered in evaluating runoff and offsite flooding potential. This evaluation shall be approved by the implementing MICUP agency.

SW-5 Flood-MAR Initial Site Assessment and Hazardous Soil Remediation Prior to Operation

Diversion to or recharge of Flood-MAR areas will not occur on known hazardous materials sites as identified by the Department of Toxic Substances Control (DTSC) Cortese List, as well as DTSC EnviroStor and SWRCB Geotracker databases. Prior to recharge via Flood-MAR, the implementing agency will collect representative samples of soils to be analyzed for total petroleum hydrocarbons and pesticides. The implementing agency will avoid if feasible or otherwise remove from the site soils identified as containing hazardous quantities of contaminants and disposal of such soils in accordance with applicable hazardous waste regulations.

Level of Significance

Less than Significant with Mitigation

Drainage Pattern Alteration

Significance Criterion c:	Would the proposed project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i. result in substantial erosion or siltation on- or off-site; ii. substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; iii. create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or iv. impede or redirect flood flows?

IMPACT SW-2 MICUP PROJECT COMPONENTS AND FACILITIES COULD RESULT IN EROSION OR SILTATION DURING CONSTRUCTION. HOWEVER, IMPLEMENTATION OF EROSION AND WATER POLLUTION CONTROL PLANS, AND ADDITIONAL BMPS FOR IN-WATER WORK WOULD REDUCE IMPACTS. CONSTRUCTION IMPACTS WOULD BE LESS-THAN-SIGNIFICANT WITH MITIGATION. OPERATION OF MICUP PROJECT COMPONENTS AND FACILITIES WOULD NOT RESULT IN INCREASED EROSION OR SILTATION, INCREASE THE RATE OF SURFACE RUNOFF, EXCEED CAPACITIES OF STORMWATER DRAINAGE SYSTEMS, OR IMPEDE OR REDIRECT FLOOD FLOWS. OPERATION IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

Potential Impacts Related to Alteration of the Drainage Pattern of the Project Area From MICUP Construction Activities

This impact analysis evaluates how MICUP construction activities would alter the drainage pattern of the project area and the related effects. Construction of MICUP would generally alter the drainage pattern of the project area from ground disturbing activities including potentially in-water within rivers and along riverbanks (impervious surfaces are covered in the operational impact analysis below). The analysis is organized by the specific questions asked in the significance criterion. These issues are first broadly evaluated below, and then, potential impacts from construction of project components for each of MICUP partner agencies is evaluated.

Result in Substantial Erosion or Siltation Onsite or Offsite; or Create or Contribute Runoff Water Which Would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff

As discussed in the construction analysis for Impact SW-1, construction activities would involve earthmoving, excavation, stockpiling, and grading for most project components; all of which could loosen and expose soils to erosion processes, such as stormwater runoff, particularly during the winter months, which in turn could result in soil erosion, loss of topsoil, and sedimentation. Soil in stormwater runoff could be transported to receiving waters onsite or offsite. Construction in waters or along riverbanks also could directly result in discharge of eroded soil or siltation in surface waters.

As discussed in the construction analysis for Impact SW-1, construction materials, petroleum products, or construction-related wastes could be discharged into surface drainages or onto the

ground where they could be carried into receiving waters at a later time even post-construction; and agricultural sites within the project area may contain pesticides and other chemicals associated with agricultural operations that if disturbed during construction could be transported in stormwater runoff.

Construction would primarily occur in agricultural areas and other non-developed areas that are not developed with stormwater drainage systems connected to developed areas. Agricultural areas and other non-developed areas typically contain detention basins and channels for stormwater drainage/control.

Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding Onsite or Offsite

Areas disturbed during construction would either become part of the permanent facility being developed or would be temporarily used during construction and would be restored approximately to contours and conditions that existed prior to construction, except for removal of large woody vegetation and trees which would be permanent or an extended impact until vegetation becomes re-established. Construction would primarily occur in relatively flat areas, especially recharge facilities which require suitable sites for recharge operations, and agricultural areas. Disturbances along rivers and riverbanks would be limited to small, isolated areas. Furthermore, construction is occurring in an area with soils that generally have good drainage and are ideal for recharge and percolation of water. Therefore, it is not anticipated that construction activities including vegetation removal would result in exposure of large areas of bare soil, steep areas, areas currently densely vegetated with large woody vegetation, or other conditions that could substantially increase the rate or amount of surface runoff in a manner which would result in flooding onsite or offsite.

Impede or Redirect Flood Flows

Construction activities would temporarily occur along riverbanks and potentially for in-water work. Construction along riverbanks would be confined to expansion of pump stations and would not impede or redirect flood flows. Work that would potentially impede or redirect flood flows is limited to construction in the river channel during a flood event.

North San Joaquin Water Conservation District

Within the NSJWCD area, construction activities such as vegetation removal, stockpiling of soil, excavation for new and enhanced pipelines and pumps/pump stations, drilling ASR wells, and grading of recharge basins and berms for Flood-MAR would expose soils to precipitation or other construction water sources that could cause erosion and siltation an increase of sediment in stormwater runoff.

With adherence to CGP requirements, a SWPPP and associated BMPs would be implemented to minimize potential soil erosion and siltation from construction of project components that disturb more than 1 acre. Project components that disturb less than 1 acre, however, would not be required to comply with the CGP or implement a SWPPP and thus would have potential to result in erosion or siltation.

Within the NSJWCD area, construction activities would require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The development of new recharge facilities (recharge basins, ASR wells, or Flood-MAR berms) by NSJWCD could disturb existing or known contamination sites or be located in agricultural areas and disturb soils with

pesticides and other agricultural chemicals. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff at construction sites.

Upgrades or new construction of pump stations and individual pumps (for Flood-MAR), including fish screens, would take place along the Mokelumne River bank. These activities could require in-water work. Additionally, construction of pipelines, recharge basins, and berms for Flood-MAR may also occur adjacent to tributaries to the Mokelumne River and other drainages. Construction activities within or adjacent to these surface waters increases the potential for direct discharge or discharge of stormwater runoff with sediment and contaminants.

In conclusion, construction of NSJWCD project components has potential to result in substantial erosion and siltation, additional sources of polluted runoff, and/or temporally impede flood flows in the Mokelumne River. Therefore, construction impacts would be considered potentially significant.

However, the implementation of Mitigation Measures GEO-1, HAZ-1, SW-1 and SW-3 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); the preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, potential impacts associated with substantial erosion and siltation, additional sources of polluted runoff, and/or temporally impede flood flows during construction of the NSJWCD project components would be reduced to less-than-significant levels. Therefore, construction impacts would be less than significant with mitigation.

Stockton East Water District

Within the SEWD area, construction activities such as vegetation removal, stockpiling soil, excavation for new pipelines, Mosher Creek recharge basins, dry wells, drilling ASR, and grading of the Mosher Creek recharge basin and berms for West Linden Flood-MAR would expose soils to precipitation or other construction water sources that could cause an increase in erosion and siltation in stormwater runoff. With adherence to CGP requirements, a SWPPP and associated BMPs would be implemented to minimize potential soil erosion and siltation from construction of project components that disturb more than 1 acre. Project components that disturb less than 1 acre, however, would not be required to comply with the CGP or implement a SWPPP and thus would have potential to result in erosion or siltation. Within SEWD jurisdiction, construction activities also would require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The development of new direct surface water recharge facilities, ASR wells, and Flood-MAR berms by SEWD could disturb existing or known contamination sites or be in agricultural areas and disturb soils with pesticides and other agricultural chemicals. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff at construction sites. Construction of three new pipelines would require crossing the Calaveras River and potentially in-water work. Additionally, construction of pipelines, recharge basins, dry wells, ASR wells, and berms for Flood-MAR may also occur adjacent to tributaries to the Calaveras River and other drainages. Construction activities within or adjacent to these surface

waters increases the potential for direct discharge of sediment and contaminants. Additionally, construction of the three pipeline crossings within the Calaveras River channel could temporarily impede or redirect flood flows if a flood event were to occur during active construction in the channel and the construction has altered the channel in a manner that flood waters are obstructed and cannot freely flow downstream.

In conclusion, construction of SEWD project components has potential to result in substantial erosion and siltation, additional sources of polluted runoff, and/or temporally impede flood flows in the Calaveras River during pipeline construction. Therefore, construction impacts would be considered potentially significant.

However, the implementation of Mitigation Measures GEO-1, HAZ-1, SW-1 and SW-3 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); the preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, potential impacts associated with substantial erosion and siltation, additional sources of polluted runoff, and/or temporally impede flood flows during construction of the SEWD project components would be reduced to less-than-significant levels. Therefore, construction impacts would be less than significant with mitigation.

City of Stockton

Within the City of Stockton area, construction activities such as vegetation removal, stockpiling soil, and excavation and grading of recharge basins, dry well and new pipelines would expose soils to precipitation or other construction water sources that that could cause an increase in erosion and siltation in stormwater runoff. With adherence to CGP requirements, a SWPPP and associated BMPs would be implemented to minimize potential soil erosion and siltation from construction of project components that disturb more than 1 acre. Within the City of Stockton area, construction activities would require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The development of recharge basins, dry wells, and pipelines by the City of Stockton could disturb existing or known contamination sites or could contain residual pesticides or other agricultural chemicals. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff at construction sites. In conclusion, construction of City of Stockton project components has potential to result in substantial erosion and siltation and/or additional sources of polluted runoff. Therefore, construction impacts would be considered potentially significant.

However, the implementation of Mitigation Measures GEO-1, HAZ-1, SW-1 and SW-3 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); the preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for

activities disturbing less than 1 acre (Mitigation Measure SW-1); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, potential impacts associated with substantial erosion and siltation, additional sources of polluted runoff, and/or temporally impede flood flows during construction of the City of Stockton project components would be reduced to less-than-significant levels. Therefore, construction impacts would be less than significant with mitigation.

Operation

Potential Impacts Related to Alteration of the Drainage Pattern of the Project Area From MICUP Operation and Maintenance Activities

This impact analysis evaluates how MICUP operation and maintenance activities would alter the drainage pattern of the project area and the related effects. Operation of MICUP would generally alter the drainage pattern of the project area by diverting water from the Mokelumne River channel and permanent changes to land cover and site topography. Maintenance activities would be confined to existing facilities and new facilities developed for MICUP and would not result in new disturbance or alterations to the drainage pattern. The analysis is organized by the specific questions asked in the significance criterion. These issues are first broadly evaluated below, and then, potential impacts from construction of project components for each of MICUP partner agencies is evaluated.

Result in Substantial Erosion or Siltation Onsite or Offsite; or Create or Contribute Runoff Water Which Would Exceed the Capacity of Existing or Planned Stormwater Drainage Systems or Provide Substantial Additional Sources of Polluted Runoff

New facilities would not create new substantial areas of impervious surfaces. Pipelines would be buried underground after construction including at river crossings. Proposed pump stations/pumps are largely existing and would require minimal disturbance/increase of impervious areas to support upgraded pumps or pipes supporting the pump stations. Furthermore, up to 68 proposed ASR wells would have footprints up to 1-acre in size, however the impervious footprint associated with the ASR well themselves and surrounding concrete would represent a small area of this footprint. The proposed ASR wells would be surrounded by pervious soil into which precipitation would infiltrate, as it does now. New recharge basins, dry well, stormwater detention basins, and Flood-MAR berms would be constructed of earthen material allowing water to infiltrate.

As discussed in the operations analysis for Impact SW-1, operation and maintenance of pumps/pump stations, ASR wells, and pipelines would not result in erosion of soil or runoff or discharge of other contaminants; new recharge basins, dry wells, and stormwater detention basins would collect stormwater and could experience erosion from runoff but would require regular sediment removal/scraping, vegetation management, and debris clearing to maintain their efficiency and recharge rate and prevent blockages, which would provide management of eroded soil collected in the basin; and existing facilities – unlined canals and some recharge basins and stormwater detention basins – would be subject to stormwater runoff the same as under current conditions and no changes would occur when MICUP is not operating.

As discussed in the operations analysis for Impact SW-1, conducting Flood-MAR activities could result in additional runoff or sediment loads in runoff transporting pesticides or agricultural chemicals to receiving surface waters. Additionally, if there are stockpiles of pesticides and

agricultural chemicals or other contamination on agricultural lands when Flood-MAR activities are conducted, then the potential for transporting these contaminants in runoff increases.

MICUP facilities would primarily occur in agricultural areas and other non-developed areas and operation and maintenance activities would not create or contribute to substantial amounts of runoff which would exceed the capacity of existing or planned stormwater drainage systems. Additionally, no new drainage systems would be designed or needed for the project. This issue is not discussed further.

Substantially Increase the Rate or Amount of Surface Runoff in a Manner Which Would Result in Flooding Onsite or Offsite

As discussed in the analysis immediately above, operation and maintenance of all MICUP facilities, except Flood-MAR, would not substantially increase stormwater runoff and no flooding would occur onsite or offsite from these activities.

Flood-MAR would be conducted through existing agricultural irrigation systems but could result in ponding and/or additional surface water runoff, particularly during or soon after storm events and on lands with steep slopes. Onsite ponding of water would be intentional for recharge activities and would not result in adverse effects of flooding. However, if steep slopes exist, runoff could temporarily result in localized flooding offsite including on adjacent roadways and properties.

Impede or Redirect Flood Flows

As discussed in the operations analysis for Impact SW-1, diversion of water from the Mokelumne River under MICUP would not occur in every year and primarily in wetter years from December 1 to October 31. While MICUP diversions would reduce the amount of water in the lower Mokelumne River, MICUP would not substantially affect or reduce flood flows because diversions would be limited in capacity and would occur at several points (including Pardee and Camanche Reservoirs and downstream locations), and unappropriated water would remain in the Mokelumne River to flow downstream in most years. As a result, there would be no impediment, redirection, or other adverse effects to flood flows from operations including water diversions. Maintenance activities at pump stations/pumps would be the same as currently occur at these locations and would not impede or redirect flood flows. Therefore, this issue is not discussed further.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

Within the NSJWCD area, as discussed above, operation and maintenance of pump stations/pumps, pipelines, and ASR wells would not result in erosion of soil or runoff or discharge of other contaminants in runoff; and while recharge basins could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not result in substantial erosion and siltation, additional sources of polluted runoff, or runoff resulting in flooding onsite or offsite, and impacts would be less than significant.

Large areas of agricultural lands to the north and south of the Mokelumne River within the NSJWCD area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey additional runoff during recharge activities under MICUP. This could also result in temporary localized flooding offsite. Additionally, there are known hazardous materials sites within the NSJWCD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Since runoff could result in discharge of

pesticides and other contaminants and/or temporary localized flooding, operational impacts for Flood-MAR would be considered potentially significant.

However, implementing Mitigation Measures SW-4 and SW-5 will reduce this impact by requiring the following for agricultural lands proposed for Flood-MAR: Flood-MAR is not conducted on lands with slopes greater than 15 percent, construction of berms at the downslope end of lands with slopes of 5 percent or greater or on lands with slopes less than 5 percent where runoff could result in localized flooding, a desktop assessment of Flood-MAR agricultural lands for known contamination sites prior to recharge, avoidance of hazardous materials or contamination sites, visual survey for and removal of stockpiles of pesticides and other agricultural chemicals prior to use of the site, and removal of contaminated soils associated with pesticides and chemicals found onsite (and determined through soil sampling) in accordance with appliable federal and state regulations. With implementation of these mitigation measures, NSJWCD's operation of Flood-MAR would not create runoff resulting in discharge of pesticides and other contaminants and/or temporary localized flooding, and operation impacts for Flood-MAR would be less than significant with mitigation.

STOCKTON EAST WATER DISTRICT

Within the SEWD area, as discussed above, operation and maintenance of pump stations/pumps, pipelines, and ASR wells would not result in substantial erosion of soil or runoff or discharge of other contaminants in runoff; and while recharge basins and dry wells could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not result in substantial erosion and siltation, additional sources of polluted runoff, or runoff resulting in flooding onsite or offsite, and impacts would be less than significant.

Agricultural lands within SEWD's jurisdiction in the West Linden area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey additional runoff during recharge activities under MICUP. This could also result in temporary localized flooding offsite. Additionally, there are known hazardous materials sites within the SEWD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Since runoff could result in discharge of pesticides and other contaminants and/or temporary localized flooding, operational impacts for Flood-MAR would be considered potentially significant.

However, implementing Mitigation Measures SW-4 and SW-5 will reduce this impact by requiring the following for agricultural lands proposed for Flood-MAR: Flood-MAR is not conducted on lands with slopes greater than 15 percent, construction of berms at the downslope end of lands with slopes of 5 percent or greater or on lands with slopes less than 5 percent where runoff could result in localized flooding, a desktop assessment of Flood-MAR agricultural lands for known contamination sites prior to recharge, avoidance of hazardous materials or contamination sites, visual survey for and removal of stockpiles of pesticides and other agricultural chemicals prior to use of the site, and removal of contaminated soils associated with pesticides and chemicals found onsite (and determined through soil sampling) in accordance with appliable federal and state regulations. With implementation of these mitigation measures, SEWD's operation of Flood-MAR would not create runoff resulting in discharge of pesticides and other contaminants and/or temporary localized flooding, and operation impacts for Flood-MAR would be less than significant with mitigation.

CITY OF STOCKTON

Within the City of Stockton area, as discussed above, operation and maintenance of pipelines would not result in substantial erosion of soil or runoff or discharge of other contaminants in runoff; and while recharge basins and dry wells could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not result in substantial erosion and siltation, additional sources of polluted runoff, or runoff resulting in flooding onsite or offsite, and impacts would be less than significant.

Mitigation Measures

Implement Mitigation Measures GEO-1, HAZ-1, SW-1, SW-3, SW-4, and SW-5.

Level of Significance

Less than Significant with Mitigation

Risk of Pollutant Release Due to Inundation

Significance Criterion d:	In flood hazard, tsunami, or seiche zones, would the proposed project risk release of pollutants due to inundation?

IMPACT SW-3 MICUP PROJECT COMPONENTS AND FACILITIES COULD RELEASE POLLUTANTS DUE TO INUNDATION; HOWEVER, IMPLEMENTATION OF MITIGATION MEASURES WOULD REDUCE IMPACTS TO LESS-THAN-SIGNIFICANT LEVELS. CONSTRUCTION AND OPERATION IMPACTS WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION.

The entirety of the project area is located over 40 miles east of the nearest tsunami hazard zone, therefore there would be impacts associated with tsunamis and this issue is not discussed further. However, various flood hazard zones exist throughout the project area: all three MICUP partner agency areas in the project area contain portions of land that are designated by FEMA as 100-year flood zones; the project is susceptible to dam inundation; and seiches could occur within the project area.

Construction

North San Joaquin Water Conservation District

In the northern area of the NSJWCD area, the Mokelumne River is designated as Flood Zone A. Portions of the Mokelumne River connecting from the Camanche Reservoir and flowing west, are designated as Flood Zone AE, X, and A. Further, the NSJWCD area is located within dam inundation zones and is susceptible to seiches.

NSJWCD construction activities would be temporary and would not exacerbate the exposure of people or structures to risks associated with the release of pollutants due to inundation. However, construction within flood and inundation zones could release pollutants if flooding occurs during construction activities. Refer to Impact SW-1 and SW-2 above. This impact would be potentially significant.

However, the implementation of Mitigation Measures GEO-1, HAZ-1, SW-1, and SW-3 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation

Measure GEO-1); a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); the preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, potential impacts associated with the release or pollutants due to inundation during construction of the NSJWCD project components would be reduced to less-than-significant levels. Therefore, construction impacts would be less than significant with mitigation.

Stockton East Water District

The SEWD area contains flood zones designated as A, AE, and X. Further, the SEWD area is located within dam inundation zones and is susceptible to seiches.

SEWD construction activities would be temporary and would not exacerbate the exposure of people or structures to risks associated with the release of pollutants due to inundation. However, construction within flood and inundation zones could release pollutants if flooding occurs during construction activities. Refer to Impact SW-1 and SW-2 above. This impact would be potentially significant.

However, the implementation of Mitigation Measures GEO-1, HAZ-1, SW-1, and SW-3 would reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1); the preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, potential impacts associated with the release or pollutants due to inundation during construction of the SEWD project components would be reduced to less-than-significant levels. Therefore, construction impacts would be less than significant with mitigation.

City of Stockton

The City of Stockton area contains flood zones designated as AE and X near the Calaveras River. Further, the City of Stockton area is located within dam inundation zones and is susceptible to seiches.

The City of Stockton construction activities would be temporary and would not exacerbate the exposure of people or structures to risks associated with the release of pollutants due to inundation. However, construction within flood and inundation zones could release pollutants if flooding occurs during construction activities. Refer to Impact SW-1 and SW-2 above. This impact would be potentially significant.

However, the implementation of Mitigation Measures GEO-1 and HAZ-1 would reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-

1); and a Phase I ESA for construction within or near documented hazardous material sites, development of plans to avoid or remediate hazardous conditions and contaminated soils identified in the Phase I ESA (Mitigation Measure HAZ-1). With implementation of these mitigation measures, potential impacts associated with the release or pollutants due to inundation during construction of the City of Stockton project components would be reduced to less-than-significant levels. Therefore, construction impacts would be less than significant with mitigation.

Operation

Flood hazard areas, including 100-year flood zones, dam inundation zones and seiche zones are a pre-existing condition within the project area; and the placement of project components within these flood hazards areas would not exacerbate these flood conditions.

Under MICUP, there could be use of stored water of up to 48,000 AFY at Camanche Reservoir/Dam; however, EBMUD operation of the Camanche Dam and maximum water surface elevation of the reservoir would not change. Water diverted to storage in Camanche Reservoir between December 1 and June 30 would be rediverted under MICUP between July 1 and October 31. MICUP water would not be stored in Camanche Reservoir after October 31 because EBMUD reserves this space for storage of flood flows in the wet season. Therefore, the proposed project would not change existing risk of flooding due to dam inundation and this issue is not discussed further.

As described in Section 4.8, *Hazards and Hazardous Materials*, maintenance activities and periodic earth work outside of normal operations would be subject to regulations for the safe handling, transportation, and disposal of hazardous materials associated with maintenance of project components and agricultural activities. For example, hazardous materials that may be located within the project site would include appropriate containerization. BMPs would ensure that operation of the project components would not add to pollutant loads that may be released in the event of a flood or inundation.

In regard to the safety of individuals performing maintenance activities of project components at the project site, if pollutants were released during a flood, seiche, or dam failure, evacuation would occur per the San Joaquin County Local Hazard Mitigation Plan. The Local Hazard Mitigation Plan and San Joaquin County Emergency Operations Plan establishes emergency procedures for the County to institute warning and evacuation procedures in the event of flooding.

Potential impacts from operation and maintenance of specific project components for each of MICUP partner agencies is evaluated.

North San Joaquin Water Conservation District

As discussed previously in Impacts SW-1 and SW-2, operation and maintenance of pump stations/pumps, pipelines, and ASR wells would not result in discharge of contaminants; and while recharge basins could collect stormwater, maintenance activities would provide management of polluted soil collected in the basin. Therefore, operation and maintenance of these facilities would not release pollutants if flood or inundation were to occur. Impacts would be less than significant.

Large areas of agricultural lands to the north and south of the Mokelumne River within the NSJWCD area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey polluted runoff during recharge activities under MICUP. Additionally, there are known hazardous materials sites within the NSJWCD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Therefore, operation and maintenance of Flood-MAR facilities could result in the release of

pesticides and other contaminants in the event of inundation or flood. Impacts of Flood-MAR would be considered potentially significant.

However, the implementation of Mitigation Measures SW-4 and SW-5 will reduce this impact for Flood-MAR components on agricultural land. Mitigation Measure SW-4 will ensure waters are contained onsite and do not result in contaminated runoff. Mitigation Measure SW-5 will ensure Flood-MAR sites are clear of any hazardous materials or contaminated soils prior to applying MICUP water to agricultural lands for recharge: Flood-MAR is not conducted on lands with slopes greater than 15 percent, construction of berms at the downslope end of lands with slopes of 5 percent or greater or on lands with slopes less than 5 percent where runoff could result in localized flooding, a desktop assessment of Flood-MAR agricultural lands for known contamination sites prior to recharge, avoidance of hazardous materials or contamination sites, visual survey for and removal of stockpiles of pesticides and other agricultural chemicals prior to use of the site, and removal of contaminated soils associated with pesticides and chemicals found onsite (and determined through soil sampling) in accordance with appliable federal and state regulations. With implementation of these mitigation measures, NSJWCD's operation of Flood-MAR would not result in release of pollutants during inundation or flood. Impacts for Flood-MAR would be less than significant with mitigation.

Stockton East Water District

As discussed previously in Impacts SW-1 and SW-2, operation and maintenance of pump stations/pumps, pipelines, and ASR wells would not result in discharge of contaminants; and while recharge basins and dry wells could collect stormwater, maintenance activities would provide management of polluted soil collected in the basin. Therefore, operation and maintenance of these facilities would not release pollutants if flood or inundation were to occur. Impacts would be less than significant.

Agricultural lands within the SEWD area in the West Linden area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey additional runoff during recharge activities under MICUP. Additionally, there are known hazardous materials sites within the SEWD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Therefore, operation and maintenance of Flood-MAR facilities could result in the release of pesticides and other contaminants in the event of inundation or flood. Impacts of Flood-MAR would be considered potentially significant.

However, the implementation of Mitigation Measures SW-4 and SW-5 will reduce this impact for Flood-MAR components on agricultural land. Mitigation Measure SW-4 will ensure waters are contained onsite and do not result in contaminated runoff. Mitigation Measure SW-5 will ensure Flood-MAR sites are clear of any hazardous materials or contaminated soils prior to applying MICUP water to agricultural lands for recharge: Flood-MAR is not conducted on lands with slopes greater than 15 percent, construction of berms at the downslope end of lands with slopes of 5 percent or greater or on lands with slopes less than 5 percent where runoff could result in localized flooding, a desktop assessment of Flood-MAR agricultural lands for known contamination sites prior to recharge, avoidance of hazardous materials or contamination sites, visual survey for and removal of stockpiles of pesticides and other agricultural chemicals prior to use of the site, and removal of contaminated soils associated with pesticides and chemicals found onsite (and determined through soil sampling) in accordance with appliable federal and state regulations. With implementation of these mitigation measures, SEWD's operation of Flood-MAR would not result in release of

pollutants during inundation or flood. Impacts for Flood-MAR would be less than significant with mitigation.

City of Stockton

As discussed previously in Impacts SW-1 and SW-2, operation and maintenance of pipelines would not result in discharge of contaminants; and while recharge basins and dry wells could collect stormwater, maintenance activities would provide management of polluted soil collected in the basin. Therefore, operation and maintenance of these facilities would not release pollutants if flood or inundation were to occur. Impacts would be less than significant.

Mitigation Measures

Implement Mitigation Measures GEO-1, HAZ-1, SW-1, SW-3, SW-4, and SW-5.

Level of Significance

Less than Significant with Mitigation

4.9.5 Cumulative Impacts

The geographic area affected by MICUP and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative surface water hydrology and quality impacts encompasses the lower Mokelumne River Watershed and all surface waters extending from the Mokelumne River through the Delta, as well as the Calaveras River within the Calaveras River Watershed. The timeframe during which MICUP could contribute to cumulative surface water hydrology and quality impacts includes the construction and operations phases. For MICUP, the operations phase is permanent.

The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1, *Cumulative Plans and Larger-scale Projects List*, which lists the relevant plans and larger-scale projects considered in conjunction with the proposed plan (refer to Chapter 4.0, *Environmental Impact Analysis*). Significant cumulative impacts related to surface water hydrology and quality impacts could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative projects identified in Table 4-1 involve concurrent activities that would: violate surface water quality, waste discharge requirements, degrade surface water quality, or conflict with or obstruct implementation of the Basin Plan; alter existing drainage in a manner that would result in erosion or siltation, increase the rate or amount of runoff that would result in flooding, exceed capacity of existing or planned stormwater drainage systems, or impede or redirect flood flows; or risk release of pollutants due to project inundation.

As previously discussed, the proposed project would have no impact with respect to risk of pollutants due to tsunamis. Accordingly, the proposed project could not contribute to cumulative impacts related to this topic and is not discussed further.

Construction

The cumulative or larger-scale projects that could be geographically adjacent or overlap components of the proposed project during construction include the following cumulative projects: PA-2000217, PA-2200021, PA-2000218, PA-2200070; PA-2100014, PA-2200198; PA-2200277, PA-2200278, PA-2300162; Delta Water Treatment Plant Campus Improvement Project; Interstate 5

Commerce Center Project; Water Right Permit 10477; Mokelumne Aqueduct Relining Project; Larger Conjunctive Use Project; Mokelumne Aqueduct Resiliency Project; and the Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan (GSP) 2024 Update.

Surface Water Quality and Basin Plan Consistency

Similar to the proposed project, cumulative projects have the potential to disturb more than 1 acre of land. If the projects are constructed at the same time in close proximity, the erosion or contamination effects could be cumulatively significant and could affect water quality of nearby surface water bodies. However, the CGP would require each project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for erosion or surface water contamination impacts would be reduced.

NPDES permits have been developed to address cumulative conditions arising from construction throughout the state and are intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels.

Similarly, it is likely that cumulative projects that disturb less than 1 acre of land would implement some sort of erosion control plan, or water pollution control plan that would include BMPs similar to those detailed in a project's SWPPP (required as Mitigation Measure GEO-1 and Mitigation Measure SW-1 for the proposed project). Additional mitigation measures that MICUP is required to implement include: compliance with NPDES WDRs (Mitigation Measure SW-2) for construction dewatering; Phase I Environmental Site Assessments (Mitigation Measure HAZ-1) to make sure project components located within one-mile of a hazardous material site are avoided or that hazardous conditions and soils are remediated prior to construction; as well as additional BMPs to implement for in-water work to limit degradation of water quality within the Mokelumne and Calaveras rivers, as well as the Mokelumne Aqueduct (Mitigation Measure SW-3). Cumulative projects may result in significant impacts to surface water quality or may conflict with the Basin Plan if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project).

With the implementation of mitigation measures, MICUP would result in less-than-significant impacts to surface water quality, which could in turn conflict with water quality objectives in the Basin Plan; therefore, the proposed project's contribution to significant cumulative impacts regarding surface water quality and compliance with Basin Plan water quality objectives would be not be considerable.

Drainage Pattern Alteration

As discussed previously, construction activities could result in erosion, alter drainage patterns, release constructed-related wastes, redirect flood flows, or exceed capacities of existing stormwater drainage systems in the area. Therefore, all cumulative projects that include construction have the potential to result in significant cumulative impacts regarding drainage pattern alteration. However,

cumulative projects would be required to implement BMPs in accordance with a SWPPP, erosion control, or water pollution control plan (or similar) to ensure that erosion, construction wastes and fuels, as well as surface water runoff/flows would be contained on-site as to not impact surrounding areas or other project sites in the cumulative project vicinity. Cumulative projects may result in significant impacts regarding drainage pattern alternations if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project).

The proposed project would implement Mitigation Measures GEO-1, HAZ-1, SW-1, and SW-2, all of which would require BMPs for project component construction, including in-water work, and hazardous conditions/soil remediation (if any). With the implementation of mitigation measures, the project would result in less-than-significant impacts in regard to drainage pattern alteration. Therefore, the proposed projects contribution to significant cumulative impacts would not be considerable.

Risk of Pollutant Release Due to Inundation

Most of the cumulative projects identified in Table 4-1 would also be constructed within areas that are subject to inundation within 100-year flood zones, seiche zones, or by dams in the project vicinity. Construction activities of cumulative projects would be temporary and would not exacerbate the exposure of people or structures to risks associated with the release of pollutants if flooding or inundation occurs during construction activities. Therefore, similar to the proposed project, cumulative projects could result in significant cumulative impacts associated with risk of pollutants due to inundation.

It is likely that cumulative projects would implement BMPs associated with SWPPPs and other erosion and water pollution prevention plans; however, if cumulative projects may result in significant impacts regarding the release of pollutants during inundation if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project).

The proposed project would result in less-than-significant impacts if with the implementation of Mitigation Measures GEO-1, HAZ-1, SW-1, and SW-3. Therefore, the proposed project's contribution to significant cumulative impacts regarding the release of pollutants due to inundation would not be considerable.

Mitigation Measures

Mitigation Measures GEO-1, HAZ-1, SW-1, SW-2, and SW-3.

Level of Significance

Less than Significant with Mitigation

Operation

Most of the cumulative projects would not combine with the proposed project and result in cumulative impacts because many of the projects are construction-based (commercial, industrial, and residential development, rezoning/land use projects) and would not result in significant operational impacts (to which MICUP could contribute to). That is, operation and maintenance of the proposed project would recharge unappropriated water during wet years under A029835, and require maintenance of water infrastructure as well as agricultural land, similar to existing

conditions. Maintenance activities of the proposed project would not combine with operational impacts of land use-based projects.

Proposed development in the project vicinity, including land use projects would benefit from the proposed project because implementation of project components would support water supply reliability which would be used by proposed development. For example, direct recharge of high-quality surface water would help increase the quality and quantity of available groundwater to the overdraft basin; thereby supporting irrigation supply (via all proposed project components), urban supply (ASR wells), or potable water requirements required for habitable structures in the project vicinity.

The cumulative or larger-scale projects that could combine with the proposed project during operation and maintenance activities include the following cumulative projects: the Lower Mokelumne River Habitat Restoration Project; PA-2000217, PA-2200021, PA-2000218, PA-2200070; PA-2100014, PA-2200198; PA-2200277, PA-2200278, PA-2300162; Delta Water Treatment Plant Campus Improvement Project; Interstate 5 Commerce Center Project; Water Right Permit 10477; Mokelumne Aqueduct Relining Project; Larger Conjunctive Use Project; Mokelumne Aqueduct Resiliency Project; as well at the Site Approval No. PA-1900214; all of which could impact surface waters that feed into the Delta.

Surface Water Quality and Basin Plan Consistency

During operation, cumulative projects would likely not include operations that could degrade surface water quality or conflict with water quality objectives in the Basin Plan, unless they include permanent or reoccurring discharges, pollution, or sedimentation in the project vicinity. However, some of the cumulative projects such as PA-2300198 (agricultural production) and the Delta Water Treatment Plant Groundwater Recharge Basin (utility development) include similar infrastructure and uses in the same areas as MICUP. Similar to the proposed project, cumulative project activities that include facilities such as recharge basins, stormwater basins, and unlined canals would be subject to stormwater runoff that could contaminate surface waters via erosion or polluted runoff. However, these facilities would likely require standard maintenance activities such as sediment removal/scraping, vegetation management, and debris clearing, similar to the proposed project. Maintenance activities and standard best practices for facilities associated with water conveyance, storage, recharge, or agricultural production would ensure erosion and siltation runoff, and potential impacts to surface water quality would likely reduce potential significant impacts during operation. Additionally, some cumulative projects that include agricultural irrigation exhibit similar operational activities as the proposed project's Flood-MAR. However, if cumulative projects do not follow local regulations or implement erosion and pollution BMPs during operation and maintenance activities, similar to the proposed project, it is possible that cumulative projects could result in significant impact associated with the degradation of surface water quality to inconsistency with water quality objectives as outlined in the Basin Plan.

Cumulative projects may also affect flow objectives/standards downstream of the Mokelumne River and into the Delta area. As described previously, the Mokelumne River contributes to approximately 2.6 percent of unimpaired Delta inflow on an average annual basis and after conducting modeling for the proposed project, MICUP would reduce outflow from the Mokelumne River to the Delta during wetter periods, but would also increase flows from the Mokelumne, Calaveras, and San Joaquin Rivers due to reduced seepage from groundwater recharge under MICUP, including during critical drier periods when water isn't used during MICUP and flows would exceed those under Baseline conditions.

The proposed project would be required to implement mitigation measures to include initial site assessment and hazardous conditions or soils remediation prior to diversion, as well as siting Flood-MAR to avoid hazardous material sites and incorporate berms into downslope lands associated with Flood-MAR. With implementation of these mitigation measures, the proposed project would not result in degradation for surface water quality due to erosion or hazardous materials associated with Flood-MAR. Therefore, the proposed project's contribution to significant cumulative water quality impacts and flow requirements as described in the Basin Plan, would not be cumulatively considerable.

Drainage Pattern Alteration

Cumulative projects such as land use development projects like the PA-2200277, PA-2200278, PA-2300162 (Residential) project would include construction of large impervious areas which could redirect drainage and flows in the immediate area. Cumulative projects that include new development would need to implement new stormwater drainage facilities to capture runoff onsite in accordance with applicable county and/or city regulations. If appropriate regulations and project design are not completed in compliance with local regulations, it is possible that cumulative projects result in significant cumulative impacts associated with drainage pattern alterations.

The proposed project would not include maintenance activities that would result in impacts regarding drainage pattern alteration but would be required to implement mitigation measures SW-4 and SW-5 for Flood-MAR operations in order to reduce impacts of erosion or contamination of surface water within agricultural areas in the project vicinity during operation and maintenance activities. With implementation of mitigation measures, the proposed project would result in less-than-significant impacts; therefore, the project's contribution to significant cumulative impacts would not be considerable.

Risk of Pollutant Release Due to Inundation

Cumulative projects that have increased risk include cumulative projects that would include operation and maintenance activities that could result in erosion, sedimentation, or release of pollutants into the environment. Cumulative projects could potentially result in significant impacts associated releasing pollutants into the environment due to inundation because all of the cumulative projects are located within areas containing flood risk, dam inundation, and seiche zones.

The proposed project would result in less than significant impacts associated with the operation and maintenance of proposed pumps, pump stations, recharge basins, stormwater detention basins, unlined canals, dry wells, and ASR wells. The proposed project would implement Mitigation Measures SW-4 and SW-5 during the operation of Flood-MAR facilities, thereby reducing potentially significant impacts to less-than-significant levels. Therefore, the proposed project's contribution to potentially significant cumulative impacts regarding the release of pollutants due to inundation would not be considerable.

Mitigation Measures

Mitigation Measures GEO-1, SW-1, SW-4, and SW-5.

Level of Significance

Less than Significant with Mitigation

Overall Level of Cumulative Significance

Less than Significant with Mitigation

4.10 Hydrology and Water Quality: Groundwater

4.10.1 Introduction

This section describes the existing groundwater hydrology and water quality setting in the region as well as the relevant regulatory framework. This section also evaluates the possible impacts related to groundwater hydrology and water quality that could result from implementation of the proposed project within the project area (defined as the Place of Use that also encompasses the three Partner Agency areas). The information in this section is based on existing 2035 San Joaquin County, and City of Stockton, and Lodi General Plans; the East Bay Municipal Utility District (EBMUD) 2020 Urban Water Management Plan; the Central Valley Regional Water Quality Control Board (CVRWQCB) Sacramento River Basin and the San Joaquin River Basin Water Quality Control Plan (Basin Plan); the 2024 Eastern San Joaquin Groundwater Authority Groundwater Sustainability Plan Amendment; and the San Joaquin County Flood Control and Water Conservation District Fall 2023 Groundwater Report. Other supporting documentation includes the Groundwater Modeling Analysis Technical Memorandum prepared by GEI Consultants (GEI) for the proposed project (see Appendix I-1).

A complete discussion of surface water resources and potential impacts is provided in Section 4.9, *Hydrology and Water Quality: Surface Water*.

4.10.2 Environmental Setting

Groundwater Basin Hydrology

Definitions

The following terminology is used in this section to describe groundwater basin hydrology.

- **Groundwater** – Groundwater is an important source of water stored underground in aquifers (see definition below). During an average year, California's groundwater basins and subbasins contribute to approximately 41 percent of the state's total water supply. During dry years, groundwater contributes up to 60 percent (or more) of the statewide annual supply and serves as a critical buffer against the impacts of drought and climate change. Groundwater is primarily accessed through wells and pumps and is typically collected at higher volumes when surface water supplies in lakes and reservoirs are running low.[1]

  Groundwater and surface water are physically connected by the hydrologic cycle in which water evaporates, forms clouds, and falls to the ground as rain or snow. Some of this precipitation seeps into the ground and moves slowly into an underground aquifer, eventually becoming groundwater. Water law and water policy often consider groundwater and surface water as separate resources, though they are functionally inter-dependent.[2]
- **Interconnected Surface Water -** Interconnected surface water refers to surface water that is hydrologically connected at any point by a continuous saturated zone to the underlying aquifer. (Title 23 Cal. Code of Regs. Section 351[o]).

[1] California Department of Water Resources. 2025. Groundwater. Available: https://water.ca.gov/water-basics/groundwater. Accessed January 22, 2025.
[2] *Ibid*

- **Aquifer** – An aquifer is a geologic formation, a group of formations, or a part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.[3]

  There are two general types of aquifers: confined and unconfined: confined aquifers have a layer of impenetrable rock or clay above them (impermeable); and unconfined aquifers lie below a permeable layer of soil. Many different types of sediments and rocks can form aquifers and are sometimes categorized according to the type of rock or sediments of which they are composed.[4]

  Aquifers can be described as underground reservoirs[5]; however, they are not underground rivers or lakes. While groundwater can seep into or out of aquifers due to their porous nature, it cannot move fast enough to flow like a river. The rate at which groundwater moves through an aquifer varies depending on the rock's permeability. Layers of aquifers make up a groundwater basin.[6]
- **Water Year** – The movement of water through a landscape is measured in "water years". A water year (WY) begins on October 1st and ends on September 30th. The year in which the period ends denote the water year, e.g., September 30th 2023, is the end of the WY2023. The 12-month timeframe is based on the fact that precipitation and snow that fall in the latter part of a regular calendar year may not drain through or out of a watershed (refer to Section 4.9, *Hydrology and Water Quality: Surface Water*, for more details on watersheds) until the following spring.[7] Wet and dry WYs are determined by evaluating how much more or less precipitation is for a given WY than the average precipitation. Using this information, the WYs are categorized as critically dry, dry, below normal, above normal, and wet. Water year types defined herein are based on the San Joaquin Water Year Index, consistent with the definition of water years used in the Eastern San Joaquin Subbasin (ESJSB) Groundwater Sustainability Plan (GSP). The WY type is based on unimpaired river water runoff observed during the WY for the San Joaquin area is defined by the Four Rivers Index: 1) Stanislaus River below Goodwin Reservoir (aka inflow to New Melones Res.); 2) Tuolumne River below La Grange (aka inflow to New Don Pedro Reservoir); 3) Merced River below Merced Falls (aka inflow to Lake McClure); and 4) San Joaquin River inflow to Millerton Lake.
- **Cone of Depression** – A cone of depression is a conical-shaped area around a well where the water table has been lowered due to the extraction of groundwater. This occurs when water is pumped from a well faster than it can be replenished, creating a drop in groundwater levels that radiates outward from the well. The size and shape of the cone of depression depends on the rate of groundwater pumping, aquifer properties, and surrounding groundwater conditions.[8]
- **Water Budget** – Water budgets are developed to provide a quantitative account of water entering and leaving a groundwater basin, in this case the ESJSB. Water entering and leaving the ESJSB includes flows at the surface and in the subsurface environment. Water enters and leaves

[3] United States Geologic Survey. 2021. Principal Aquifers of the United States. Available: https://www.usgs.gov/mission-areas/water-resources/science/principal-aquifers-united-states. Accessed January 22, 2025.
[4] United States Geologic Survey. 2024. What is the difference between a confined and an unconfined (water table) aquifer? Available: https://www.usgs.gov/faqs/what-difference-between-a-confined-and-unconfined-water-table-aquifer. Accessed January 22, 2025.
[5] National Oceanic and Atmospheric Administration. 2024a. What is a watershed? Available: https://oceanservice.noaa.gov/facts/watershed.html. Accessed January 19, 2025.
[6] California Department of Water Resources. 2025. Groundwater. Available: https://water.ca.gov/water-basics/groundwater. Accessed January 22, 2025.
[7] United States Geologic Survey. 2016. Water Sources of the United States. Available: https://water.usgs.gov/nwc/explain_data.html. Accessed January 22, 2025.
[8] United States Geologic Survey. 2018. Cone of depression: Pumping a well can cause water level lowering. Available: https://www.usgs.gov/media/images/cone-depression-pumping-a-well-can-cause-water-level-lowering. Accessed January 23, 2025.

due to natural conditions, such as precipitation and streamflow, and/or through human activities, such as groundwater pumping or recharge from applied water. Additionally, interconnection between the groundwater system and rivers/streams accounts for other components of the water budget.[9]

- **Beneficial Uses** – An essential part of water quality control includes an assessment of beneficial uses, which are to be designated and protected. The Water Quality Control Plan (Basin Plan) for the Sacramento River Basin and San Joaquin River Basin oversees the beneficial uses of the ESJSB. The Basin Plan states:[10]

  > "All ground waters in the Region are considered as suitable or potentially suitable, at a minimum, for municipal and domestic water supply (MUN), agricultural supply (AGR), industrial service supply (IND), and industrial process supply (PRO)."

  Beneficial uses of groundwater within the Central Valley include the following designations, according to the Basin Plan (last updated in February 2019) [11]:

  - Municipal and Domestic Supply: use of water for drinking water supply
  - Agriculture: use of water for farming, horticulture, or ranching
  - Industry: use of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization
  - Industrial Process Supply: use of water for industrial activities that depend primarily on water quality

Central Valley Groundwater System

The Central Valley, also referred to as the Great Valley, is a very large, flat alluvial valley that dominates the central portion of California. The Central Valley is formed from a combination of marine sediments and Sierra Nevada and Coastal Range alluvial sediments. The Sierra Nevada Range, which is located along the eastern edge of the Central Valley, is comprised of pre-Tertiary igneous and metamorphic rocks. The Coastal Range, located along the western edge of the Central Valley, is comprised of primarily pre-Tertiary and Tertiary semi-consolidated to consolidated marine sedimentary rocks.[12][13]

The Central Valley is divided into three hydrologic regions or water basins including the Sacramento River Basin in the north, the San Joaquin River Basin in the center, and the Tulare Lake Basin to the very south. The Place of Use is located within the east-central portion of the Central Valley Groundwater System, entirely within the San Joaquin River Basin which spans about 15,825 square

[9] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[10] California Legislative Information. 1996. Water Code – WAT, Division 7. Water Quality [13000 – 16201]. Available: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=13050.&lawCode=WAT#:~:text=(f)%20%E2%80%9CBeneficial%20uses%E2%80%9D,of%20fish%2C%20wildlife%2C%20and%20other. Accessed January 23, 2025.
[11] California Regional Water Quality Control Board Central Valley Region, 2019. The Water Quality Control Plan (basin Plan) for the California Regional Water Quality Control Board Central Valley Firth Edition, the Sacramento River Basin and the San Joaquin River Basin, Revised February 2019.
[12] California Department of Water Resources. 2006. San Joaquin Valley Groundwater Basin Eastern San Joaquin Subbasin. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_022_01_EasternSanJoaquinSubbasin.pdf. Accessed January 23, 2025.
[13] San Joaquin County. 2016. San Joaquin County General Plan. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed December 30, 2024.

miles, including the northern half of the San Joaquin Valley, the central Sierra Nevada, and some of the eastern part of the Coast Ranges. It is bounded topographically and geologically by the bedrock of the Diablo Range on the west and the Sierra Nevada to the east. [14] The San Joaquin River Basin is divided into nine separate subbasins, one of which is the ESJSB, where the Place of Use is located.[15] The ESJSB is one of 21 basins and subbasins identified by the California Department of Water Resources (DWR) as being in a state of critical overdraft.[16]

Geologic formations specific to San Joaquin County vary in origination times ranging from Recent to Pre-Cretaceous bed rock or basement. Six to 10 miles of sediment have been deposited in the Central Valley, including both marine and continental gravels, sands, silts, and clays. During the middle Cretaceous period (approximately 100 million years ago), parts of the Central Valley were inundated by the Pacific Ocean, resulting in deposition of marine deposits. Marine conditions persisted through the middle Tertiary period, after which time sedimentation changed from marine to continental. The materials sources for the continental deposits are the Coastal Ranges and Sierra Nevada. The Central Valley has one natural surface water outlet, the Carquinez Strait, located at the mouth of the Sacramento-San Joaquin Delta and just east of San Francisco Bay.[17][18]

Geologic formations within the Central Valley and Eastern San Joaquin County are generally grouped as either east-side or west-side formations based on their location relative to the San Joaquin River, and the source of the sedimentary material of which they are composed. Generally, Eastside formation material originates in the Sierra Nevada and Westside formation material originates in the Coastal Ranges.[19]

Project Area

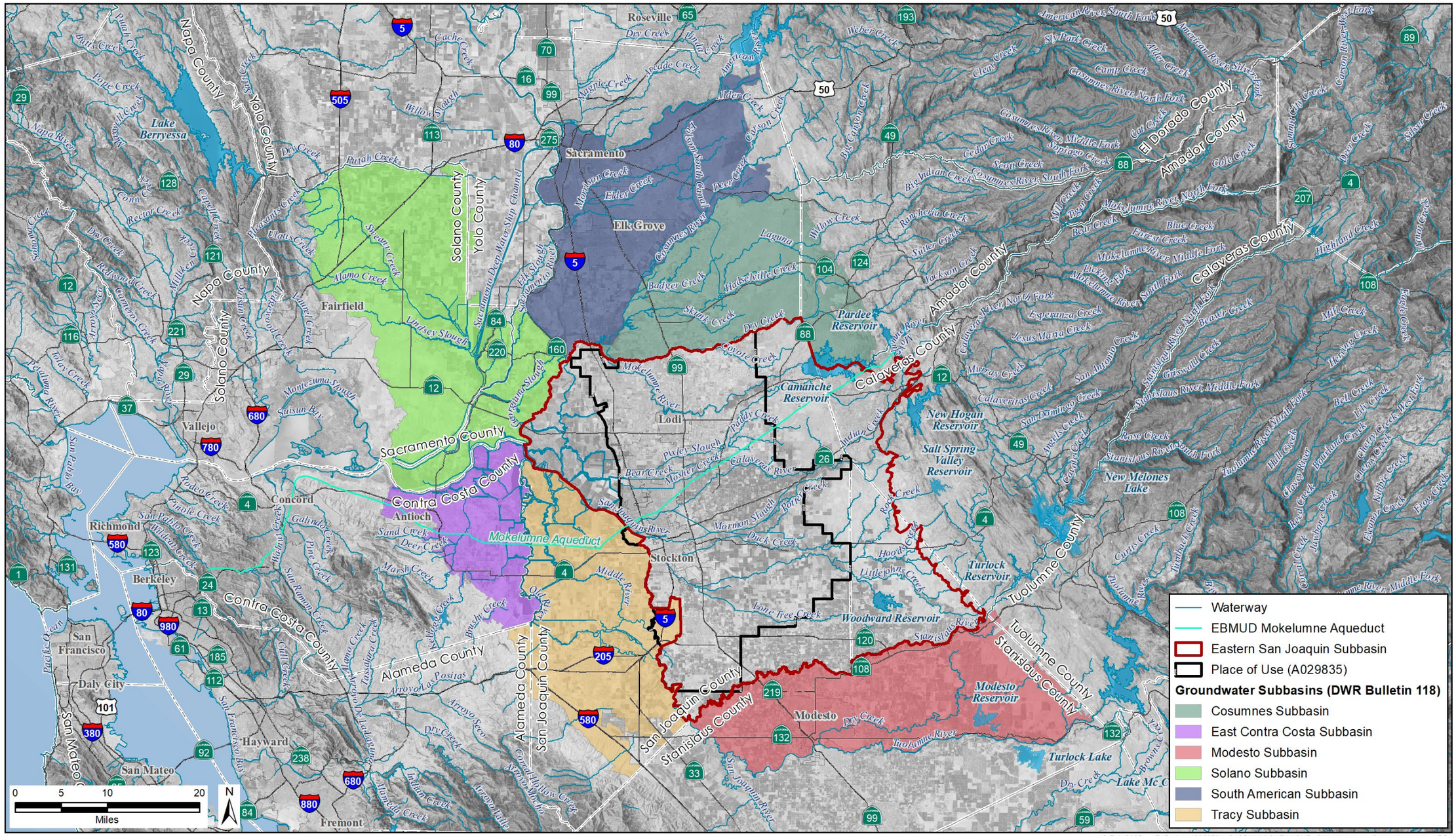
The entire Place of Use is located within the ESJSB, which is detailed in the following section.

EASTERN SAN JOAQUIN SUBBASIN

The ESJSB is within the larger San Joaquin River Basin and bordered to the north by the Cosumnes, the South American, and the Solano Subbasins; to the south by the Modesto Subbasin; and to the west by the Tracy and East Contra Costa Subbasins. The ESJSB is located to the east of the Sacramento-San Joaquin River Delta (Delta) and is bounded by the Sierra Nevada foothills to the east, the San Joaquin River to the west, Dry Creek to the north, and Stanislaus River to the south (Figure 4.10-1). The ESJSB is approximately 1,105 square miles in size and ground surface elevations vary extensively across the ESJSB, from almost 1,000 feet above mean sea level (msl) in the upland

[14] San Joaquin County. 2014. San Joaquin County 2035 General Plan Environmental Impact Report. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=eir. Accessed January 15, 2025.
[15] *Ibid*
[16] East Bay Municipal Utilities District. 2021. *Urban Water Management Plan 2020*. June 2021.
[17] California Department of Water Resources. 2006. San Joaquin Valley Groundwater Basin Eastern San Joaquin Subbasin. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_022_01_EasternSanJoaquinSubbasin.pdf. Accessed January 23, 2025.
[18] East San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[19] *Ibid*

Figure 4.10-1 Groundwater Hydrology and Subbasins in the Project Region



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areas in the east to around sea level in the flat lying valley floor to the west.[20][21] Annual precipitation within the ESJSB ranges from about 25 inches in the northeast in the upland areas to 11 inches in the southwest (lower valley floor).[22] Hydrologic drainage (surface water) generally flows from east to west, with the major river systems traversing the ESJSB being the Mokelumne, Calaveras, San Joaquin, and Stanislaus rivers. Other hydrologic features like creeks and smaller streams flow into the San Joaquin River, which flows from south to north. In the eastern portion of the ESJSB, groundwater flows mimic surface water from east to west and generally mirrors the eastward sloping topography of the geologic formations. Soils in the ESJSB are one of the primary controlling factors on surface water percolation rates down to the groundwater aquifer. Refer to Section 4.6, *Geology and Soils*, for detailed geologic mapping and soil properties within the MICUP project area.

Groundwater Aquifer and Production Zones

As described in the 2024 GSP Amendment,[23] a single (unconfined) aquifer was defined for the ESJSB based on a compilation of cross sections created from over 330 well logs. During the compilation of the cross sections, the areas with the most permeable zones for groundwater production and good water quality were identified at depths of less than 700 feet below ground surface. The aquifer is broken into three water-bearing zones: shallow, intermediate, and deep zones. Each of these zones are comprised of various freshwater bearing geologic formations. The groundwater from these three water-bearing zones is primarily used for domestic, irrigation, and municipal water supply.[24] The three zones are described as follows.

- **Shallow water-bearing zone** – composed of permeable sediments from recent alluvium, the Modesto/Riverbank, and Upper Turlock Lake Formations (refer to Section 4.6, *Geology and Soils* for more details). The shallow water-bearing zone is mostly unconfined and extends to the ground surface, including hydrologic features such as rivers, streams, and creeks. Based on the cross-sections that were created, the thickness of the shallow zone varies from 30 feet to greater than 300 feet. Many high yielding wells are present in the shallow zone.[25]
- **Intermediate zone** – is composed of sands from the Lower Turlock Lake and Laguna Formations (refer to Section 4.6, *Geology and Soils* for more details) and is generally 10 feet to greater than 60 feet thick. It has a relatively continuous sand unit around 350 feet below ground surface. The intermediate zone is generally confined with some areas being semi-confined. This water-bearing zone has many high yielding wells and is considered the primary groundwater production zone currently.[26]

[20] East San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[21] California Department of Water Resources. 2006. San Joaquin Valley Groundwater Basin Eastern San Joaquin Subbasin. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_022_01_EasternSanJoaquinSubbasin.pdf. Accessed January 23, 2025.
[22] California Department of Water Resources. 2006. San Joaquin Valley Groundwater Basin Eastern San Joaquin Subbasin. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_022_01_EasternSanJoaquinSubbasin.pdf. Accessed January 23, 2025.
[23] *Ibid*
[24] *Ibid*
[25] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[26] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available:

- **Deep zone** – is composed of black sands from the semi-consolidated Mehrten Formation (refer to Section 4.6, *Geology and Soils* for more details). The deep zone is confined due to overlying low permeable clays and aquitards. It is a very high yielding zone with wells yielding over 1,000 gallons of groundwater per minute. As a result, the deep zone is commonly used in the ESJSB as an important water source for production wells including agricultural wells.[27]

Groundwater Levels

The ESJSB has experienced declining groundwater levels historically with the greatest declines in the central portion of the ESJSB. As a result, the ESJSB has been in an overdraft condition and was identified by DWR as being in a state of critical overdraft. The western and southern portions of the ESJSB have experienced less change in groundwater levels, in part due to minimal pumping and the import of surface water for agricultural and urban use. The overdraft condition is identified on groundwater level maps as a cone of depression which has persisted for many years. The appearance of the cone of depression on water level maps changes shape in response to variable hydrologic conditions and the distribution and amount of recent groundwater pumping.

Spring groundwater elevation contour maps for the last five WYs (WY2020 - WY2024) are presented and briefly discussed in this section to highlight the recent trends in groundwater levels. Spring data are based on April measurements representing seasonal high groundwater conditions. Based on the San Joaquin Valley Water Year Index, WY2020 was a dry year, WY2021 was a critically dry year, WY2022 was a critically dry year, WY2023 was wet, and WY2024 was an above normal year.[28][29]

Based on the most recent groundwater elevation contours, regional groundwater south of the Mokelumne River generally flows from higher elevation areas along the outer edges of the ESJSB toward the cone of depression in the central portion of the ESJSB within the SEWD. North of the Mokelumne River, groundwater flow appears to be directed toward a small, localized cone of depression in the NSJWCD.

In recent years, groundwater elevations reflect a persistent cone of depression, with levels ranging from approximately 40 feet to greater than 100 feet below msl (Figure 4.10-2). Groundwater levels show a general increasing trend as a result of two wet years (WYs 2023 and 2024) following three dry years (WYs 2020, 2021, and 2022). While groundwater levels temporarily stabilized or increased in some areas following the wet years, the cone of depression has generally expanded laterally during WY2021 and WY2022, likely due to groundwater withdrawals exceeding recharge during dry and critically dry years (Figure 4.10-3, Figure 4.10-4).[30] [31] Despite reduced pumping in WY2023 resulting from increased surface water availability, groundwater use still exceeds the basin's

https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

[27] *Ibid*

[28] San Joaquin County Flood Control and Water Conservation District. 2025. *Groundwater Report Fall 2024.* July 2025.

[29] California Department of Water Resources (DWR). 2025. California Data Exchange Center. Available: https://cdec.water.ca.gov/reportapp/javareports?name=WSIHIST. Accessed: April 13, 2026.

[30] *Ibid*

[31] San Joaquin County Flood Control and Water Conservation District. 2022b. Groundwater Report Spring 2022. Available: https://www.sjwater.org/Portals/0/Spring%202022_ESJ%20Groundwater%20Monitoring%20Report_vFINAL.pdf?ver=tAaNXMOD0xNlw_LueJxG1A%3d%3d. Accessed: January 15, 2025.

estimated sustainable yield, contributing to ongoing groundwater level declines (Figure 4.10-5, Figure 4.10-6). [32] [33] [34]

In WY2023, total groundwater use in the ESJSB was estimated at 806,000 acre-feet (AF) compared to 819,000 AF in WY2022. These ranges of pumping are higher than the estimated sustainable yield of 715,000 AF for the ESJSB, as reported in the WY2023 Annual Report.[35]

Groundwater Storage

The 2024 GSP Amendment estimates that for the 28 years of historical hydrologic period from 1996 to 2023, the groundwater budget has greater outflows than inflows, leading to an estimated average annual decrease in groundwater storage of approximately 48,000 AFY, based on the historical calibrated modeling results. Change in groundwater storage varies by WY types and increases during wet periods due to greater availability of surface water and reduced groundwater pumping and decreases in dry years due to less recharge and more groundwater pumping.

The 2024 GSP Amendment reported the average of the last five years of the historical simulation (WYs 2019-2023) to represent conditions reflective of current ESJSB management activities. Similar to the historical trends, the ESJSB's current groundwater budget has greater outflows than inflows, resulting in an annual average decline in groundwater storage of 89,000 AFY. The ESJSB GSP estimates that groundwater pumping offsets and/or recharge may be required to achieve sustainability.

[32] San Joaquin County Flood Control and Water Conservation District. 2023. Groundwater Report Spring 2023. Available: https://www.sjwater.org/Portals/0/Spring%202023_ESJ%20Groundwater%20Monitoring%20Report_vFINAL_11-27-23.pdf?ver=WXn2Yx5v0_lUNN8wIG-pmg%3d%3d. Accessed: January 15, 2025
[33] *Ibid*
[34] *Ibid*
[35] *Ibid*

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Figure 4.10-2 Spring 2020 Groundwater Elevation Contours

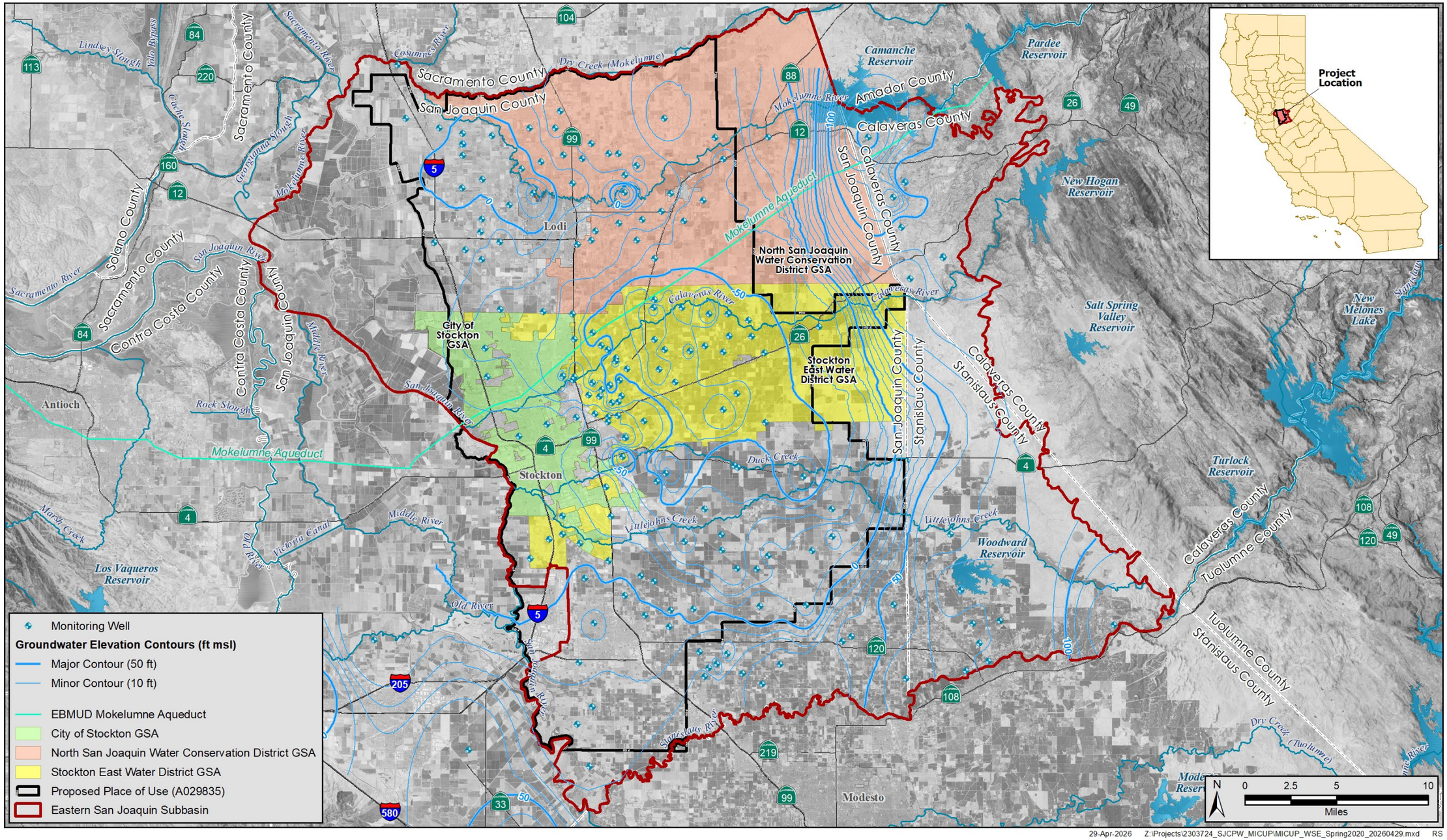


Figure 4.10-3 Spring 2021 Groundwater Elevation Contours

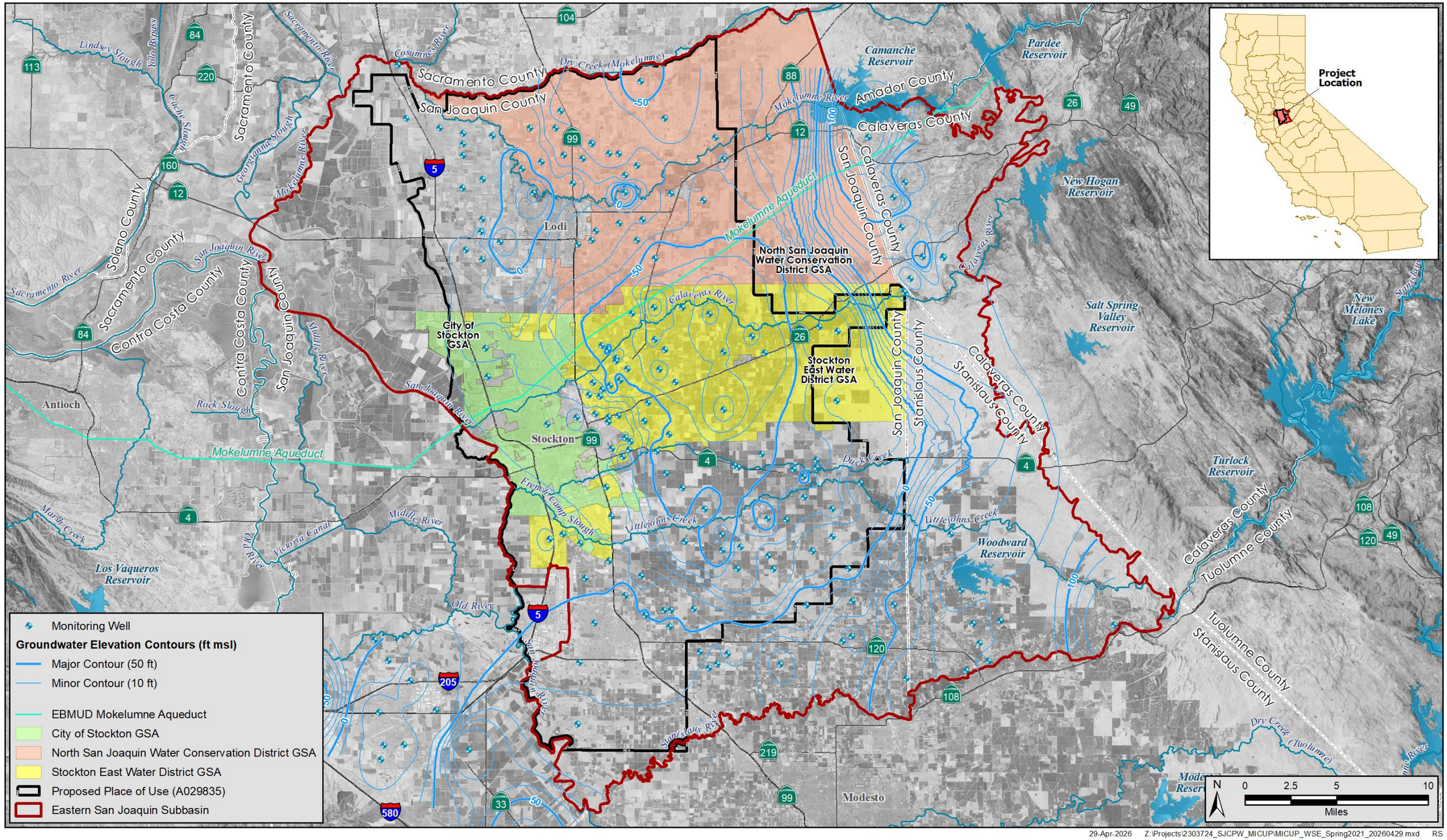


Figure 4.10-4 Spring 2022 Groundwater Elevation Contours

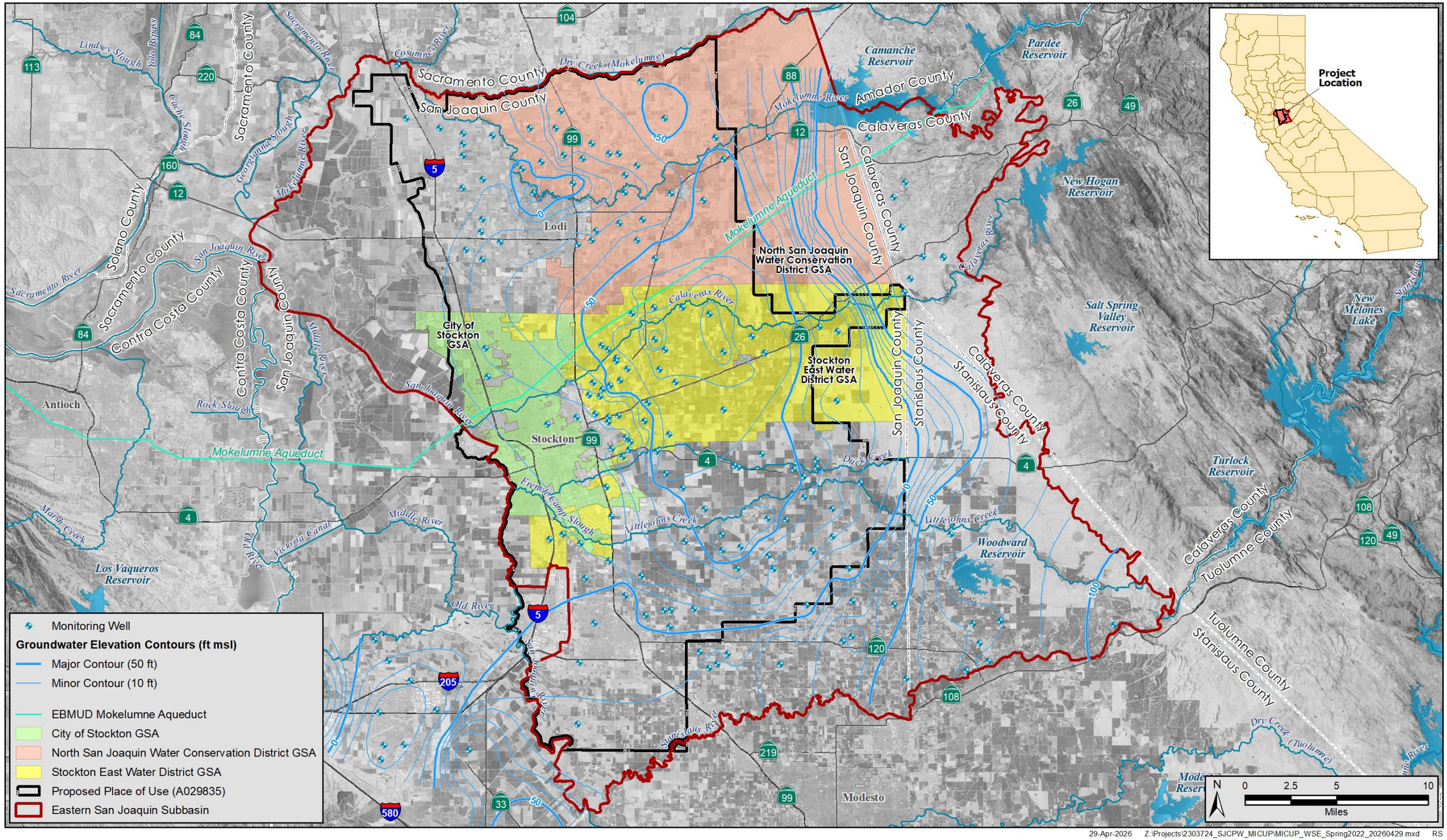


Figure 4.10-5 Spring 2023 Groundwater Elevation Contours

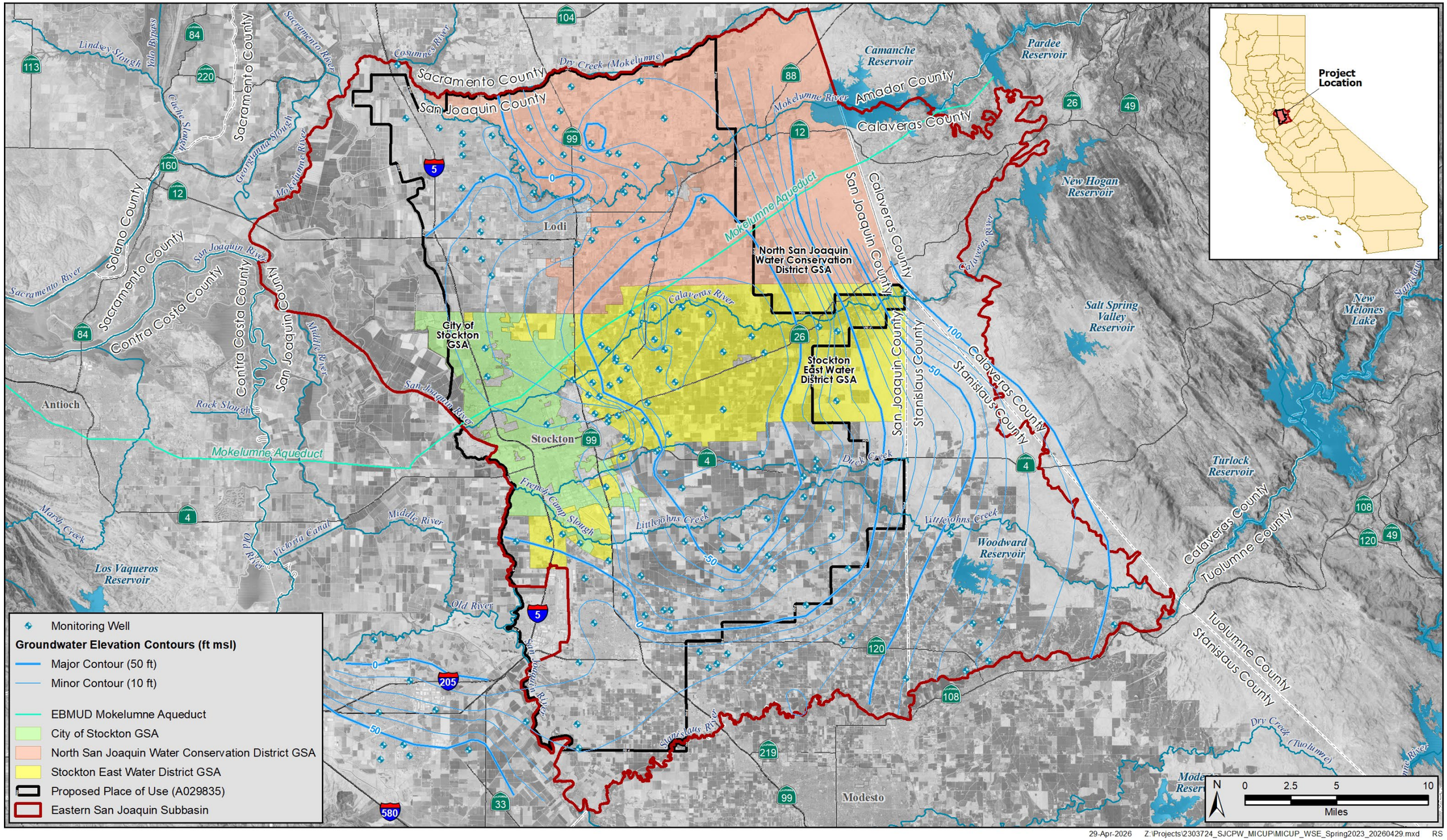
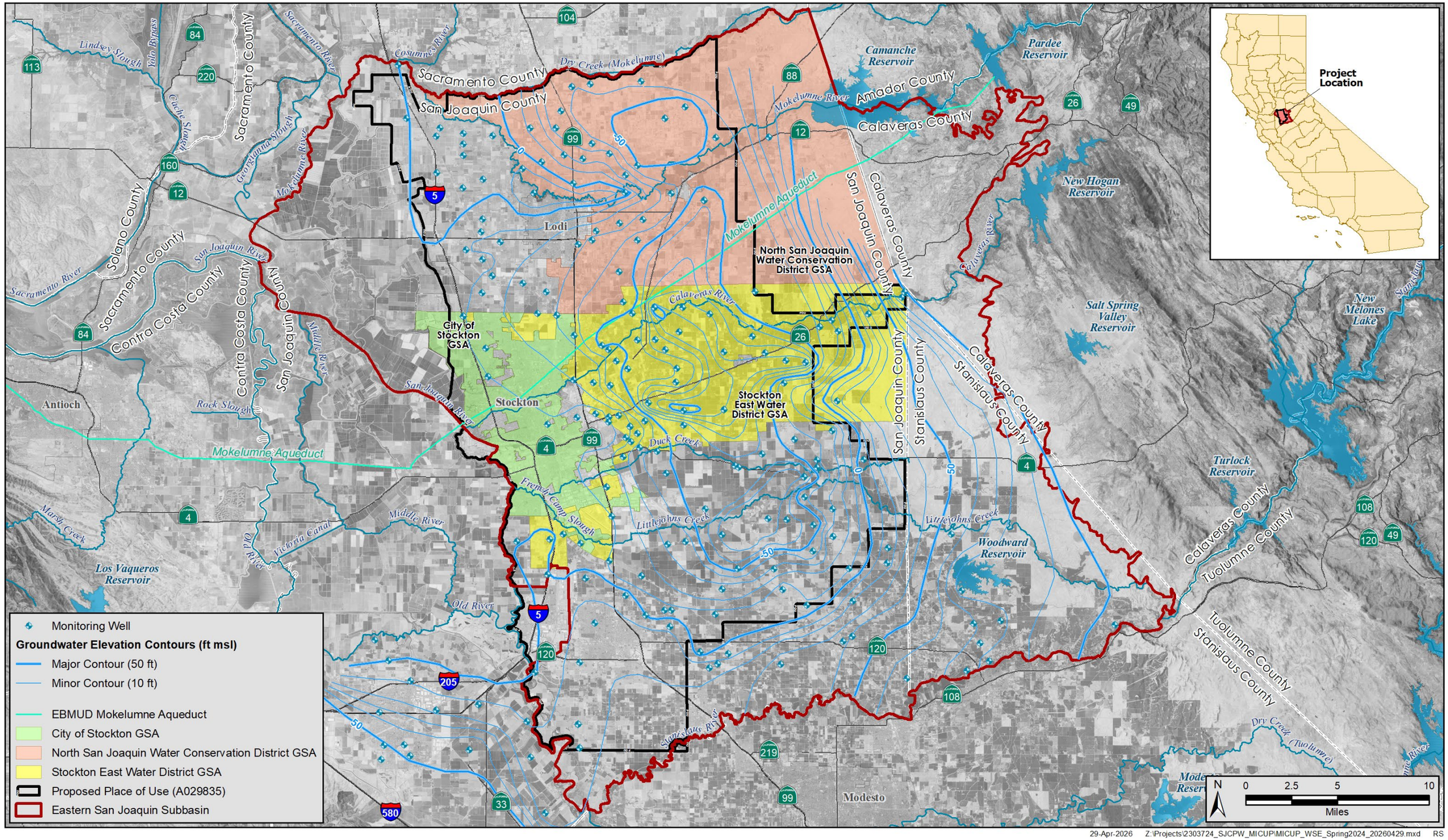


Figure 4.10-6 Spring 2024 Groundwater Elevation Contours



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Groundwater Monitoring Network

Groundwater levels throughout San Joaquin County are monitored and reported in the Semi-annual Groundwater Reports prepared by the San Joaquin County Flood Control and Water Conservation District (SJCFCWCD)[36]. The purpose of these reports is to provide information on county-wide groundwater conditions. Water level data are collected on a semi-annual basis, during the months of April and October, to observe groundwater levels before and after peak groundwater pumping conditions. Groundwater levels from each semi-annual report are compared with values from the previous period to highlight wells with increasing, decreasing or stable groundwater levels. The monitoring data reported by the SJCFCWCD includes over 550 wells, of which 300 are measured by County staff, including the data by California Statewide Groundwater Elevation Monitoring (CASGEM).

In addition to the historical county-wide monitoring and CASGEM monitoring since 2009, groundwater levels are monitored and reported under the GSP efforts by the Eastern San Joaquin Groundwater Authority (ESJGA)[37]. The monitoring network established under the GSP leverages the existing monitoring that has been developed locally and in cooperation with DWR. The main objective of the GSP monitoring network is to monitor conditions across the ESJSB to continue managing groundwater sustainably. Currently, 23 wells are located in the GSP-representative groundwater monitoring network for groundwater levels, including two new wells added to the network as part of the 2024 GSP Amendment. Wells in the network will be measured on a semi-annual schedule. Out of these, 9 representative monitoring wells (RMWs) are located within the MICUP project area.

The various sources of groundwater level data within the ESJSB provide a robust dataset for groundwater level conditions in the ESJSB.

Interconnected Surface Waters and Representative Monitoring Network

Currently, 12 wells are located in the ESJSB GSP representative groundwater monitoring network for interconnected surface water and monitored semi-annually. Wells in the network include the recent construction of five new shallow monitoring wells near surface waters. The representative monitoring wells contained in the network for interconnected surface water consists of a subset of the groundwater level monitoring network. Interconnected surface water minimum thresholds (MTs) and measurable objectives (MOs) are the same as for groundwater levels, to demonstrate that groundwater levels minimum thresholds are protective of stream depletions and stream-aquifer interactions (refer to further explanation of MTs and MOs, below, under *Groundwater Levels in the Project Area*).

As reported in the 2024 GSP Amendment, the Mokelumne River and Calaveras River are losing streams for most of their lengths. [38] Interconnected surface water is highlighted as a data gap in the 2024 GSP Amendment due to a lack of data from shallow monitoring wells near streams. Future improvements to the understanding of interconnected surface water include proposed monitoring

[36] San Joaquin County Flood Control and Water Conservation District Groundwater Reports. Available: https://www.sjwater.org/Groundwater/Groundwater-Reports
[37] Eastern San Joaquin Subbasin GSP Annual Reports. Available: https://www.esjgroundwater.org/Documents/Reports
[38] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

wells that are largely located along streams, which would improve understanding of losses along Mokelumne River[39]

Groundwater Levels in the Project Area

The project area is located entirely in the ESJSB. The major hydrologic features located within the project area include the Mokelumne and Calaveras rivers, as well as Duck and Littlejohns creeks, and French Camp Slough. Additionally, the Mokelumne Aqueduct transects the ESJSB and flows southwest through the project area from the Pardee Reservoir, transects the western edge of the ESJSB at the San Joaquin River and continues west (refer to Section 4.9, *Hydrology and Water Quality: Surface Water*, for more details on surface waters and flow).

Average annual groundwater levels for WYs 2020 through 2024 at four selected RMWs are compared with the MTs and MOs established by the ESJSB GSP in Table 4.10-1[40]. MTs and MOs for groundwater levels are used for the groundwater sustainability indicators. MTs are considered to be protective of groundwater levels and storage, and MOs are goals that reflect the desired subbasin conditions to achieve the subbasin sustainability.

In addition, a comparison of fall (October) 2023 monitoring results to the fall 2022 conditions, reveals that while most of the ESJSB experienced a decline in groundwater elevations over time, the recent data at these selected locations do not show undesirable conditions per the GSP requirements. Also, fall 2023 data records generally show an increase in average groundwater levels compared to fall 2022 conditions, is likely due to very wet conditions during WY 2023.

Table 4.10-1 Average Groundwater Levels from Representative Wells in the Vicinity of the Project Area

Well ID	Location	Average Groundwater Elevation (feet msl)					Minimum Threshold (feet msl)[1]	Measurable Objective (feet msl)[2]
		2020	2021	2022	2023	2024		
04N07E20H003M	NSJWCD	-29.0	-33.3	-36.4	-35.7	-33.1	-80.5	-35.5
03N07E21L003	NSJWCD	–	–	-53.1	-47.6	–	-94	-51.8
02N07E03D001	SEWD	-59.7	-52.2	53.3	–	-51.2	-113.7	-61.7
Swenson-3	City of Stockton	–	–	–	-9.8	-10.6	-26.6	-19.3

[1] Minimum Thresholds are used to define when undesirable conditions occur.

[2] Measurable Objectives are a set of goals for the maintenance or improvement of groundwater conditions for sustainable management.

– Data not available

[39] *Ibid*

[40] California Department of Water Resources. 2025. SGMA Data Viewer. Available: https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels. Accessed February 2025.

Groundwater Quality

Definitions

The following terminology is used in this section to describe groundwater quality.

- **Point Sources** - Point sources are discrete or discernable sources of pollutants which may introduce undesirable constituents into groundwater and may negatively impact water quality.
- **Groundwater Quality Constituents** - Several constituents that are either currently impacting groundwater use or have the potential to impact it in the future are briefly described below and discussed further beneath each MICUP partner agency.
  - **Salinity** - Salinity is a measure of the mass of dissolved particles and ions in a volume of water. Salinity includes many different ions, but the most common are sodium, calcium, magnesium, chloride, bicarbonate, and sulfate. Chloride and total dissolved solids (TDS) are two common ways to measure and analyze salinity, as explained below.
  - **Total Dissolved Solids** - TDS in groundwater can come from geologic sources or from percolation of irrigation return water. Other potential sources of salt in groundwater includes food processing, dairies, and municipal/industrial discharges.
  - **Chloride** – Similar to TDS, chloride in groundwater can be a result of geologic material or irrigation return water.
  - **Sulfate** – Sulfate in groundwater primarily originates from the dissolution of sulfate-containing minerals like gypsum (calcium sulfate); the oxidation of sulfide minerals (like pyrite) within rock formations; atmospheric deposition; and anthropogenic sources like fertilizers, industrial waste, and mining activities; with natural sources like rock weathering often being the dominant contributor to sulfate levels in groundwater.
  - **Arsenic** - Arsenic in groundwater can be both naturally occurring, from geologic material, or from anthropogenic sources such as agriculture and recharge activity. Arsenic can be released either via the weathering of minerals containing arsenic, by desorption under certain pH values, or release in redox conditions are naturally occurring sources of arsenic.[41]
  - **Nitrate** - Nitrate in groundwater can be a result of anthropogenic sources, such as fertilizer application or septic systems, and naturally occurring from the aquifer lithology.[42]
- **Seawater Intrusion** – As sea levels rise along the coasts, saltwater can move onto land. Known as seawater intrusion, this occurs when storm surges or high tides overtop areas low in elevation. It also occurs when saltwater infiltrates freshwater aquifers and raises the groundwater table below the soil surface.[43]

[41] Izbicki, J., Stamus, C., Metzger, L., Halford, K., Kulp, T., & Benner, G. 2008. USGS. Source, Distribution, and Management of Arsenic in Water from Wells, East San Joaquin Ground-Water Subbasin, California.
[42] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[43] United States Department of Agriculture. 2025. Saltwater Intrusion: A Growing Threat to Coastal Agriculture. Available: https://www.climatehubs.usda.gov/hubs/northeast/topic/saltwater-intrusion-growing-threat-coastal-agriculture#:~:text=As%20sea%20levels%20rise%20along,table%20below%20the%20soil%20surface.. Accessed January 23, 2025.

Groundwater Quality Summary

While groundwater quality in the ESJSB is generally sufficient to meet beneficial uses, several constituents of concern are either currently impacting groundwater use or have the potential to impact it in the future. Depending on the water quality constituent, the source may be anthropogenic in origin or naturally occurring, and the issue may be widespread or localized. The primary naturally occurring water quality constituents of concern are salinity and arsenic, while the primary water quality constituents related to human activity include nitrates, salinity, and various point-source contaminants.[44]

Water quality parameters for TDS, chloride, and sulfate were assessed from 2005 to 2017 and are shown on Table 4.10-2[45] [46] [47], along with the secondary maximum contaminate levels (SMCLs). Historical data for arsenic and nitrate were discussed to the maximum contaminate levels (MCLs) to highlight areas of concerns with exceedances.

Table 4.10-2 Groundwater Quality Constituents

Water Quality Constituent (mg/L)	MCL (mg/L)[1]	SMCL (mg/L)[2]		Range (mg/L)	Median (mg/L)
		Recommended	Upper Limit		
Total Dissolved Solids	–	500	1,000	100 – 2,000	520
Chloride	–	250	500	ND – 300	50
Sulfate	–	250	500	ND – 250	25
Nitrate[3]	10	–	–	ND – 47,000	See note[5]
Arsenic[4] (µg/L)	10 (µg/L)	–	–	ND – 1760 (µg/L)	See note[6]

Notes: MCL= maximum contaminant level; SMCLs = secondary maximum contaminant levels; mg/L = milligrams per liter; ND = non-detect; µg/L= micrograms per liter

[1] MCLs defined by the Basin Plan[48]

[2] SMCLs defined by the Basin Plan[49]

[3] Total dissolved solids, chloride, and sulfate levels range from years 2005 to 2017, while nitrate levels were reported from monitoring wells ranging from years 2014 to 2024

[4] Total dissolved solids, chloride, and sulfate levels range from years 2005 to 2017, while arsenic levels were reported from monitoring wells ranging from years 2014 to 2024; arsenic is the only constituent reported in µg/L within this table (.01 mg/L=10 µg/L)

[5] Median could not be calculated using this data source; however, out of a total of 592 monitoring wells, 219 were above the MCL (36.99 percent)

[6] Median could not be calculated using this data source; however, out of a total of 465 monitoring wells, 217 were above the MCL (46.67 percent)

[44] *Ibid*
[45] GEI Consultants. *Water Quality Evaluation Technical Memorandum*. February 5, 2026.
[46] State Water Resources Control Board. 2025a. GAMA Groundwater Information System - Nitrate. Available: https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/. Accessed February 13, 2025.
[47] State Water Resources Control Board. 2025b. GAMA Groundwater Information System - Arsenic. Available: https://gamagroundwater.waterboards.ca.gov/gama/gamamap/public/. Accessed February 13, 2025.
[48] Central Valley Regional Water Quality Control Board. 2019. The Water Quality Control Plan (Basin Plan) for the Sacramento river Basin and the San Joaquin River Basin. Available: https://www.waterboards.ca.gov/rwqcb5/water_issues/basin_plans/sacsjr_201902.pdf. Accessed February 2025.
[49] I*bid*

TOTAL DISSOLVED SOLIDS

Sources of TDS in the ESJSB include Delta sediments, deep deposits, and irrigation return water. From 2005 to 2017, TDS concentrations ranged from 100 to 2,000 milligrams per liter (mg/L). Over this 13-year period, the median TDS value has risen from 400 mg/L to approximately 600 mg/L.[50] The eastern region of the ESJSB typically has TDS concentrations less than 500 mg/L, with higher concentrations in the western region and along the San Joaquin River, ranging from 500 mg/L to greater than 1,000 mg/L.[51] TDS levels exceeding the SMCL of 500 mg/L are generally near the City of Stockton. Elevated TDS concentrations are apparent in very shallow groundwater in close proximity to the San Joaquin River while deep wells (greater than 200 feet deep) typically have TDS concentrations below 500 mg/L.

CHLORIDE

Sources of chloride in the ESJSB are similar to those for TDS and include Delta sediments, deep deposits, and irrigation return water. Chloride values vary across the ESJSB from non-detect (ND) to 300 mg/L. The median concentration for chloride stayed relatively stable at 50 mg/L over the 13-year period from 2005 to 2017[52], which is well below the SMCL of 250 mg/L and the upper limit of 500 mg/L for chloride. Chloride measurements that exceed the SMCL of 250 mg/L during 2017 are observed mainly on the western side of the ESJSB near Manteca and Stockton.[53] Historically, chloride concentrations greater than 250 mg/L generally occurred in the shallowest wells less than 100 feet deep.

SULFATE

Sulfate was observed in concentrations ranging from ND to 250 mg/L, with the median value remaining fairly stable at 25 mg/L during the 13-year period from 2005 to 2017. Higher sulfate concentrations exceeding the SMCL of 250 mg/L during 2017 are apparent near the cities of Manteca and Stockton.[54]

NITRATE

The Mokelumne River Watershed contains substantial quantities of nitrogen from bedrock lithology. Land use practices in the region, such as agriculture, can also contribute to elevated levels of nitrate. The MCL for nitrate is 10 mg/L as nitrogen. Based on data from recent and historical trends, measurements above the MCL of 10 mg/L nitrate for drinking water use are generally observed in the western areas between Highway 99 and Interstate 5, from the city of Ripon to near the city of Lodi.[55] Elevated nitrate concentrations related to land use activities are generally localized and not widespread. Table 4.10-2 shows a very large range of levels (ND-47,000 mg/L) reported from

[50] *Ibid*

[51] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

[52] *Ibid*

[53] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

[54] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

[55] *Ibid*

monitoring locations within the ESJSB over the last 10 years. This is likely due to outliers with a high chance of error in contaminated locations such as water treatment plants or hazardous material sites.

ARSENIC

The MCL of arsenic is .01 mg/L (or 10 micrograms per liter [µg/L]). Arsenic exceedances were detected in the western portion of the ESJSB. A greater number of arsenic measurements above the MCL were observed between Interstate 5 and Highway 99, near the cities of Manteca and Lodi.[56] Similar to nitrate, elevated arsenic concentrations are generally localized and not widespread. Table 4.10-2 shows a very large range of levels (ND – 1760 µg/L) reported from monitoring locations within the ESJSB over the last 10 years. This is likely due to outliers with a high chance of error in contaminated locations such as water treatment plants or hazardous material sites.

Groundwater Quality Monitoring

The CVRWQCB is the primary agency that regulates water quality and establishes water quality objectives for beneficial uses. The ESJSB has been historically monitored for groundwater quality, similar to groundwater levels. Groundwater quality within the ESJSB is characterized by information from the Groundwater Ambient Monitoring and Assessment Program (GAMA) and various United States Geological Survey (USGS) and other government agency studies.

As part of the ESJSB GSP, 21 wells are monitored as part of the representative groundwater quality monitoring network to monitor conditions for beneficial users and uses of groundwater in the ESJSB in compliance with the Sustainable Groundwater Management Act (SGMA) (refer to Section 4.10.3, *Regulatory Framework* for more information on SGMA). In the ESJSB GSP, MTs for water quality were defined by considering two primary beneficial uses at risk of undesirable results related to salinity: drinking water; and agriculture uses. The minimum threshold for degraded water quality is 1,000 milligrams per liter (mg/L) TDS and 250 mg/L for chloride at each of the RMWs, consistent with the upper limit SMCL for TDS and the SMCL of chloride, respectively.

Under the GSP monitoring program, nitrate and arsenic are monitored for informational purposes only to track trends in concentrations. Therefore, the ESJSB GSP does not include sustainability goals, MOs, or MTs for nitrate and arsenic. However, these two constituents are currently regulated in the ESJSB through existing water resources monitoring and management programs.

Groundwater Quality in the Project Area

Groundwater quality constituents are summarized by MICUP partner agency areas, below.[57][58]. Data also include TDS and chloride fall (taken during the month of October) 2023 measurements, based on the USGS monitoring well clusters to assess saline water intrusion into the ESJSB, as reported in the 2023 SJCFCWCD Fall 2023 Groundwater Report[59]. Overall, recent TDS and chloride concentrations during fall 2023 remain consistent with the historical trends over the last two decades.

[56] *Ibid*
[57] *Ibid*
[58] Central Valley Regional Water Quality Control Board. 2019. Water Quality Control Plan (Basin Plan) Fifth Edition. Available: https://www.waterboards.ca.gov/rwqcb5/water_issues/basin_plans/sacsjr_201902.pdf. Accessed January 14, 2025.
[59] San Joaquin County Flood Control and Water Conservation District. 2023. Groundwater Report 2023. Available: https://www.sjwater.org/Portals/0/Fall%202023_ESJ%20Groundwater%20Monitoring%20Report_FINAL_r.pdf?ver=2r467U8M0L5o4jzat_DlXg%3d%3d. Accessed February 11, 2025.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

- **TDS** – Scattered samples of TDS throughout the NSJWCD area are available, primarily along the Mokelumne River near the city of Lodi. Concentrations are generally within 100-250 mg/L, remaining within the SMCL of 250 mg/L for TDS.
- **Chloride and Sulfate** – Several chloride and sulfate samples within the NSJWCD area show similar chloride and sulfate distribution patterns, all within the 0-100 mg/L range, compared to the SMCL of 250 mg/L for both chloride and sulfate.
- **Arsenic** – Only a small number of arsenic samples that exceed the MCL of 10 µg/L are located near the Mokelumne River.
- **Nitrate** - Only a small number of nitrate samples that exceed the MCL of 10 mg/L (as nitrogen) are located near the eastern edge of the NSJWCD area.

STOCKTON EAST WATER DISTRICT

- **TDS** – Scattered groundwater samples with TDS concentrations range from 100 mg/L to 1,000 mg/L that are within the SMCL upper limit of 1,000 mg/L.
- **Chloride and Sulfate** – Chloride and sulfate have very similar distribution patterns. Several chloride and sulfate samples within the SEWD area have concentrations primarily between 0-100 mg/L. These ranges are lower than the SMCL of 250 mg/L for both chloride and sulfate.
- **Arsenic** – Only a small number of arsenic samples that exceed the MCL of 10 µg/L are available near the City of Stockton.
- **Nitrate** - Only a small number of nitrate samples that exceed the MCL of 10 mg/L (as nitrogen) are available near the City of Stockton.

CITY OF STOCKTON

- **TDS** – The City of Stockton has the highest levels of TDS detected throughout the ESJSB. There are a large number of samples within ranges of 100 mg/L and greater than 1,000 mg/L. These samples extend south toward Duck Creek. TDS concentrations at the Swenson Wells (nested wells) during October 2023 measurements were below the SMCL of 500 mg/L with the deepest well (screened at 482-502 feet bgs) showing higher concentrations than the shallow depth well (screened 195-204 feet bgs).
- **Chloride and Sulfate** – Chlorides and sulfates have very similar distribution patterns. There are a large number of chloride and sulfate samples throughout the city of Stockton. Many are located near the confluence of Duck Creek, French Camp Slough, and Littlejohns Creek. Concentrations are generally within 0-100 mg/L, with a few chloride and sulfate samples detected at 100-250 mg/L and greater than 1,000 mg/L. There are also several samples detected near the San Joaquin River with concentrations of 250-500 mg/L. There is one chloride sample near Duck Creek with a concentration of greater than 1,000 mg/L. Chloride concentrations at the Swenson Wells during October 2023 measurements were all below the 100 mg/L, which are well below the SMCL of 250 mg/L.
- **Arsenic** – There are many arsenic samples that exceed the MCL of 10 µg/L, primarily clustered around the city of Stockton and extending south. The City of Stockton's 2023 Drinking Water

Quality results reported average arsenic in groundwater as 4.3 mg/L, ranging from ND to 6.1 µg/L.[60]

- **Nitrate** – There are many nitrate samples that exceed the MCL of 10 µg/L, primarily clustered around the city of Stockton. The City of Stockton reported average nitrate (as nitrogen) in groundwater as 3.5 mg/L, ranging from 0.65 mg/L to 6.2 mg/L, in the 2023 Drinking Water Quality Report.[61]

Seawater Intrusion

The ESJSB is not located in a coastal area and seawater intrusion is not present. While the Delta ecosystem evolved with a natural salinity cycle that brought brackish tidal water in from the San Francisco Bay, levees installed to allow development of agriculture, followed by development and operation of the Central Valley Project (CVP) and the State Water Project (SWP), have altered the inward movement of seawater through the Delta. Current management practices endeavor to maintain freshwater flows through a combination of hydraulic and physical barriers and alterations to existing channels. Portions of the ESJSB do, however, experience water quality issues related to salinity.[62]

Pumping in excess of recharge has resulted in declining groundwater levels that have contributed to an increase of salinity in groundwater wells since the 1950s. Salinity concentrations in the ESJSB are the result of natural processes and overlying land use activities. Within the ESJSB, there are three primary sources of salinity:

- **Delta Sediments** – Evaporation of groundwater in discharge areas introduced naturally occurring soluble salts into Delta sediments.
- **Deep Deposits** – Saline groundwater in the ESJSB is largely the result of the migration of a naturally occurring deep saline water body which originates in regionally deposited marine sedimentary rocks that underlie the San Joaquin Valley. This results in a saline aquifer underlying the freshwater aquifer, and well pumping can result in upwelling saline brines into the freshwater aquifer.
- **Irrigation Return Water** – Irrigation return water is excess applied water that percolates into the groundwater system or flows to the stream system from an irrigated field following the application of irrigation water. Return water may include contaminants typical of agricultural practices (e.g., pesticides, herbicides) and can concentrate salts due to evapotranspiration. The return water may act as a conduit delivering these contaminants to the surrounding watershed or underlying groundwater aquifer. Areas in the ESJSB with salinity resulting from irrigation return water do not commonly exceed chloride concentrations of 100 mg/L that is lower than the SMCL of 250 mg/L for chloride.

[60] City of Stockton 2023 Drinking Water Quality Report. Available: https://cms3.revize.com/revize/stockton/Documents/Services/Water,%20Sewer%20&%20Stormwater/Water/Water%20Quality/ccr.pdf. Accessed February 11, 2025.
[61] City of Stockton 2023 Drinking Water Quality Report. Available: https://cms3.revize.com/revize/stockton/Documents/Services/Water,%20Sewer%20&%20Stormwater/Water/Water%20Quality/ccr.pdf. Accessed February 11, 2025.
[62] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

Point Sources

In the ESJSB, point sources include hazardous materials and hazardous material sites, as defined by the Department of Toxic Substances Control (DTSC) Cortese List, and DTSC EnviroStor and the State Water Resources Control Board (SWRCB) GeoTracker databases. The United States Environmental Protection Agency (EPA), DTSC, and the CVRWQCB provide oversight of point-source pollution through existing regulatory programs, including management of remedial action for point-source contamination sites (refer to Section 4.2, *Hazards and Hazardous Materials*). As shown in Figure 4.8-1, there are many active hazardous material sites within the ESJSB. Most sites within the ESJSB are fuel sites (e.g., gas or diesel) that are under active investigation or remediation.[63] Sites that have the potential to cause groundwater plumes (movement of hazardous materials within the groundwater) are managed by existing regulatory programs as detailed in Section 4.8.2, *Regulatory Framework* of Section 4.2, *Hazards and Hazardous Materials*.

Specific point source sites and contaminants include:[64]

- **Petroleum Hydrocarbons** – Petroleum hydrocarbon constituents are most commonly fuels (diesel, gasoline, motor oil, or aviation fuel) and volatile organic compounds (VOCs) commonly added to fuels, including Methyl tert-butyl ether (MTBE) and benzene, toluene, ethylbenzene, and xylenes (BTEX) constituents. Concentrations of petroleum hydrocarbons have not been modeled across the ESJSB; concentrations are local and site specific.
- **Synthetic Organics** – At these sites, pesticides, herbicides, fertilizer, and pesticides are the most common constituents. Other constituents include VOCs such as perchloroethylene (PCE) and trichloroethylene (TCE). Concentrations of synthetic organics have not been modeled across the ESJSB; concentrations are local and site specific.
- **Mixed Constituents** – Sites with mixed constituents are those that include a release of more than one type of contaminant, such as a mix of heavy metals, diesel, inorganics, and/or organics. At these sites, the most common constituents include a mixture of heavy metals (chromium, arsenic, and lead), inorganics, and solvents.
- **Emerging Contaminants** – Many chemical and microbial constituents that have not historically been considered as contaminants are occasionally, and in some cases with increasing frequency, detected in groundwater. These newly recognized (or emerging) contaminants are commonly derived from municipal, agricultural, industrial wastewater, and domestic wastewater sources and pathways. These newly recognized contaminants are dispersed to the environment from domestic, commercial, and industrial uses of common household products. Residual waste products of genetically modified organisms are also of potential concern.
    - Perfluorooctanesulfonic acid (PFOS) and perfluorooctantoic acid (PFOA) – Organic chemicals synthesized for water and lipid resistance, used in a wide variety of consumer products as well as fire-retarding foam and various industrial processes. These chemicals tend to accumulate in groundwater, though typically in a localized area in association with a specific facility, such as a factory or airfield.
    - 1,2,3-Trichloropropane (1,2,3-TCP) – Solvent and is typically found in industrial or hazardous waste sites. Along with an industrial solvent, 1,2,3-TCP is a cleaning and degreasing agent and associated with pesticide products

[63] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[64] *Ibid*

4.10.3 Regulatory Framework

Federal Regulations

Safe Drinking Water Act

The federal Safe Drinking Water Act is described in Section 4.9, *Hydrology and Water Quality: Surface Water*.

Clean Water Act

The federal CWA and subsequent amendments, including Sections 401, 402, and 404 are described in Section 4.9, *Hydrology and Water Quality: Surface Water*.

State Regulations

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act is described in Section 4.9, *Hydrology and Water Quality: Surface Water*.

National Pollutant Discharge Elimination System and Storm Water Pollution Prevention Plans

The National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP) and associated Storm Water Pollution Prevention Plan (SWPPP) is described in Section 4.9, *Hydrology and Water Quality: Surface Water*.

California Toxics Rule and State Implementation Policy

The California Toxics Rule and State Implementation Policy is described in Section 4.9, *Hydrology and Water Quality: Surface Water*.

Water Quality Control Plan for the Sacramento River Basin and the San Joaquin River Basin (Basin Plan)

The Water Quality Control Plan for the Basin Plan is described in Section 4.9, *Hydrology and Water Quality: Surface Water*.

California Department of Pesticide Regulation – Restricted Materials Permits and Pesticide Use Report

The California Department of Pesticide Regulation (CDPR) is dedicated to protect human health and the environment by regulating pesticide sales and use, and by fostering reduced-risk pest management. The State of California maintains a list of pesticides that are especially dangerous to human health or the environment if used incorrectly, commonly called restricted materials. These pesticides are listed in 3 California Code of Regulations (CCR) Section 6400. CDPR puts special controls and limitations on these pesticides; furthermore, the purchase or use of restricted

materials for agricultural purposes requires a permit from the CAC. Use requirements for these pesticides are given in 3 CCR Sections 6445 through 6489.[65]

CDPR maintains a list of registered pesticides known to cause groundwater contamination in California; these pesticides are listed in Title 3, California Code of Regulations (3 CCR), Section 6800(a): atrazine, bantazon, bromacil, diuron, norflurazon, prometon, simazine. Section 6800(a) pesticides have certain use restrictions. Section 6800(a) pesticides are prohibited below the high water mark inside artificial recharge basins, unless the pesticide is applied six months or more before the basin is used to recharge groundwater (3 CCR Section 6487.1). CDPR also maintains a list of pesticides that have the potential to move to, but are not currently found in groundwater, listed in 3 CCR Section 6800(b). Section 6800(b) pesticides are not prohibited for use in artificial recharge basins.[66] CDPR also has regulations pertaining to wellhead protection and the use of pesticides, as listed in 3 CCR Section 6609[67]. These measures apply to all wells (irrigation, domestic, municipal, monitoring, abandoned, dry, or drainage wells) where pesticides are mixed, loaded, rinsed, or otherwise used within 100 feet of the well. The following management measures are given by CDPR to protect wellheads:

- **Wells protected from runoff:**
  - The well should be sited so that no surface water runoff can contact the wellhead including the concrete base, or;
  - A berm should be constructed adjacent to the wellhead to prevent movement of surface water to the wellhead. Preemergent herbicides from the 6800(a) and 6800 (b) lists are prohibited between the berm and the wellhead.
- **Wells not protected from runoff:** The following activities are prohibited within 100 feet of an unprotected well:
  - Mixing, loading, and storing pesticides,
  - Rinsing of spray equipment or pesticide containers,
  - Maintenance of spray equipment that could result in a pesticide or pesticide residue spill,
  - Application of preemergent herbicides from the Section 6800(a) and Section 6800 (b) lists.

California became the first state to require full reporting of agricultural pesticide use in response to demands for more realistic and comprehensive pesticide use data. Under the PUR program, all agricultural pesticide use must be reported monthly to county agricultural commissioners, who in turn, report the data to CDPR.

Sustainable Groundwater Management Act

In 2014, the State adopted the SGMA to help manage its groundwater. According to the act, local Groundwater Sustainability Agencies (GSAs) must be formed for all high- and medium-priority basins in the state. These GSAs must develop and implement GSPs for managing and using groundwater without causing undesirable results, including significant groundwater-level declines,

[65] California Department of Pesticide Regulation. 2025a.Restricted Materials Use Requirements. Available: https://www.cdpr.ca.gov/docs/enforce/permitting.htm. Accessed January 20, 2025.
[66] California Department of Pesticide Regulation . 2025b. California Code of Regulations (T3. Food and Agriculture) Division 6. Pesticides and Prest control Operations. Available: https://www.cdpr.ca.gov/docs/enforce/permitting.htm. Accessed January 20, 2025.
[67] California Department of Pesticide Regulation . 2025c. Regulations. Available: https://www.cdpr.ca.gov/docs/emon/grndwtr/gwp_regs.htm#:~:text=Wellhead%20protection&text=Restricts%20pesticide%20handling%20practices%20within,a%20berm%20and%20the%20wellhead.&text=Wellhead%20Protection%203CCR%20section%206609.. Accessed January 20, 2025.

groundwater-storage reductions, seawater intrusion, water-quality degradation, land subsidence, and surface-water depletions.[68] These are also referred to as sustainability indicators.

SGMA requires that all designated medium and high-priority groundwater basins be managed in a sustainable manner within 20 years of GSP adoption, and the ESJSB is designated as a high-priority groundwater basin. SGMA also requires that GSAs demonstrate sustainability through the avoidance of undesirable results. The presence of significant and unreasonable effects for any of the indicators, if left uncorrected, could result in State intervention in the management of groundwater in the ESJSB. In compliance with SGMA, GSPs should be evaluated regarding their progress towards meeting the approved sustainability goals at least every five years.[69] The project area is covered by the ESJGA and ESJSB GSP, described below under R*egional and Local Regulations*.

Groundwater Ambient Monitoring and Assessment Program

The GAMA Program is California's comprehensive groundwater quality monitoring program that was created by the SWRCB in 2000. It was later expanded by Assembly Bill 599 (AB 599) - the Groundwater Quality Monitoring Act of 2001. AB 599 required the SWRCB, in coordination with an Interagency Task Force (ITF) and Public Advisory Committee (PAC) to improve statewide comprehensive groundwater monitoring and increase the availability to groundwater quality information to the public. The GAMA Program is based on interagency collaboration with the State and Regional Water Boards, DWR, CDPRs, USGS, and Lawrence Livermore National Laboratory, University of California and California State University, and cooperation with local water agencies and well owners. Comprehensively monitoring groundwater quality under the GAMA Program is an important part of managing water resources.[70]

Regional and Local Regulations

Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan

The ESJSB (Bulletin 118 Basin Number 5-0022.01) is one of 21 basins and subbasins identified by DWR as being in a state of critical overdraft.[71] For compliance with SGMA, the ESJSB was required to prepare a GSP to achieve sustainability for long-term management of the ESJSB without causing undesirable results.

The ESJGA, formed in 2017 in response to SGMA, is comprised of 16 GSAs in the ESJSB. To address the requirements of SGMA, the original GSP was developed by the GSAs and submitted by the January 31, 2020, deadline. The 2020 GSP was subsequently revised to address two deficiencies identified by DWR and potential corrective actions to address each potential deficiency. In July 2022, the GSAs submitted the 2022 Revised GSP to DWR. DWR's July 2023 letter of determination concluded that the GSAs have taken sufficient actions to correct the deficiencies identified by DWR and approved the 2022 Revised GSP. The 2023 determination letter also outlined eight recommended corrective actions. The Final 2024 GSP Amendment was prepared to adequately

[68] California Department of Water Resources. 2024. Sustainable Groundwater Management Act. Available: https://water.ca.gov/programs/groundwater-management/sgma-groundwater-management. Accessed January 23, 2025.
[69] *Ibid*
[70] State Water Resources Control Board. 2025. Groundwater Ambient Monitoring and Assessment Program. Available: https://www.waterboards.ca.gov/gama/. Accessed January 23, 2025.
[71] California Department of Water Resources. 2006. Bulletin 118: San Joaquin Valley Groundwater Basin Eastern San Joaquin Subbasin.

address the recommended corrective actions and submitted in November 2024 for DWR review and approval process.[72]

Pursuant to SGMA, the ESJSB GSP sets the following sustainability goal:

> "Maintain economically-viable groundwater resources for the beneficial use of the people of the Eastern San Joaquin Subbasin by operating the Subbasin within its sustainable yield or by modification of existing management to address future conditions. This goal will be achieved through the implementation of a mix of supply and demand type projects consistent with the GSP implementation."

The ESJSB GSP established minimum thresholds and measurable objectives for a series of RMWs to determine compliance with SGMA with respect to each of the six sustainability indicators. MTs are numeric values for each sustainability indicator and are used to define when undesirable results occur. MOs are quantifiable goals that reflect the desired ESJSB condition for achieving sustainability. Representative networks were used to determine compliance with the MTs and demonstrate progress toward achieving sustainability in the ESJSB.

Table 4.10-3[73] presents a summary of the 2024 GSP Amendment sustainability indicators, designated monitoring network, and definition of undesirable results. Figure 4.10-7 shows the locations of the GSP representative monitoring network and depth to water, relative to the MICUP recharge areas. As noted in Table 4.10-2, groundwater levels were used as a proxy for reduction in groundwater storage; thus, the GSP uses the groundwater levels MTs and monitoring network for groundwater storage. MTs for groundwater quality consider both drinking water and agricultural uses and are defined for TDS and chloride. Seawater intrusion is not considered applicable as the ESJSB is not in a coastal area and seawater is not currently present. Minimum thresholds for interconnected surface water were established using groundwater levels.

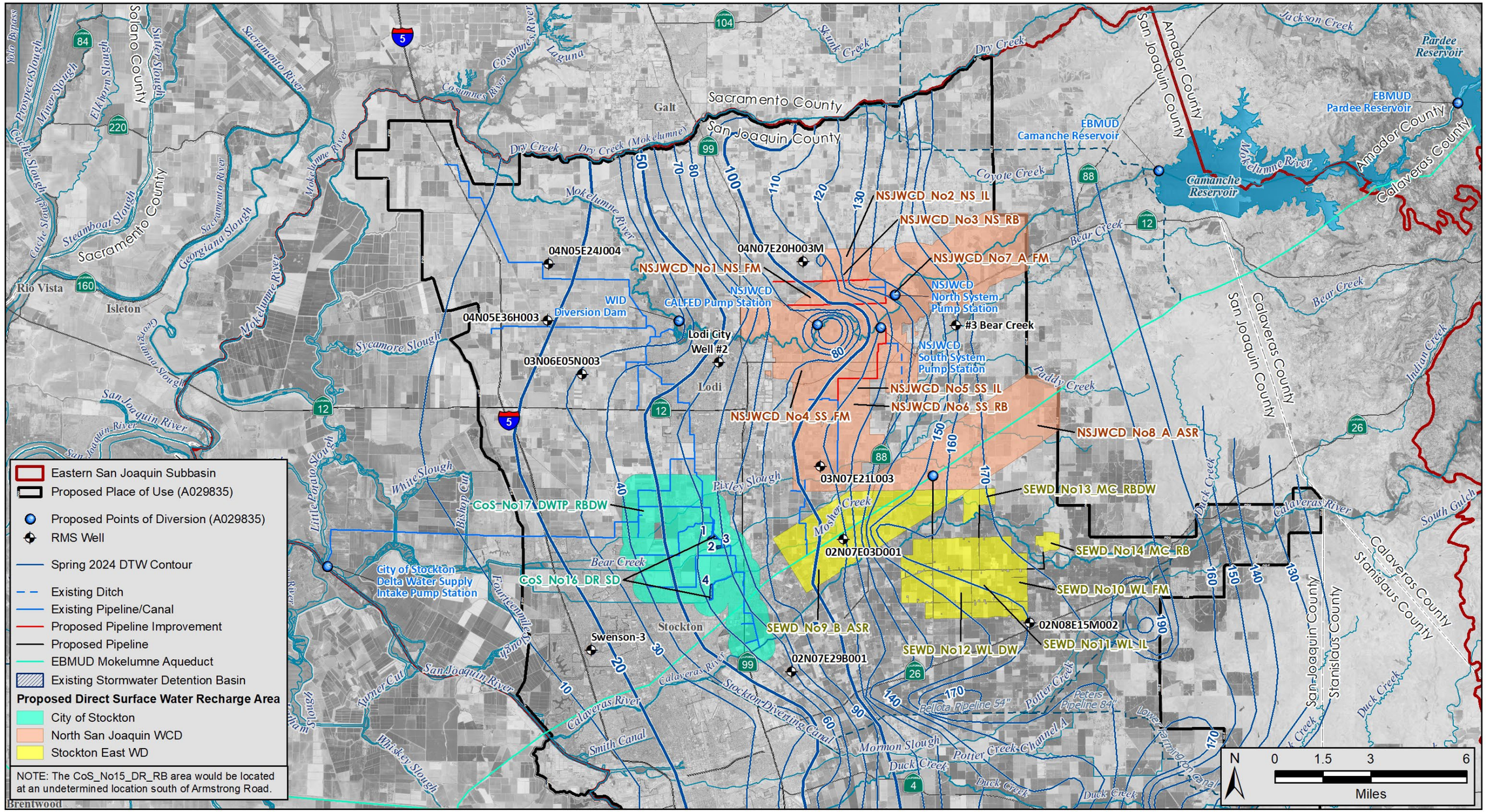
[72] East San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[73] *Ibid*

Table 4.10-3 Eastern San Joaquin Groundwater Subbasin GSP Sustainability Indicators

Sustainability Indicator	Definition	Monitoring Network	Undesirable Result Definition
Chronic lowering of groundwater levels	Significant and unreasonable depletion of supply	23 representative monitoring wells	At least 25 percent of RMWs used to monitor groundwater levels in the Subbasin (5 out of 21 wells[1]) fall below their minimum thresholds for two consecutive years
Reduction in groundwater storage	Significant and unreasonable reduction of groundwater storage	23 representative monitoring wells; same as groundwater levels	Groundwater levels used as a proxy; groundwater levels minimum thresholds used for protecting groundwater storage
Degraded water quality	Significant and unreasonable degraded water quality, including migration of contaminant plumes	21 representative monitoring wells	More than 25 percent of RMWs exceed the minimum thresholds for water quality for two consecutive years and where these concentrations are the result of groundwater management activities. The minimum threshold for degraded water quality is 1,000 mg/L TDS and 250 mg/L for chloride at each of the RMWs, consistent with the upper limit SMCL for TDS and chloride, respectively.
Seawater intrusion	Significant and unreasonable seawater intrusion	Not applicable	Not applicable
Land subsidence	Significant and unreasonable land subsidence that substantially interferes with surface land uses	10 representative monitoring sites	Minimum threshold was set at no more than 0.2 foot/year in any five-year period between 2020 and 2040, resulting in no more than a total additional 2 feet of land subsidence by 2040.
Depletion of interconnected surface water	Significant and unreasonable adverse impacts in beneficial uses of surface water	12 representative monitoring wells	Interconnected surface water minimum thresholds for wells with historical groundwater levels are the same as chronic lowering of groundwater levels minimum thresholds.

[1] Two wells were newly constructed and do not have established minimum thresholds as part of the 2024 GSP Amendment.

Figure 4.10-7 Eastern San Joaquin Subbasin GSP Representative Monitoring Well Network for Groundwater Levels



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Table 4.10-4[74] lists the 20 RMWs established for groundwater levels along with their minimum thresholds and measurable objectives. Table 4.10-5 identifies the 9 RMWs located in the vicinity of each of the 15 MICUP recharge areas across the three agencies participating in the MICUP, including the name of the recharge area and the proposed method of groundwater recharge. These RWMs were used to estimate the approximate depth to groundwater and evaluate available groundwater storage to receive MICUP recharge water in the vicinity of each of the proposed MICUP recharge areas.

Table 4.10-4 Eastern San Joaquin Subbasin GSP Representative Monitoring Wells for Groundwater Levels

Local Well Name	Well Location	Minimum Threshold (feet MSL)	Measurable Objective (feet MSL)
01S09E05H002	CSJWCD	-49.8	-8.6
01N07E14J002	CSJWCD	-93.9	-49.9
Lodi City Well #2	City of Lodi	-34.4	0.6
Manteca 18	City of Manteca	-19	2.8
Swenson-3	City of Stockton	-26.6	-19.3
01S10E26J001M	Eastside GSA	43.7	81.7
01S10E04C001M	Eastside GSA	54.7	76.4
02N08E15M002	LCWD	-124.1	-63.2
#3 Bear Creek	LCSD	-73.8	-51.8
04N07E20H003M	NSJWCD	-80.5	-35.5
03N07E21L003	NSJWCD	-94	-51.8
NSJWCD-01	NSJWCD	TBD[1]	TBD[1]
Hirschfield (OID-8)	OID	7.9	31.5
Burnett (OID-4)	OID	60.8	79.7
02S07E31N001	SDWA	0.8	12.3
02S08E08A001	SSJ GSA	0.6	24
02N07E03D001	SEWD	-113.7	-61.7
01N09E05J001	SEWD	-86.8	-22.6
02N07E29B001	SEWD	-130.1	-80.4
SEWD-01	SEWD	TBD[1]	TBD[1]

[1] Two wells were newly constructed and do not have established minimum thresholds and measurable objectives as part of the 2024 GSP Amendment.

[74] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025. https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f

Table 4.10-5 Eastern San Joaquin Subbasin GSP Representative Monitoring Wells in the Vicinity of MICUP Recharge Areas

Recharge Area Number	District	Recharge Area Name	Recharge Method	Amount (AFY)	04N07E20H003M	#3 Bear Creek	Lodi City Well #2	03N06E05N003	03N07E21L003	02N07E03D001	02N08E15M002	Swenson-3	02N07E29B001
1	NSJWCD	NSJWCD_No1_NS_FM	Flood-MAR	800	X		X						
2	NSJWCD	NSJWCD_No2_NS_IL	In - Lieu	10,000	X		X						
3	NSJWCD	NSJWCD_No3_NS_RB	Recharge Basin	32,600	X		X						
4	NSJWCD	NSJWCD_No4_SS_FM	Flood-MAR	800		X			X				
5	NSJWCD	NSJWCD_No5_SS_IL	In - Lieu	10,000		X			X				
6	NSJWCD	NSJWCD_No6_SS_RB	Recharge Basin	32,600		X			X				
7	NSJWCD	NSJWCD_No7_A_FM	Flood-MAR	4,300	X	X	X		X				
8	NSJWCD	NSJWCD_No8_A_ASR	Wells (ASR)	13,400						X			
9	SEWD	SEWD_No9_B_ASR	Wells (ASR)	500						X			
10	SEWD	SEWD_No10_WL_FM	Flood-MAR	1,800						X	X		
11	SEWD	SEWD_No11_WL_IL	In - Lieu	17,300						X	X		
12	SEWD	SEWD_No12_WL_DW	Wells (Dry Wells)	24,100						X	X		
13	SEWD	SEWD_No13_MC_RBDW	Recharge Basin	35,700					X	X			
14	SEWD	SEWD_No14_MC_RB	Recharge Basin	30,900					X	X			
15	City of Stockton	Cos_No15_DR_RB	Recharge Basin	10,700			X	X					
16	City of Stockton	Cos_No16_DR_SD	Recharge Basin	2,700			X	X					
17	City of Stockton	CoS_No17_DWTP_RBDW	Recharge Basin	8,800								X	X

AFY = acre-feet/year[75]

[75] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

As part of the 2024 GSP Amendment, the Eastern San Joaquin Water Resources Model (ESJWRM) was updated to Version 3.0 to incorporate new datasets and extend the simulation period through WY 2023. Based on the future projections of land and water uses and projected baseline simulations, groundwater levels in the ESJSB are expected to decline.[76] The GSP identified projects and managements actions (PMAs) that would offset groundwater pumping and/or increase recharge to help the ESJSB reach sustainability. The types of potential projects included in the GSP projected conditions represent a variety of direct and in-lieu recharge projects, similar to MICUP, in addition to water transfers and conservation. Category A projects (completed or anticipated to advance in the next five years) were simulated in the projected conditions. MICUP is included in the GSP as a Category B project (not anticipated to advance in the next five years but may be implemented in the future). Additionally, the GSP implementation will evaluate other programs as part of an adaptive management strategy (including a demand reduction strategy) to achieve sustainability in compliance with SGMA requirements for the ESJSB GSP.

San Joaquin County Ordinance Code Section 9-1115.6

San Joaquin County well standards (Code Section 9-1115.6) include general standards of well construction and deconstruction in the county.[77]

San Joaquin County Well Permit Program

San Joaquin County's Environmental Health Department includes information and resources available in their Well Permit Program to assist with permitting of wells. The purpose of the program is to prevent groundwater contamination and safety hazards by regulation of the location, construction, repair and destruction of water supply, monitoring, and geophysical wells and borings.[78]

San Joaquin County General Plan 2035

The County's 2035 General Plan includes a comprehensive framework for the County's physical, economic, and social development and environmental resource preservation. The following goals and policies from the 2035 General Plan may be relevant to the proposed project.[79]

NATURAL AND CULTURAL RESOURCES ELEMENT

- **Goal NCR-3** To ensure the quality of water for municipal and industrial uses, agriculture, recreation, and fish and wildlife.
  - **NCR-3.1** Preserve Groundwater Recharge Areas: The County shall strive to ensure that substantial groundwater recharge areas are maintained as open space. (PSP)
  - **NCR-3.2** Groundwater Recharge Projects: The County shall encourage the development of groundwater recharge projects of all scales within the County and cities to increase groundwater supplies. (PSP)

[76] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.
[77] San Joaquin County. 2005. San Joaquin County Well standards. Available: https://www.sjgov.org/docs/default-source/environmental-health-documents/well-permits/well-standards.pdf?sfvrsn=40772261_3. Accessed January 23, 2025.
[78] San Joaquin County. 2025b. Well Permits. Available: https://www.sjgov.org/department/envhealth/programs/well-permits. Accessed January 23, 2025.
[79] San Joaquin County. 2016. San Joaquin County General Plan Policy Document. Available: https://www.sjgov.org/commdev/cgi-bin/cdyn.exe/file/Planning/General%20Plan%202035/General%20Plan%202035.pdf. Accessed January 20, 2025.

- **NCR-3.3** Multi-Jurisdictional Groundwater Management Evaluation: The County shall support multi-jurisdictional groundwater management that involves adjacent groundwater basins. (IGC)
- **NCR-3.9** Require Water Projects to Mitigate Impacts: The County shall require water projects to incorporate safeguards for fish and wildlife and mitigate erosion and seepage to adjacent lands. (RDR)

City of Stockton General Plan

The City of Stockton 2024 General Plan is the City's primary planning tool to guide physical change withing the city limit, and, in some cases beyond it in a Sphere of Influence where City services may someday be provided (areas currently governed by the County). The following goals and policies from the 2040 General Plan may be relevant to the proposed project.[80]

LAND USE ELEMENT

- **Goal LU-5** Protected Resources: Protect, maintain, and restore natural and cultural resources.
  - **Policy LU-5.2**: Protect natural resources areas, fish and wildlife habitat, scenic areas, open space areas, agricultural lands, parks, and other cultural/historic resources from encroachment or destruction by incompatible development.

4.10.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2024 *CEQA Guidelines* Appendix G significance criteria questions related to groundwater hydrology and quality.

Would the proposed project:

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade ground water quality?

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

c) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan?

Approach to Analysis

This analysis addresses the potential impacts related to groundwater hydrology and water quality that could result from construction and operation and maintenance activities associated with MICUP project components within the project area. The analysis is based on a review of the following information: the description of the proposed project provided in Chapter 3, *Project Description*; a review of available literature (groundwater hydrology and quality reports and maps); and review of the existing conditions of the project area, as described above in Section 4.10.2, *Environmental Setting*.

MICUP would be regulated by the various laws, regulations, and policies including but not limited to those summarized above in Section 4.10.2, *Regulatory Framework*. Compliance by MICUP with applicable federal, state, and local laws and regulations is assumed in this analysis and local and state

[80] City of Stockton. 2018. Envision Stockton 2040 General Plan. Available: https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/Stockton_General_Plan_Adopted.pdf. Accessed January 20, 2025.

agencies would be expected to continue to enforce applicable requirements to the extent that they do so now. Note that compliance with some regulations is a condition of permit and project approval.

After considering the implementation of MICUP described in Chapter 3, *Project Description*, and compliance with the required regulatory requirements, the environmental analysis below identifies if significance thresholds are exceeded, and therefore, a significant impact would occur. For those impacts considered to be significant, mitigation measures are proposed to the extent feasible to reduce the identified impacts.

The potential for project components to intersect with areas containing contaminated groundwater is discussed in this section. However, more detailed information, including locations of hazardous material sites, are discussed in greater detail in Section 4.8, *Hazards and Hazardous Materials*.

Construction

Construction activities include ground disturbance, in-water work, dewatering, discharges, and use of chemicals onsite, along with potential changes in project site conditions and groundwater hydrology due to these activities.

Operation and Maintenance

Operational activities evaluated includes recharge using surface water via the proposed recharge methods (direct surface recharge, ASR wells, and Flood-MAR) within each of the three MICUP agency areas. MICUP would not change existing beneficial uses of water within the Place of Use. Instead, MICUP would provide additional recharge to the ESJSB to increase groundwater levels and storage to support existing beneficial uses within the Place of Use that are supplied by groundwater, primarily consisting of agricultural irrigation.

Maintenance activities evaluated for impacts to groundwater hydrology and quality include management of the proposed pumps/pump stations, pipelines, ASR and dry wells, Flood-MAR, and recharge basins.

Groundwater Modeling

To evaluate the potential impacts of the proposed project on groundwater conditions, modeling was conducted using the ESJWRM—an integrated surface water and groundwater hydrologic model developed and maintained for the ESJSB GSP. Groundwater analysis was performed using scenarios representing: 1) Current Conditions Baseline (CCBL) and 2) Current Conditions Baseline with MICUP (CCBL+MICUP).

GROUNDWATER MODELING METHODOLOGY

The methodology used to estimate changes in groundwater is provided in Appendix I-1 and summarized in this section. The Historical ESJWRM Version 3.0 and Projected Conditions Baseline (PCBL) Version 3.0, completed through the 2024 GSP Amendment for the ESJ Subbasin, were used as the basis for the development of the CCBL and CCBL+MICUP scenarios. Based on a review of the annual water budget for the 2019 to 2023 period, it was determined that WY 2023 would be most representative to establish the current conditions in support of the two MICUP scenarios. The CCBL scenario represents the most recent land use, demand and supply conditions as of WY 2023. The model stratigraphy, layering, and structure for the CCBL are identical to the Historical ESJWRM and PCBL Version 3.0.

The current conditions in the GSP are represented as the average of the last five years from 2019 to 2023 period. The WY 2023 water management activities differ from average of the prior water years and

reflect the expected future water management activities among the MICUP partners. These include: increased surface water diversions to NSJWCD, better representation of stream losses in the Calaveras River, and increased surface water use in the City of Stockton.

The CCBL scenario simulates the existing level of development and agricultural demand to a 53-year historical hydrology from WYs 1969 to 2021. This modelling period includes extended droughts (e.g., 1976-1977, 1987-1992, 2012-2015, and 2020-2021) as well as several very wet WYs. It also represents the overlapping period between the historical hydrology in the PCBL Version 3.0 and the MICUP water availability analysis. The CCBL+MICUP scenario represents incorporation of diversions for MICUP—direct diversion of up to 110,000 acre-feet from December 1st to June 30th under A029835 and rediversion from storage in Camanche Reservoir of up to 48,000 acre-feet between July 1st to October 31st—and groundwater recharge under MICUP.

The hydrologic period and the data for land use, cropping patterns, agricultural demands, urban demand and urban supplies are identical to the GSP modeling and reflect the data at the end of the Historical ESJWRM Version 3.0. Additionally, historical records of hydrologic data, including stream flow, precipitation, and evapotranspiration are based on the historical data used in the PCBL Version 3.0. The following adjustments were made for CCBL+MICUP: additional surface water diversions, agricultural groundwater pumping was reduced due to increased surface water diversions in-lieu of pumping, and Aquifer Storage and Recovery (ASR) wells were incorporated as positive pumping to simulate direct recharge into the aquifer system.

GROUNDWATER MODELING RESULTS

Groundwater modeling results are provided in Appendix I-1 and summarized in this section.

Groundwater Budget and Storage

The annual average groundwater budget throughout the 53-year modeling period for CCBL and CCBL+MICUP for MICIP overall and each MICUP parter agency is presented in Table 4.10-6. Groundwater pumping remains the largest component in the groundwater budget under the CCBL+MICUP, with an annual average of 841 thousand acre-feet per year (TAFY). However, MICUP would substantially reduce the ESJ Subbasin's overdraft conditions. In the absence of MICUP, the CCBL scenario estimates an average annual overdraft of 32 TAFY over the 53-year simulation period. In contrast, with MICUP, this overdraft is reduced to 13 TAFY, reflecting a net gain of 19 TAFY of groundwater in storage, an improvement of nearly 60 percent compared to the CCBL.

Figure 4.10-8 shows a comparison of groundwater storage changes in the ESJ Subbasin from MICUP. A consistent increase in groundwater storage is seen throughout the entire 53-year simulation period due to MICUP. At the end of the modeling period, MICUP contributed approximately 1,015 thousand acre-feet (TAF) of additional groundwater storage in the ESJ Subbasin, which equates to an average annual gain of 19 TAFY, as presented in Table 4.10-6.

Table 4.10-6 Annual Average Groundwater Budget throughout the 53-Year Modeling Period (TAF)

Groundwater Budget Component	CCBL	CCBL+MICUP	Change with MICUP
MICUP Total			
Deep Percolation	286	287	1
Other Recharge	143	191	49
Flow from Stream[2]	234	210	-24
Boundary Flow	158	142	-16
Pumping[1]	850	841	-9
Change in Storage[1]	-32	-13	19
North San Joaquin Water Conservation District Only			
Deep Percolation	26.2	26.8	0.5
Other Recharge	3.2	26.7	23.5
Flow from Stream[2]	101.9	87.8	-14.1
Boundary Flow	35.6	25.7	-9.9
Pumping[1]	173.6	167.2	-6.4
Change in Storage[1]	-6.7	-0.3	6.4
City of Stockton Only			
Deep Percolation	10.3	10.4	0.1
Other Recharge	21.8	21.8	0.0
Flow from Stream[2]	24.8	20.4	-4.4
Boundary Flow	-5.6	0.7	6.4
Pumping[1]	53.4	53.6	0.2
Change in Storage[1]	-2.1	-0.4	1.8
Stockton East Water District Only			
Deep Percolation	45.0	45.2	0.2
Other Recharge	38.6	60.5	21.9
Flow from Stream[2]	15.8	15.4	-0.4
Boundary Flow	75.9	55.4	-20.4
Pumping[1]	180.3	176.9	-3.4
Change in Storage[1]	-5.0	-0.3	4.6

MICUP Total values are rounded to nearest whole number

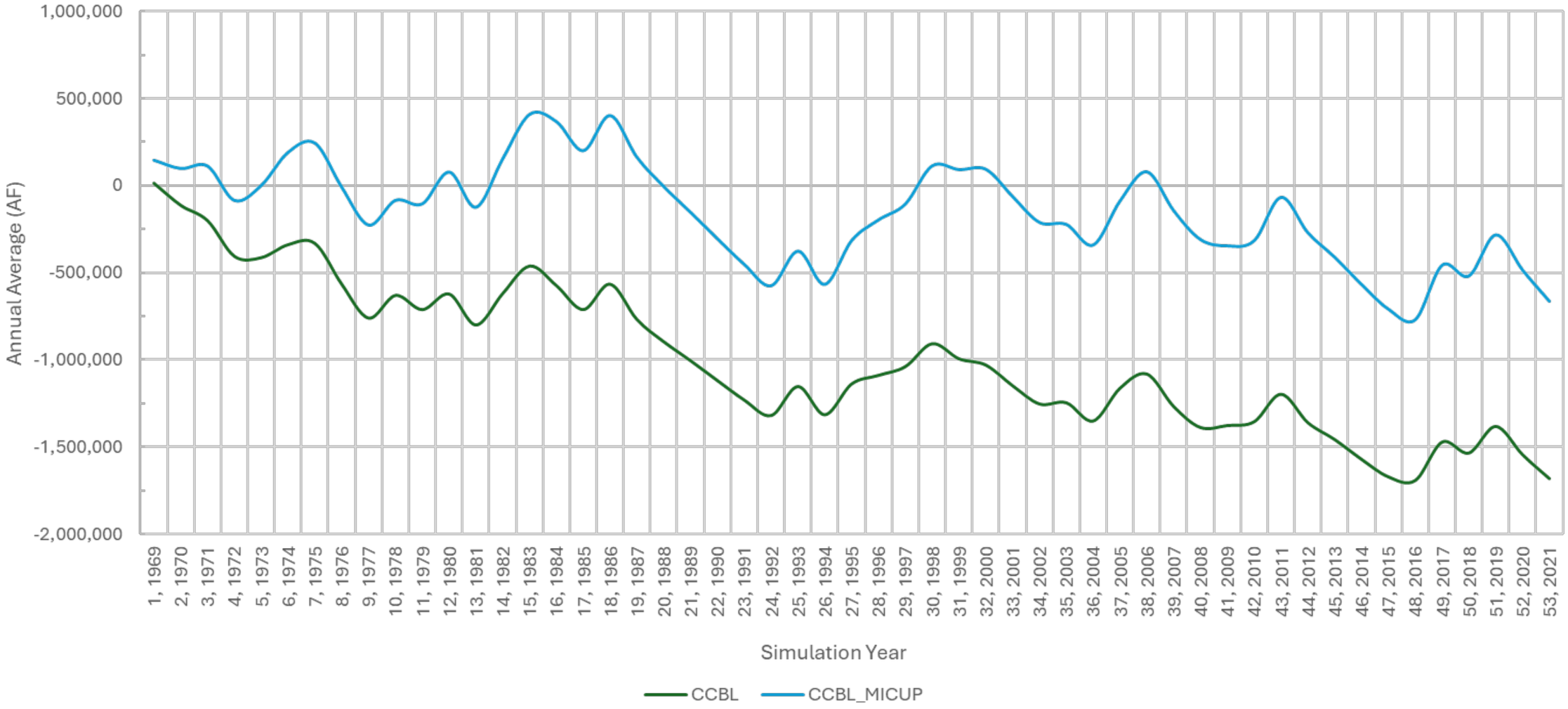
TAF = thousand acre-feet

[1] Number inverted relative to the original sign;

[2] Net value; Negative = outflow from Groundwater; Positive = inflow to Groundwater

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Figure 4.10-8 Cumulative Change in Storage in the Eastern San Joaquin Subbasin from MICUP



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Groundwater Levels

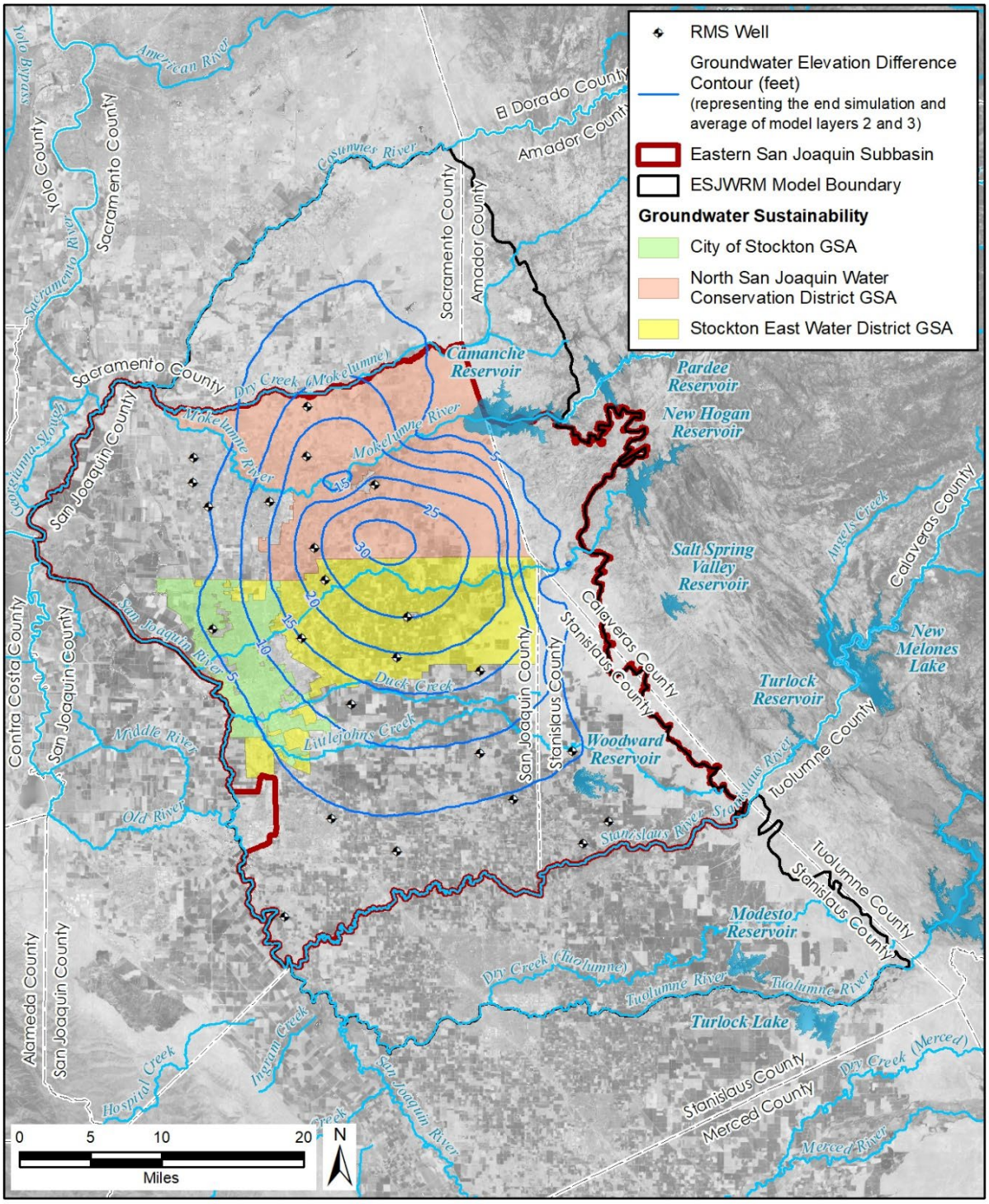
Figure 4.10-9 includes groundwater elevation contours showing increases in groundwater levels at the end of the 53-year modeling period. Increases in groundwater elevations are centered around the MICUP project components. The most substantial increases, on the order of 30 to 35 feet, occur between the Mokelumne River corridor and the Camanche Reservoir. Model results indicate that MICUP produces measurable improvements in groundwater elevations across the eastern and central portions of the ESJ Subbasin, particularly near the Mokelumne River and within the NSJWCD and SEWD GSAs.

Appendix I-1 includes hydrographs showing groundwater level changes at representative RMS wells near MICUP project components. Groundwater levels at these locations are consistently higher with MICUP compared to existing conditions. These improvements are evident in both shallow and deeper model layers, demonstrating that MICUP benefits extend vertically within the aquifer system. At RMS wells farther from the MICUP project footprint, modeled groundwater elevation changes are small, indicating that the MICUP effects diminish with distance from the project footprint.

Stream Seepage

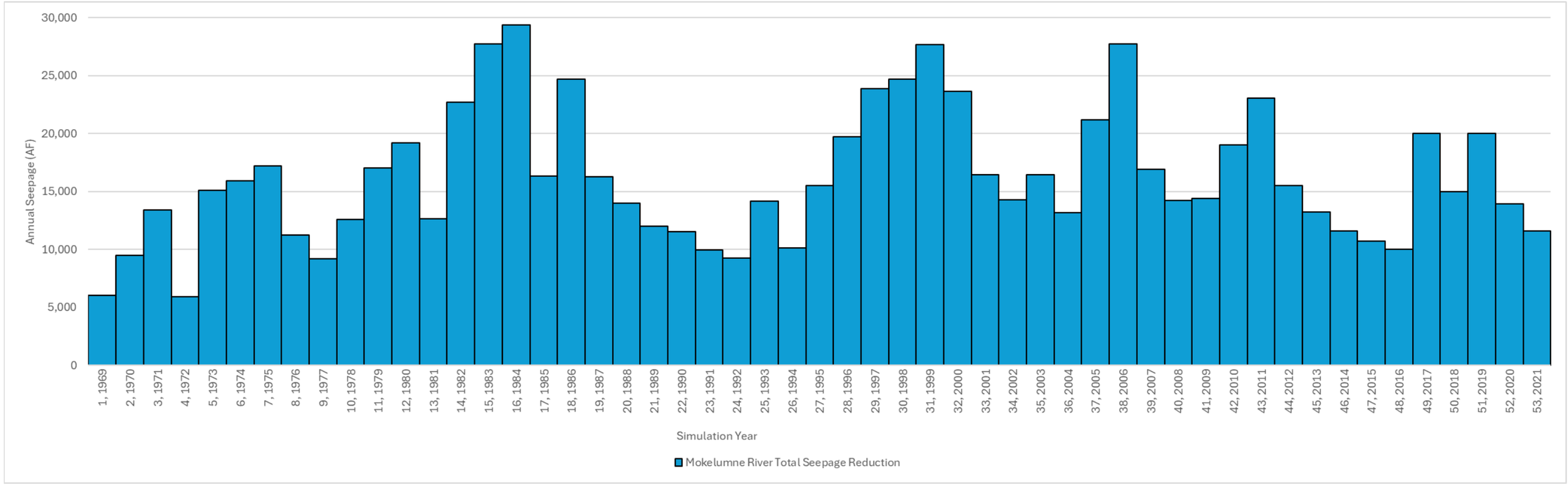
Higher groundwater levels under MICUP also result in 24 TAFY reduction in stream seepage into the groundwater system and 16 TAFY decrease in boundary flows. Figure 4.10-10 shows annual stream seepage reduction along the Mokelumne River over the 53-year modeling period. Under existing conditions, the Mokelumne River is generally losing water from the stream to the aquifer system. However, with the implementation of MICUP and increased groundwater levels, stream seepage to the aquifer system is reduced, retaining more flow within the Mokelumne River.

Figure 4.10-9 Contour Map of Groundwater Level Difference af the 53-Year Modeling Period



Z:\Projects\2303724_SJCPW_MICUP\GWE_DiffContours_Avg_Layers2_3.mxd
15Oct2025 RS

Figure 4.10-10 Annual Stream Seepage Reduction for the Mokelumne River



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EIR Scoping Comments Consideration

Various comments were submitted during the Environmental Impact Report (EIR) scoping process. Comments related to groundwater and hydrology and quality include: the request for explanation of how changes in the groundwater table would be monitored and whether the information would be publicly available; potential impacts appropriation could have on groundwater reserves; conformance with the Basin Plan; and clarification that MICUP water will only be used for direct groundwater recharge.

Specific Thresholds of Significance

For purposes of the following impact analysis, the following thresholds are used to evaluate the significance of groundwater hydrology and quality impacts resulting from implementation of MICUP.

- Violate any water quality standards or waste discharge requirements established by the CVRWQCB that apply to groundwater.
- Deplete groundwater supplies or interfere with groundwater recharge such that the proposed project would result in undesirable results identified in the ESJSB GSP.
- Conflict with or obstruct implementation of the ESJSB GSP.

Impact Evaluation

Groundwater Quality and Water Quality Control Plan Consistency

Significance Criterion a:	Would the proposed project violate any water quality standards or waste discharge requirements or otherwise substantially degrade groundwater quality?
Significance Criterion c:	Would the proposed project conflict with or obstruct implementation of a water quality control plan?

Impact GW-1 MICUP PROJECT COMPONENTS AND FACILITIES COULD VIOLATE WATER QUALITY STANDARDS, WATER QUALITY OBJECTIVES IDENTIFIED IN THE BASIN PLAN, WASTE DISCHARGE REQUIREMENTS, OR DEGRADE GROUNDWATER QUALITY DURING CONSTRUCTION IF THE MOBILIZATION OF SEDIMENT, CONTAMINATION, OR INADVERTENT SPILLS OR LEAKS OCCUR. HOWEVER, IMPLEMENTATION OF EROSION AND WATER POLLUTION CONTROL PLANS, PHASE I AND II ENVIRONMENTAL SITE ASSESSMENT RECOMMENDATIONS, AND ADDITIONAL BEST MANAGEMENT PRACTICES FOR IN-WATER WORK WOULD REDUCE IMPACTS. CONSTRUCTION IMPACTS WOULD BE LESS-THAN-SIGNIFICANT WITH MITIGATION. OPERATION OF FLOOD-MAR AND ASR WELLS IN THE PROJECT AREA COULD VIOLATE WATER QUALITY STANDARDS, WATER QUALITY OBJECTIVES IDENTIFIED IN THE BASIN PLAN, WASTE DISCHARGE REQUIREMENTS OR DEGRADE GROUNDWATER QUALITY. HOWEVER, IMPLEMENTATION OF FLOOD-MAR DESIGN PARAMETERS, INITIAL SITE ASSESSMENTS, AND HAZARDOUS SOIL REMEDIATION, AS WELL COMPLIANCE WITH GENERAL WASTE DISCHARGE REQUIREMENTS FOR ASR WELLS WOULD REDUCE IMPACTS. OPERATIONAL IMPACTS WOULD BE LESS-THAN-SIGNIFICANT WITH MITIGATION.

Construction

As described above in Section 4.10, *Environmental Setting*, many surface waters are hydraulically connected by a saturated zone to the groundwater system. In these systems, the water table (typically in the shallow zone of the aquifer), and surface water features intersect at the same

elevations and locations. Therefore, in these areas, surface water quality impacts could directly or indirectly impact groundwater quality, and vice versa. For these reasons, impacts to groundwater quality during construction are the same as potential surface water impacts analyzed in Section 4.9, *Hydrology and Water Quality: Surface Water*.

Specifically, the analysis in Impact SW-1 found that the following general types of activities could impair water quality during construction: ground disturbance and in-water work, discharge of contaminants, and discharge of dewatering effluents. Refer to Impact SW-1 for detailed analysis. Where receiving surface water quality is impaired by these MICUP construction activities, and the surface water is interconnected with groundwater or would percolate into the aquifer, groundwater quality could also become impaired. Potential impacts to groundwater quality from construction of project components for each of MICUP partner agencies is evaluated below.

North San Joaquin Water Conservation District

Surface water runoff during construction activities could combine with, or navigate to a saturated zone in the groundwater system where there is a shallow water table, especially in areas closer to surface water features such as streams and rivers. Within the NSJWCD area, proposed project components would be constructed near or immediately adjacent to the Mokelumne River, Bear Creek, Pixley Slough, and Paddy Creek, as well as near existing unlined agricultural channels, which are all areas where there could be interconnected surface waters (refer to Figure 4.9-1 and Figure 4.10-1). Therefore, within the NSJWCD area, construction activities such as vegetation removal, stockpiling of soil, excavation for new and enhanced pipelines and pumps/pump stations, drilling ASR wells, and grading of recharge basins and berms for Flood-MAR would expose soils to precipitation or other construction water sources that could cause an increase in sediment in stormwater runoff, which could negatively impact groundwater quality .

Additionally, construction activities would also require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff, which also could negatively impact groundwater quality through interconnected surface waters. As detailed in Impact SW-1, construction of project components that would disturb more than 1 acre of land would be subject to the NPDES CGP, which would require the preparation and implementation of a SWPPP, which would identify and implement BMPs, such as erosion control and pollution prevention measures to be used during the course of construction activities. The SWPPP would include BMPs to minimize the impacts of construction activities to groundwater quality through interconnected surface waters in the NSJWCD area. With implementation of the SWPPP's BMP requirements required by the State CGP (managed at the local level by the CVRWQCB), the potential for pollutants and sediment to affect the water quality of runoff from construction sites, which could impact groundwater quality , would be minimized to less-than-significant levels.

However, those project components that may disturb less than 1 acre of land would not be required to prepare and implement a project SWPPP. Therefore, construction activities for these project components have the potential to impact groundwater quality if there are no BMPs implemented to control erosion or pollution of surface water runoff during construction. Furthermore, the development of new recharge facilities (recharge basins, ASR wells, or Flood-MAR berms) by NSJWCD could disturb existing or known contamination sites or be located in agricultural areas and disturb soils with pesticides and other agricultural chemicals. The mobilization of contaminated sediment at hazardous material sites, or inadvertent spills or leaks of pesticides and other

agricultural chemicals in these areas could affect the quality of stormwater runoff, which could negatively impact groundwater quality .

Upgrades or new construction of pump stations and individual pumps (for Flood-MAR), including fish screens, would take place along the Mokelumne River bank. These activities could require in-water work. Additionally, construction of pipelines, recharge basins, and berms for Flood-MAR may also occur adjacent to tributaries to the Mokelumne River and other drainages. Construction activities within or adjacent to these surface waters increases the potential for direct discharge or discharge of runoff with sediment and contaminants, which also could negatively impact groundwater quality.

Within the NSJWCD area, dewatering and discharge of effluent may be required for the expansion of pump stations and pumps along the Mokelumne River, as well as ASR wells located near Paddy Creek (areas more likely to contain interconnected surface waters). For ASR wells, dewatered effluent would be tested to evaluate the pump design parameters and to gather data on pumping volume, water quality, and groundwater levels, and would require discharge. Discharge of dewatering effluent could negatively impact groundwater quality.

In conclusion, construction of NSJWCD project components that would impact less than 1 acre of land, or are located within or near hazardous material sites, as well as project's requiring in-water work, have the potential to increase discharge of sediment and contaminants in stormwater runoff and interconnected surface water systems or directly to the Mokelumne River, and discharge dewatering effluent to the Mokelumne River; all of which could substantially degrade groundwater quality and conflict with groundwater quality objectives in the Basin Plan. Therefore, construction impacts would be considered potentially significant.

However, implementation of Mitigation Measures GEO-1, HAZ-1, SW-1, SW-2, and SW-3 would reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); preparation of Phase I and/or Phase II, Environmental Site Assessments (ESAs), and groundwater management plan if impacted soils or groundwater are encountered on a project site, and voluntary oversight with a regulatory agency if hazardous wastes are encountered on a project component site to reduce potential impacts to groundwater (Mitigation Measure HAZ-1); preparation of a Water Pollution Control Plan and implementation of BMPs to prevent contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); compliance with the CVRWQCB's Waste Discharge Requirements (WDRs) for *Limited Threat Discharges to Surface Waters* for discharge of dewatering effluent, onsite treatment prior to disposal or offsite disposal of dewatering effluent that does not meet applicable CVRWQCB standards (in the WDRs) (Mitigation Measure SW-2); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, construction of NSJWCD project components would not violate any water quality standards or waste discharge requirements, substantially degrade groundwater quality, or conflict with the Basin Plan. Therefore, construction impacts would be less than significant with mitigation.

Stockton East Water District

Most interconnected surface waters include stream-aquifer connectivity; however, surface water runoff during construction activities could combine with, or navigate to a saturated zone in the groundwater system where there is a shallow water table, especially in areas closer to surface water features such as streams and rivers. Within the SEWD area, proposed project components would be

constructed near or immediately adjacent to the Mokelumne and Calaveras rivers, Bear Creek, Mosher Creek, and Paddy Creek, as well as near existing unlined agricultural channels, which are all areas where there could be interconnected surface waters (refer to Figure 4.9-1 and Figure 4.10-1). Therefore, within the SEWD area, construction activities such as vegetation removal, stockpiling soil, excavation for new pipelines, Mosher Creek recharge basins, and dry wells, drilling ASR, and grading of the Mosher Creek recharge basins and berms for West Linden Flood-MAR would expose soils to precipitation or other construction water sources that could cause an increase in sediment in stormwater runoff, which could negatively impact groundwater quality. Additionally, construction activities would also require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff, which also could negatively impact groundwater quality through interconnected surface waters. As detailed in Impact SW-1, construction of project components that would disturb more than 1 acre of land would be subject to the NPDES CGP, which would require the preparation and implementation of a SWPPP, which would identify and implement BMPs, such as erosion control and pollution prevention measures to be used during the course of construction activities. The SWPPP would include BMPs to minimize the impacts of construction activities to groundwater quality through interconnected surface waters in the SEWD area. With implementation of the SWPPP's BMP requirements required by the State CGP (managed at the local level by the CVRWQCB), the potential for pollutants and sediment to affect the water quality of runoff from construction sites, which could impact groundwater quality , would be minimized to less-than-significant levels.

However, those project components that may disturb less than 1 acre of land would not be required to prepare and implement a project SWPPP. Therefore, construction activities for these project components have the potential to impact groundwater quality through interconnected surface waters if there are no BMPs implemented to control erosion or pollution of surface water runoff during construction. Furthermore, the development of new direct surface water recharge facilities, ASR wells, and Flood-MAR berms by SEWD could disturb existing or known contamination sites or be in agricultural areas and disturb soils with pesticides and other agricultural chemicals. The mobilization of contaminated sediment at hazardous material sites, or inadvertent spills or leaks of pesticides and other agricultural chemicals in these areas could affect the quality of stormwater runoff, which could negatively impact groundwater quality .

Construction of three new pipelines would require crossing the Calaveras River and potentially in-water work. Additionally, construction of pipelines, recharge basins, dry wells, ASR wells, and berms for Flood-MAR may also occur adjacent to tributaries to the Calaveras River and other drainages. Construction activities within or adjacent to these surface waters increases the potential for direct discharge or discharge of runoff with sediment and contaminants, which also could negatively impact groundwater quality.

Within the SEWD area, dewatering and discharge of effluent may be required for the installation of ASR wells and pipelines. For ASR wells, dewatered effluent would be tested to evaluate the pump design parameters and to gather data on pumping volume, water quality, and groundwater level, and would require discharge. Discharge of dewatering effluent could negatively impact groundwater quality.

In conclusion, construction of SEWD project components that would impact less than 1 acre of land, or are located within or near hazardous material sites, as well as project's requiring in-water work, have the potential to increase discharge of sediment and contaminants in stormwater runoff and interconnected surface water systems, or directly to the Calaveras River and other surface waters,

and discharge dewatering effluent to the Calaveras River, all of which could substantially degrade groundwater quality and conflict with groundwater quality objectives in the Basin Plan. Therefore, construction impacts would be potentially significant.

However, the implementation of Mitigation Measures GEO-1, HAZ-1, SW-1, SW-2, and SW-3 will reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1);); preparation of Phase I and/or Phase II ESAs, and groundwater management plan if impacted soils or groundwater are encountered on a project site, and voluntary oversight with a regulatory agency if hazardous wastes are encountered on a project component site to reduce potential impacts to groundwater (Mitigation Measure HAZ-1); preparation of a Water Pollution Control Plan and implementation of BMPs to prevent and contamination of stormwater runoff for activities disturbing less than 1 acre (Mitigation Measure SW-1); compliance with the CVRWQCB's WDRs for *Limited Threat Discharges to Surface Waters* for discharge of dewatering effluent, onsite treatment prior to disposal or offsite disposal of dewatering effluent that does not meet applicable CVRWQCB standards (in the WDRs) (Mitigation Measure SW-2); and implementation of BMPs to adhere to during in-water construction to prevent discharge of sediments and other contaminants (Mitigation Measure SW-3). With implementation of these mitigation measures, construction of SEWD project components would not violate any water quality standards or waste discharge requirements, substantially degrade groundwater quality, or conflict with the Basin Plan. Therefore, construction impacts would be less than significant with mitigation.

City of Stockton

Most interconnected surface waters include stream-aquifer connectivity; however, surface water runoff during construction activities could combine with, or navigate to a saturated zone in the groundwater system where there is a shallow water table, especially in areas closer to surface water features such as streams and rivers. Within the City of Stockton area, proposed project components would be constructed near or immediately adjacent to the Pixley Slough, as well as near existing unlined agricultural channels, which are areas where there could be interconnected surface waters (refer to Figure 4.9-1 and Figure 4.10-1). Therefore, within the City of Stockton area, construction activities such as vegetation removal, stockpiling soil, and excavation and grading of recharge basins, dry wells, and new pipelines would expose soils to or other construction water sources that could cause an increase in sediment in stormwater runoff, which also could negatively impact groundwater quality .

Additionally, construction activities would also require the use of hazardous materials including but not limited to petroleum products and automotive fluids. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff, which also could negatively impact groundwater quality through interconnected surface waters. As detailed in Impact SW-1, construction of project components that would disturb more than 1 acre of land would be subject to the NPDES CGP, which would require the preparation and implementation of a SWPPP, which would identify and implement BMPs, such as erosion control and pollution prevention measures to be used during the course of construction activities. The SWPPP would include BMPs to minimize the impacts of construction activities to groundwater quality through interconnected surface waters in the City of Stockton area. With implementation of the SWPPP's BMP requirements required by the State CGP (managed at the local level by the CVRWQCB), the potential for pollutants and sediment to affect the water quality of runoff from construction sites, which could impact groundwater quality , would be minimized to less-than-significant levels.

Although the new recharge facilities would be implemented within the already disturbed Delta Water Treatment Plant (DWTP) area, the development of recharge basins and dry wells by the City of Stockton could disturb existing or known contamination sites or could contain residual pesticides or other agricultural chemicals. The mobilization of contaminated sediment or inadvertent spills or leaks of such pollutants could affect the quality of stormwater runoff and receiving interconnected surface systems, which also could negatively impact groundwater quality through the Pixley Slough or nearby unlined agricultural channels.

Within the City of Stockton area, dewatering and discharge of effluent may be required for the installation of recharge facilities in areas of shallow groundwater levels or deeper excavations. Discharge of dewatering effluent could negatively impact groundwater quality.

In conclusion, construction of the City of Stockton project components that are located within or near hazardous material sites have the potential to increase discharge of sediment and contaminants in stormwater runoff and surface systems, and discharge dewatering effluent, all of which could substantially degrade groundwater quality and conflict with groundwater quality objectives in the Basin Plan. Therefore, construction impacts would be potentially significant.

However, the implementation of Mitigation Measures GEO-1, HAZ-1, and SW-2 would reduce this impact by requiring the following: preparation of an Erosion Control Plan and implementation of BMPs to prevent and control erosion during activities disturbing less than 1 acre (Mitigation Measure GEO-1); preparation of Phase I and/or Phase II ESAs, and groundwater management plan if impacted soils or groundwater are encountered on a project site, and voluntary oversight with a regulatory agency if hazardous wastes are encountered on a project component site to reduce potential impacts to groundwater (Mitigation Measure HAZ-1); and compliance with the CVRWQCB's WDRs for *Limited Threat Discharges to Surface Waters* for discharge of dewatering effluent, onsite treatment prior to disposal or offsite disposal of dewatering effluent that does not meet applicable CVRWQCB standards (in the WDRs) (Mitigation Measure SW-2). With implementation of these mitigation measures, construction of the City of Stockton's project components would not violate any water quality standards or waste discharge requirements, substantially degrade groundwater quality, or conflict with the Basin Plan. Therefore, construction impacts would be less than significant with mitigation.

Operation

This impact analysis discusses groundwater quality impacts related to MICUP operations and maintenance activities. The analysis is organized by the general types of activities that could impair groundwater quality during operations and maintenance: recharge of Mokelumne River water with different quality than groundwater, groundwater contamination due to changes in groundwater conditions, and operation and maintenance of different types of MICUP facilities. These issues are first broadly evaluated below, and then, potential impacts from operation and maintenance of project components for each of the MICUP partner agencies is evaluated.

Recharge of High-Quality Surface Water

Recharge of Mokelumne River and Aqueduct water would occur into the shallow water-bearing zone of the aquifer via proposed recharge basins, Flood-MAR, stormwater detention facilities, unlined canals, and dry wells where it would mix with native groundwater and create a blended chemistry and then percolate to intermediate zones. Recharge of Mokelumne River and Aqueduct water via proposed ASR wells would occur deeper in the aquifer, either within the intermediate

zone or deep zone of the aquifer. Water quality improves with depth in the aquifer, due to the semi- to fully-confined zones.

Water in the lower Mokelumne River is supplied from Camanche and Pardee reservoirs, and surface water quality of the lower Mokelumne River is discussed in Section 4.9, *Hydrology and Water Quality: Surface Water*. Water quality data collected (Table 4.9-4) shows high quality water low in electrical conductivity (EC) and turbidity. This indicates there are low suspended solids and salts in Mokelumne River water, which would include water quality parameters such as TDS, chloride, and sulfate. Arsenic, nitrate, chloride, and sulfate data were not available for either surface water reservoir but are considered low because the reservoir water quality must meet drinking water standards.

ESJSB groundwater quality is discussed in Section 4.10.2, *Environmental Setting*, and Figure 4.10-2. Median TDS levels found in the ESJSB were reported at 520 mg/L, which exceeds the recommended levels for the ESJSB. Chloride and sulfate levels ranged from ND to 300 and 250 mg/L, respectively, with median levels of these constituents at 50 mg/L for chloride and 25 mg/L for sulfate. These levels are significantly higher than maximum levels of chloride and sulfate reported for the Mokelumne River, which has a max reported level of 3.4 mg/L for chloride and 2.9 mg/L for sulfate. Approximately 37 and 47 percent of groundwater monitoring wells in the ESJSB exceeded MCLs for nitrate and arsenic, respectively. Levels of nitrate and arsenic are significantly higher within groundwater as compared to Mokelumne River water, which contained ND levels of nitrate and arsenic. Therefore, a comparison of surface water and groundwater quality data indicates that Mokelumne River water quality that would be used for recharge under MICUP is generally lower in constituent concentrations than that of local groundwater in the ESJSB.

Additionally, a supporting water quality analysis was conducted by EBMUD for its Demonstration Recharge Extraction and Aquifer Management (DREAM) project; EBMUD determined that Mokelumne River water tested met all primary drinking water standards and chemical constituents were lower than the groundwater sampled in all constituents relevant to uses of groundwater within the Place of Use.[81] As a result, a dilution of the native groundwater is expected due to recharge of groundwater with Mokelumne River water under MICUP. The introduction of surface water in the shallow zone would improve groundwater quality, which tends to be of lower quality in the shallower portions of the groundwater aquifer. In addition, as the recharge water percolates downward, water quality is anticipated to further improve since soil would filter out some of the constituents. Since Mokelumne River water is of high quality, MICUP recharge activities would not result in adverse impacts to groundwater quality within the ESJSB.

Groundwater Contamination due to Changes in Groundwater Conditions

As discussed further below in Impact GW-2, MICUP would recharge the ESJSB with surface water from the Mokelumne River, thereby raising groundwater levels in the ESJSB. Changes to groundwater levels could potentially alter gradients and flow paths of groundwater within the ESJSB. An adverse impact could occur if increases in groundwater levels were to mobilize contaminants at active contamination/hazardous material sites in the region. Active contamination sites are identified in Section 4.8, *Hazards and Hazardous Materials*, and are primarily concentrated in two main areas of the ESJSB, in the urban areas of the cities of Stockton and Lodi. As discussed above in Section 4.10-1, *Existing Setting*, groundwater gradients currently flow away from the urban

[81] San Joaquin County Department of Public Works. Final Initial Study/Mitigated Negative Declaration for the Demonstration Recharge Extraction and Aquifer Management (DREAM) Project & North San Joaquin Water Conservation District South System Improvements. 2016.

centers towards the cone of depression located in the middle of the ESJSB. MICUP project components and proposed recharge locations would be located around the city of Lodi and east of the city of Stockton. As shown in Figure 4.10-9, MICUP would increase groundwater levels in areas of cones of depression within NSWCD, SEWD, and city of Stockton GSA areas. Therefore, operation of proposed project components would help the current levels of pumping depression, reducing the groundwater gradient, and therefore, recharged surface water would continue to flow away from contamination sites within the ESJSB.

Operation and Maintenance of Pumps, Pump Stations, Pipelines, Recharge Basins, Dry Wells, Stormwater Detention Basins, and Unlined Canals

Impacts to groundwater quality during operations and maintenance are the same as potential surface water impacts analyzed in Section 4.9, *Hydrology and Water Quality: Surface Water*, except for ASR wells (which is addressed below).

Specifically, the analysis in Impact SW-1 found that operation and maintenance of pumps, pump station, pipelines, recharge basins, dry wells, stormwater detention basins, and unlined canals would not result in discharge of runoff or of other contaminants. However, Flood-MAR could result in discharge of pesticides and other contaminants in runoff. Refer to Impact SW-1 for detailed analysis. Where receiving surface water quality is impaired by these MICUP construction activities, and the surface water is interconnected with groundwater or would percolate into the aquifer, groundwater quality could also become impaired.

Operation of ASR Wells

Maintenance activities for ASR wells would not impact groundwater quality. Therefore, maintenance activities for ASR wells, are not further discussed for each of the MICUP partner agencies, below.

During operations, injection of surface water into ASR wells could result in chemical (redox) reactions in groundwater due to differences in surface water and groundwater quality. Redox reactions are changes in the oxidation state of minerals within the groundwater. Under MICUP, ASR wells would recharge (inject) water into the intermediate or deep aquifer zones of the ESJSB, and potential redox reactions could impair the quality of groundwater within the ESJSB in proximity to ASR well sites. ASR wells typically include filtration systems onsite for surface water prior to recharge/injection into groundwater. However, it is possible that redox reactions still occur with the presence of filtration systems.

Potential impacts to groundwater quality from operation and maintenance of project component facilities for each of the MICUP partner agencies is evaluated below.

North San Joaquin Water Conservation District

As discussed above, operation and maintenance of pump stations/pumps, and pipelines, would not result in runoff or discharge of other contaminants; and while basins could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not violate water quality standards, conflict with the Basin Plan, or otherwise impair groundwater quality. Impacts would be less than significant.

Within the NSJWCD area, operation of ASR wells would inject Mokelumne River water (provided via the Mokelumne Aqueduct) and could cause redox reactions and impair local groundwater quality.

Prior to the construction of ASR wells, NSJWCD would obtain WDRs through coverage and compliance with SWRCB Water Quality Order (Order) 2012-0010 for Aquifer Storage and Recovery Projects that Inject Drinking Water into Groundwater or acquisition of individual WDRs for MICUP. Eligibility for Order 2012-0010 includes that the project injects drinking water that has been treated pursuant to a California Department of Public Health domestic water supply permit. While Mokelumne River water would not be treated prior to injection, the SWRCB may consider using this order given the high quality of Mokelumne River surface water. As required by the SWRCB, NSJWCD would provide surface and groundwater quality data to evaluate degradation of groundwater and determine treatment requirements. Pilot tests may be required by the SWRCB to conduct site-specific anti-degradation analysis for ASR projects with limited information about aquifer characteristics and is recommended for MICUP. NSJWD would design, operate, and maintain ASR wells and systems and equipment, including for treatment of water prior to injection, to ensure continuous compliance with the requirements of Order 2012-0010 or individual WSRs obtained for the project. With coverage under Order 2012-0010 or individual WDRs obtained for the project, NSJWCD's operation of ASR wells would not violate water quality standards, conflict with the Basin Plan, or otherwise impair groundwater quality, and operational impacts for ASR wells would be less than significant.

Large areas of agricultural lands to the north and south of the Mokelumne River within the NSJWCD area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey additional runoff during recharge activities under MICUP. Additionally, there are known hazardous materials sites within the NSJWCD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Since discharge of pesticides and other contaminants could impair receiving water quality, groundwater quality could also be impaired, and operational and maintenance impacts for Flood-MAR would be potentially significant.

However, the implementation of Mitigation Measures SW-4 and SW-5 would reduce this impact by: requiring Flood-MAR facilities to follow specific design parameters, such as avoiding lands with slopes greater than 15 percent into the Flood-MAR facilities to prevent surface water runoff (Mitigation Measure SW-4); and conducting site assessments and hazardous material soil remediation prior to operation of the Flood-MAR facilities in accordance with appliable federal and state regulations (Mitigation Measure SW-5). With implementation of these mitigation measures, NSJWCD's operation and maintenance activities of Flood-MAR would not violate water quality standards, conflict with the Basin Plan, or otherwise impair groundwater quality, and operational impacts for Flood-MAR would be less than significant with mitigation.

Stockton East Water District

As discussed above, operation and maintenance of pump stations/pumps, pipelines, and ASR wells would not result in runoff or discharge of other contaminants; and while basins and dry wells could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not violate water quality standards, conflict with the Basin Plan, or otherwise impair groundwater quality. Impacts would be less than significant.

Within the SEWD area, operation of ASR wells would inject Mokelumne River water (provided via the Mokelumne Aqueduct) and could cause redox reactions and impair local groundwater quality. Prior to the construction of ASR wells, SEWD would obtain WDRs through coverage and compliance with SWRCB Water Quality Order (Order) 2012-0010 for Aquifer Storage and Recovery Projects that

Inject Drinking Water into Groundwater or acquisition of individual WDRs for MICUP. Eligibility for Order 2012-0010 includes that the project injects drinking water that has been treated pursuant to a California Department of Public Health domestic water supply permit. While Mokelumne River water would not be treated prior to injection, the SWRCB may consider using this order given the high quality of Mokelumne River surface water. As required by the SWRCB, SEWD would provide surface and groundwater quality data to evaluate degradation of groundwater and determine treatment requirements. Pilot tests may be required by the SWRCB to conduct site-specific anti-degradation analysis for ASR projects with limited information about aquifer characteristics and is recommended for MICUP. SEWD would design, operate, and maintain ASR wells and systems and equipment, including for treatment of water prior to injection, to ensure continuous compliance with the requirements of Order 2012-0010 or individual WSRs obtained for the project. With coverage under Order 2012-0010 or individual WDRs obtain for the project, SEWD's operation of ASR wells would not violate water quality standards, conflict with the Basin Plan, or otherwise impair groundwater quality, and operational impacts for ASR wells would be less than significant.

Agricultural lands within the SEWD area in the West Linden recharge area may be used for Flood-MAR. While most of these lands are relatively flat, there could be small areas of steeper slopes that could convey additional runoff during recharge activities under MICUP. Additionally, there are known hazardous materials sites within the SEWD Flood-MAR recharge area designated for MICUP, as discussed in Section 4.8, *Hazards and Hazardous Materials.* Since discharge of pesticides and other contaminants could impair receiving water quality, groundwater quality could also be impaired, and operational impacts for Flood-MAR would be potentially significant.

However, the implementation of Mitigation Measures SW-4 and SW-5 would reduce this impact by: requiring Flood-MAR facilities to follow specific design parameters, such as avoiding lands with slopes greater than 15 percent into the Flood-MAR facilities to prevent surface water runoff (Mitigation Measure SW-4); and conducting site assessments and hazardous material soil remediation prior to operation of the Flood-MAR facilities in accordance with appliable federal and state regulations (Mitigation Measure SW-5). With implementation of these mitigation measures, SEWD's operation and maintenance activities of Flood-MAR would not violate water quality standards, conflict with the Basin Plan, or otherwise impair groundwater quality, and operational impacts for Flood-MAR would be less than significant with mitigation.

City of Stockton

As discussed above, within the City of Stockton area, operation and maintenance of pipelines would not result in runoff or discharge of other contaminants; and while basins and dry wells could collect stormwater, maintenance activities would provide management of eroded soil collected in the basin. Therefore, operation and maintenance of these facilities would not violate water quality standards, conflict with the Basin Plan, or otherwise impair groundwater quality. Impacts would be less than significant.

Mitigation Measures

The following mitigation measures are required for construction activities associated with project components for NSJWCD and SEWD. Mitigation Measure GEO-1 as described in Section 4.6, Geology and Soils; and Mitigation Measures SW-1, SW-2, SW-3, SW-4, and SW-5 as described in Section 4.9, Hydrology and Water Quality: Surface Water; and Mitigation Measure HAZ-1 as described in Section 4.8, Hazards.

Level of Significance

Less than Significant with Mitigation

Groundwater Supply and Recharge

Significance Criterion b:	Would the proposed project substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin?

Impact GW-2 MICUP PROJECT COMPONENTS AND FACILITIES WOULD NOT DECREASE GROUNDWATER SUPPLIES OR INTERFERE WITH GROUNDWATER RECHARGE SUCH THAT THE PROPOSED PROJECT WOULD IMPEDE SUSTAINABLE GROUNDWATER MANAGEMENT OF THE EASTERN SAN JOAQUIN SUBBASIN. IMPACTS WOULD BE LESS THAN SIGNIFICANT.

Construction

North San Joaquin Water Conservation District

Construction activities required to expand pump stations and develop pipelines, recharge basins, and berms for Flood-MAR for NSJWCD project components would involve ground disturbing activities such as vegetation removal, shallow excavation, grading, and compaction of soils. Project components would be finished and maintained to minimize any disturbance to existing recharge in the project area (refer to Operational Impacts, below). These activities are temporary and would not affect groundwater recharge or supplies.

Groundwater dewatering may be required during construction of project components in areas of shallow groundwater levels or where deeper excavations would occur. Construction activities within the Mokelumne River may also require surface water dewatering. Dewatered effluent would be managed with the use of pumped sumps, dewatering wells, and/or settling basins. Impacts associated with construction dewatering would be negligible because the project areas where dewatering may occur is a relatively small portion of the greater ESJSB and dewatered surface or groundwater would ultimately return to the groundwater aquifer via surface water percolation via sumps, wells, or settling basins. *De minimus* amounts of surface or groundwater may be lost to evaporation, prior to percolation back into the groundwater aquifer.

Additionally, construction of ASR wells for NSJWCD, specifically, would require drilling into the underlying aquifer and pump tests to evaluate pump design and parameters. Pump tests would temporarily extract a limited amount of water from the aquifer, such that there would be no substantive adverse effect to groundwater supplies. Therefore, construction impacts would be less than significant.

Stockton East Water District

Construction activities required to develop pipelines, recharge basins, dry wells, and berms for Flood-MAR for SEWD project components would involve ground disturbing activities such as vegetation removal, shallow excavation, grading, and compaction of soils. Project components would be finished and maintained to minimize any disturbance to existing recharge in the project area (refer to Operational Impacts, below). These activities are temporary and would not affect groundwater recharge or supplies.

Groundwater dewatering may be required during construction of project components in areas of shallow groundwater levels or where deeper excavations would occur. Construction activities within the Calaveras River may also require surface water dewatering. Dewatered effluent would be managed with the use of pumped sumps, dewatering wells, and/or settling basins. Impacts associated with construction dewatering would be negligible because the project areas where dewatering may occur is a relatively small portion of the greater ESJSB and dewatered surface or groundwater would ultimately return to the groundwater aquifer via surface water percolation via sumps, wells, or settling basins. *De minimus* amounts of surface or groundwater may be lost to evaporation, prior to percolation back into the groundwater aquifer.

Construction of ASR wells for SEWD would require drilling into the underlying aquifer and pump tests to evaluate pump design and parameters. Pump tests would temporarily extract a limited amount of water from the aquifer, such that there would be no adverse effects to groundwater supplies. Therefore, construction impacts would be less than significant.

City of Stockton

Construction activities required to develop basins, dry wells, and new pipelines for City of Stockton project components would involve ground disturbing activities such as vegetation removal, shallow excavation, grading, and compaction of soils. Project components would be finished and maintained to minimize any disturbance to existing recharge in the project area (refer to Operational Impacts, below). These activities are temporary and would not affect groundwater recharge or supplies.

Groundwater dewatering may be required during construction of project components in areas of shallow groundwater levels or where deeper excavations would occur. Dewatered effluent would be managed with the use of pumped sumps, dewatering wells, and/or settling basins. Impacts associated with construction dewatering would be negligible because the project areas where dewatering may occur is a relatively small portion of the greater ESJSB and dewatered groundwater would ultimately return to the groundwater aquifer via surface water percolation via sumps, wells, or settling basins. *De minimus* amounts of groundwater may be lost to evaporation, prior to percolation back into the groundwater aquifer.

These activities are temporary and would not significantly affect groundwater recharge or supplies. This impact would be less than significant.

Operation

This impact analysis discusses groundwater supply and recharge related to MICUP operations and maintenance activities. The analysis evaluates permanent changes from new/improved structures (including impervious surfaces), maintenance activities, and operations including recharge using the various types of facilities proposed. These issues are first broadly evaluated below, and then, potential impacts from operation and maintenance of project components for each of MICUP partner agencies is evaluated.

New/Improved Structures, Impervious Surfaces, and Maintenance of Project Component Facilities

Pipelines would occupy limited space and would be buried below ground. Pump station expansions are mostly developed already and could only create small, minimal new areas of impervious surfaces. ASR wells would include a footprint of up to approximately 1-acre of impervious surfaces and would not have the scale or massing to substantially impair indirect groundwater recharge via

surface water runoff. Furthermore, MICUP only proposes to use ASR wells for injection of surface water for recharge and would not be used for new groundwater pumping. Therefore, new/improved facilities and impervious surfaces associated with project components would not interfere with or impede groundwater recharge. Maintenance would occur at developed infrastructure recharge sites and does not include activities that would potentially impair or interfere with groundwater recharge.

Facility Operations including Recharge

MICUP operations would not deplete groundwater supplies as the project is limited to diversion and recharge of Mokelumne River surface water—and does not propose new extractions or uses of groundwater. Existing water users within the Place of Use rely heavily on groundwater pumping, particularly for agricultural irrigation. Recharge of Mokelumne River water under MICUP would provide a new source of recharge to the ESJSB to offset effects of groundwater pumping. Recharge under MICUP would occur primarily during non-irrigation seasons and in wetter periods when surplus water is available for MICUP; however, this additional water would be stored in the ESJSB and then available for pumping during the irrigation season and drier years, resulting in a net benefit to groundwater supplies, uses, and users. Additionally, MICUP would allow for direct use of Mokelumne River water for irrigation within the three MICUP partner agency areas instead of pumping groundwater, resulting in a reduction in pumping of groundwater for existing uses.

To evaluate operational impacts to groundwater supplies and recharge, modeling was conducted to estimate changes in groundwater storage, elevations, and stream seepage for existing conditions and with MICUP (refer to discussion in the *Groundwater Modeling* section above). Overall, the model results demonstrate that MICUP enhances groundwater conditions both locally and across the subbasin, contributing substantial benefits to groundwater storage and elevations. Groundwater modeling conducted for MICUP indicates that while most increases in groundwater levels would occur at the proposed recharge areas, increases in groundwater levels would also extend beyond these areas, as depicted in Figure 4.10-9. Over the 53-year modeling period, groundwater modeling indicates increases in groundwater levels by up to 30 to 35 feet, which occurs at the southern area of NSJWCD and northern area of SEWD. Recharge under MICUP would also result in consistent increases in groundwater storage in the ESJSB compared to existing conditions. Groundwater modeling conducted for MICUP indicates that after 53 years (the modeling period), groundwater storage is expected to increase by 1,015 TAF or an average of 19 TAFY.

Increases in groundwater levels and storage are attributed to direct recharge and use of MICUP water directly for irrigation instead of pumping groundwater. By raising groundwater levels and storage, MICUP would improve overall groundwater conditions in the ESJSB and contribute towards achieving long-term sustainable groundwater conditions consistent with the GSP goals. These results indicate that MICUP would reduce declining groundwater levels and contribute to a more sustainable water supply for the region.

As discussed in Section 4.10.2, *Environmental Setting*, the Mokelumne and Calaveras Rivers are losing streams. . By raising the elevation of groundwater levels, MICUP would reduce the gradient between losing streams and the groundwater table, which would in turn reduce stream seepage into the groundwater basin. . An estimated 24 TAFY reduction in stream seepage into the groundwater system would occur from MICUP. Annual stream seepage reduction along the Mokelumne River over the 53-year modeling period is shown in Figure 4.10-10. The reduction in seepage would result in an increase in streamflow, as discussed in Section 4.9, *Hydrology and Water Quality: Surface Water*.

North San Joaquin Water Conservation District

Maintenance does not include activities that would potentially impair or interfere with groundwater recharge. Recharge activities within the NSJWCD area would raise local groundwater levels and storage compared to existing conditions. Groundwater modeling indicates that groundwater level increases within the NSJWCD area would range from 5 to 35 feet under MICUP, as shown in Figure 4.10-9.. Based on the model subregion groundwater budgets, annual groundwater storage increases in the NSJWCD area are anticipated to average 6.4 TAFY at the end of the 53-year modeling period (Figure 4.10-6). Therefore, operations and maintenance would not adversely affect groundwater recharge or supplies, and no impact would occur. Furthermore, MICUP would have a beneficial effect on groundwater supplies in the NSJWD area of the ESJSB and would support/benefit implementation of local GSPs.

Stockton East Water District

Maintenance does not include activities that would potentially impair or interfere with groundwater recharge. Recharge activities within the SEWD area would raise local groundwater levels and storage compared to existing conditions. Groundwater modeling indicates that groundwater level increases within the SEWD area would range from 15 to 35 feet under MICUP, as shown in Figure 4.10-9. Based on the model subregion groundwater budgets, annual groundwater storage increases in the SEWD area are anticipated to be average 4.6 TAFY at the end of the 53-year modeling period (Table 4.10-6). Therefore, operations and maintenance would not adversely affect groundwater recharge or supplies, and no impact would occur. Furthermore, MICUP would have a beneficial effect on groundwater supplies in the NSJWD area of the ESJSB and would support/benefit implementation of local GSPs.

City of Stockton

Maintenance does not include activities that would potentially impair or interfere with groundwater recharge. Recharge activities within the City of Stockton area would raise local groundwater levels and storage compared to existing conditions. Groundwater modeling indicates that groundwater level increases within City of Stockton area would range from 5 to 15 feet under MICUP, as shown in Figure 4.10-9. Based on the model subregion groundwater budgets, annual groundwater storage increases in the City of Stockton area are anticipated to average 1.8 TAFY at the end of the 53-year modeling period (Table 4.10-6). Therefore, operations and maintenance would not adversely affect groundwater recharge or supplies, and no impact would occur. Furthermore, MICUP would have a beneficial effect on groundwater supplies in the NSJWD area of the ESJSB and would support/benefit implementation of local GSPs.

Mitigation Measures

No mitigation is required.

Level of Significance

Less than Significant

Sustainable Groundwater Management Plan Consistency

Significance Criterion e:	Would the proposed project conflict with or obstruct implementation of a sustainable groundwater management plan?

Impact GW-3 CONSTRUCTION AND OPERATION OF MICUP WOULD DIRECTLY FACILITATE IMPLEMENTATION OF THE EASTERN SAN JOAQUIN SUBBASIN GROUNDWATER SUSTAINABILITY PLAN (GSP). MICUP IS INCLUDED AS A PROJECT IN THE GSP; THEREFORE MICUP WOULD NOT CONFLICT WITH OR OBSTRUCT IMPLEMENTATION OF THE GSP. THERE WOULD BE NO IMPACT.

Construction

North San Joaquin Water Conservation District

As discussed in Impact GW-2 above, construction activities for NSJWCD project components are temporary and would not affect groundwater recharge or supplies, and while pump test for ASR wells would temporarily extract a limited amount of water from the aquifer, there would be no adverse effects to groundwater supplies. Therefore, construction would not conflict with the ESJSB GSP; there would be no impact.

Stockton East Water District

As discussed in Impact GW-2 above, construction activities for SEWD project components are temporary and would not affect groundwater recharge or supplies, and while pump test for ASR wells would temporarily extract a limited amount of water from the aquifer, there would be no adverse effects to groundwater supplies. Therefore, construction would not conflict with the ESJSB GSP; there would be no impact.

City of Stockton

As discussed in Impact GW-2 above, construction activities for City of Stockton project components are temporary and would not affect groundwater recharge or supplies. Therefore, construction would not conflict with the ESJSB GSP; there would be no impact.

Operation

This impact analysis discusses potential conflicts from MICUP with the ESJSB GSP. The analysis evaluates permanent changes from new/improved structures, impervious surfaces, maintenance activities, and operations including recharge using the various types of facilities proposed. These issues are first broadly evaluated below, and then, potential impacts from operation and maintenance of project components for each of MICUP partner agencies is evaluated.

New/Improved Structures, Impervious Surfaces, and Maintenance of Project Component Facilities

As discussed in the development and maintenance of project components analysis in Impact GW-2, development of new facilities and infrastructure for MICUP project components would not interfere with or impede groundwater recharge, and maintenance would occur at developed infrastructure recharge sites and does not include activities that would potentially impair or interfere with groundwater recharge. Therefore, new/improved facilities, creation of impervious surfaces, and maintenance associated with project components would not conflict with the ESJSB GSP.

Facility Operations including Recharge

As discussed in the operation analysis in Impact GW-2, MICUP would provide a new source of recharge water to the ESJSB and result in a reduction in pumping of groundwater for existing uses when Mokelumne River water is used directly for irrigation. MICUP does not include new groundwater pumping; and groundwater levels and storage would increase under MICUP, as demonstrated by modeling conducted for MICUP compared to existing conditions. Additionally, as discussed in Impact GW-1, since Mokelumne River water is of high quality, MICUP recharge activities would not result in adverse impacts to groundwater quality within the ESJSB.

As discussed in the *Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan* section above, groundwater levels in the ESJSB are expected to decline and the ESJSB GSP established MTs and MOs for a series of RMWs to determine compliance with SGMA with respect to each of the six sustainability indicators. As outlined in Table 4.10-2, the seawater intrusion sustainability indicator is not applicable in the ESJSB; groundwater levels are used to monitor undesirable results for the following four sustainability indicators: chronic lowering of groundwater levels, reduction in groundwater storage, land subsidence, and depletion of interconnected surface water; and TDS and chloride are used to monitor undesirable results for degraded water quality.

Table 4.10-5 outlines the effects of MICUP in comparison to the six sustainability indicators and undesirable results for the ESJSB. MICUP would enhance water supply reliability in the subbasin by augmenting supplies during the non-irrigation season and wetter years for use during irrigation seasons and drier years. By storing additional surface water, the proposed project would benefit groundwater levels and storage in the subbasin and help support groundwater sustainability efforts in compliance with SGMA requirements. Additionally, since high quality Mokelumne River water, an increase in existing concentrations of TDS and chloride is not anticipated. The 11 RMWs identified in Table 4.10-4would be used to monitor groundwater levels and quality in compliance with the minimum thresholds established under the ESJSB GSP. Therefore, MICUP would not cause undesirable results related to the six sustainability indicators in the ESJSB GSP. Instead, MICUP would bring significant benefits to the region for achieving sustainability and management of groundwater resources in compliance with SGMA requirements for the ESJSB GSP.

Table 4.10-7 Effect of MICUP on Eastern San Joaquin Groundwater Subbasin GSP Sustainability Indicators

Sustainability Indicator	ESJSB Undesirable Result Definition	Effects of MICUP
Chronic lowering of groundwater levels	At least 25 percent of RMWs used to monitor groundwater levels in the Subbasin (5 out of 21 wells[1]) fall below their minimum thresholds for two consecutive years	MICUP would increase groundwater levels in the Subbasin, including at RMWs; providing recovery of groundwater levels in areas where chronic lowering has occurred.
Reduction in groundwater storage	Groundwater levels used as a proxy; groundwater levels minimum thresholds used for protecting groundwater storage	By increasing groundwater levels, MICUP would increase groundwater storage; providing recovering in areas where groundwater storage has been declining.
Degraded water quality	More than 25 percent of RMWs exceed the minimum thresholds for water quality for two consecutive years and where these concentrations are the result of groundwater management activities. The minimum threshold for degraded water quality is 1,000 mg/L TDS and 250 mg/L for chloride at each of the RMWs, consistent with the upper limit SMCL for TDS and chloride, respectively.	By recharging high quality Mokelumne River water, MICUP is not anticipated to increase existing concentrations of TDS and chloride and would likely improve groundwater water quality.
Seawater intrusion	Not applicable	Not applicable
Land subsidence	Minimum threshold was set at no more than 0.2 foot/year in any five-year period between 2020 and 2040, resulting in no more than a total additional 2 feet of land subsidence by 2040.	By increasing groundwater levels, MICUP would not increase land subsidence but would improve conditions where land subsidence has occurred.
Depletion of interconnected surface water	Interconnected surface water minimum thresholds for wells with historical groundwater levels are the same as chronic lowering of groundwater levels minimum thresholds.	By increasing groundwater levels, MICUP would bring groundwater closer to the surface and result in decreased stream seepage

Mitigation Measures

No mitigation is required.

Level of Significance

No impact

4.10.5 Cumulative Impacts

The geographic area affected by MICUP and its potential to contribute to cumulative impacts varies based on the environmental resource under consideration. The geographic scope of analysis for cumulative groundwater hydrology and quality impacts encompasses the ESJSB. The timeframe during which MICUP could contribute to cumulative groundwater hydrology and quality impacts includes the construction and operations phases. For MICUP, the operations phase is permanent. Groundwater hydrology and quality-related impacts are generally site-specific and depend on local groundwater conditions and the potential for a project to create an adverse effect that could result in impacts related to groundwater hydrology and quality.

The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1, *Cumulative Plans and Larger-scale Projects List*, which lists the

relevant plans and larger-scale projects considered in conjunction with the proposed plan (refer to Chapter 4.0, *Environmental Impact Analysis*). Significant cumulative impacts related to groundwater hydrology and quality impacts could occur if the incremental impacts of the proposed project combined with the incremental impacts of one or more of the cumulative projects identified in Table 4-1 involve concurrent activities that would: violate any water quality standards or waste discharge requirements or otherwise substantially degrade groundwater quality; substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the ESJSB; or conflict with or obstruct implementation of the ESJSB GSP or Basin Plan.

Most of the cumulative projects are located within the ESJSB; however, it is unlikely that the following cumulative projects would combine with the proposed project to result in cumulative impacts either due to their distance away from the project area and/or they are not located within the ESJSB: Site Approval No. PA-1900214; Site Approval No. PA01900295; PA-2300280 & PA-2300281; Mountain House Master Plan; 541 Wicklund Crossing; PA-2000063, PA-2000064, and PA-2000065; PA-2300231; PA-2100126; PA-2300198; PA-2300199; PA-2300166(A); and the Pacific Gateway Project.

Construction

Ground Water Quality and Basin Plan Consistency

Similar to the proposed project, cumulative projects have the potential to disturb more than 1 acre of land. If the projects are constructed at the same time in close proximity, the runoff or contamination effects could be cumulatively significant and could affect groundwater quality within interconnected surface systems. However, the CGP would require each project to prepare and implement a SWPPP. The SWPPPs would describe BMPs to control runoff and prevent erosion for each project. Through compliance with this requirement, the potential for groundwater contamination impacts or confliction with Basin Plan water quality objectives would be reduced. Therefore, for cumulative projects that would disturb more than 1 acre of land, it is unlikely that cumulative impacts to groundwater quality to be significant.

NPDES permits have been developed to address cumulative conditions arising from construction throughout the state and are intended to maintain cumulative effects of projects subject to this requirement below levels that would be considered significant. For example, two adjacent construction sites would be required to implement BMPs to reduce and control the release of sediment and/or other pollutants in any runoff leaving their respective sites. The runoff water from both sites would be required to achieve the same action levels, measured as a maximum amount of sediment or pollutant allowed per unit volume of runoff water. Thus, even if the runoff waters were to combine after leaving the sites, the sediments and/or pollutants in the combined runoff would still be at concentrations (amount of sediment or pollutants per volume of runoff water) below action levels.

Similar to the proposed project, it is likely that cumulative projects that disturb less than 1 acre of land would implement some sort of erosion and/or water pollution control plan or include BMPs similar to those detailed in a project's SWPPP (required as Mitigation Measure GEO-1 and SW-1 for the proposed project). Additional mitigation measures that MICUP is required to implement include: compliance with NPDES WDRs (Mitigation Measure SW-1) for construction dewatering; Phase I ESAs (Mitigation Measure HAZ-1) to make sure project components located within one-mile of a hazardous material site are avoided or that hazardous conditions and soils are remediated prior to

construction; as well as additional BMPs to implement for in-water work to limit degradation of groundwater quality in the ESJSB (Mitigation Measure SW-2). Cumulative projects may result in significant impacts to groundwater quality or conflict with water quality objectives of the Basin Plan if appropriate regulations are not followed and similar measures are not implemented (depending on the type of cumulative project). Therefore, cumulative projects would result in potentially significant impacts regarding groundwater quality or conflict with the Basin Plan.

However, MICUP would implement measures (referenced above) to reduce potential impacts to groundwater to less-than-significant levels; therefore, the proposed project's contribution to significant cumulative impacts regarding groundwater quality would not be considerable.

Groundwater Supply and Recharge

Cumulative projects could potentially use minor amounts of groundwater in the form of potable water for construction workers in staging areas, in trailers, etc. or more likely, for dust suppression at the project site (depending on the location of the cumulative project site). It is unlikely that construction activities would require significant amounts of groundwater such that supplies would be depleted, or recharge would be impeded. It is anticipated that cumulative impacts associated with construction activities for cumulative projects would be less than significant. Further, the proposed project would not require the use of groundwater supply or interfere with recharge during construction. Cumulative impacts to groundwater supply and recharge during construction would be less than significant.

Sustainable Groundwater Management Plan Consistency

Refer to cumulative impacts regarding groundwater quality, Basin Plan consistency, and groundwater supply/recharge above. Cumulative projects would likely implement mitigation measures during construction similar to the proposed project to reduce the potential to conflict with water quality objectives or waste discharge requirements as identified in the Basin Plan. Furthermore, cumulative projects' construction activities are not anticipated to require large amounts of groundwater such that groundwater recharge is impeded.

With the implementation of mitigation measures referenced above, the proposed project would result in less-than-significant impacts; therefore, the project's contribution to potential cumulative impacts regarding consistency with the ESJSB GSP would not be considerable.

Operation

Most of the cumulative projects that are construction-based would not combine with the proposed project and result in cumulative impacts to groundwater from operations and would not result in significant operational impacts (to which MICUP could contribute to). Maintenance activities of the proposed project would not combine with maintenance impacts of land use-based projects.

Proposed development in the project vicinity, including land use projects would benefit from the proposed project because implementation of project components would support water supply reliability which would be used by proposed development. For example, direct recharge of high-quality surface water would help increase the quality and quantity of available groundwater to the overdraft basin; thereby supporting irrigation supply (via all proposed project components), urban supply (ASR wells), or potable water requirements required for habitable structures in the project vicinity (refer to PA-2200207 for example).

Groundwater Quality and Basin Plan Consistency

Some of the cumulative projects such as PA-2300198 (agricultural production), the Delta Water Treatment Plant Groundwater Recharge Basin (utility development), and the Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan (water infrastructure) include similar infrastructure and uses in the same areas as MICUP. Similar to the proposed project, cumulative project activities that include facilities such as recharge basins, stormwater basins, and unlined canals would be subject to stormwater runoff. However, these facilities would likely require standard maintenance activities such as sediment removal/scraping, vegetation management, and debris clearing, similar to the proposed project, and would not impact groundwater. Maintenance activities and standard best practices for cumulative project facilities associated with water conveyance, storage, recharge, or agricultural production would ensure runoff and potential impacts to groundwater quality would be reduced to less-than-significant levels.

Cumulative projects that include agricultural irrigation exhibit similar operational activities as the proposed project's Flood-MAR, which could potentially result in significant impacts to groundwater quality or conflict with water quality objectives in the Basin Plan. Therefore, cumulative projects could result in significant impacts.

The proposed project would be required to implement mitigation measures to include initial site assessment and hazardous conditions or soils remediation prior to diversion, as well as siting Flood-MAR to avoid hazardous material sites and incorporate berms into downslope lands associated with Flood-MAR. With implementation of these mitigation measures, the proposed project would not result in degradation of groundwater quality due to hazardous materials associated with Flood-MAR. Therefore, the proposed project's contribution to potentially significant cumulative groundwater quality impacts would not be considerable.

Groundwater Supply and Recharge

Cumulative projects such as the Delta Water Treatment Plant Groundwater Recharge Basin Project (analyzed in this EIR programmatically) include the development of facilities similar to the proposed project and would likely benefit groundwater supply and recharge. Therefore, cumulative projects similar to the proposed project are not expected to result in significant cumulative impacts to groundwater supply and recharge.

However, cumulative projects that include land use changes or development of habitable structures such as the Pacific Gateway Project (Commercial, Business Park, Industrial Limited, Public Development) would require water supply for a multiple of beneficial uses. Cumulative development such as this could potentially result in significant cumulative impacts to groundwater supply and recharge due to increased demand that land uses such as these would require (potable water, irrigation, etc.).

The proposed project would benefit groundwater supply and recharge in the ESJSB, and therefore, would not contribute to potential significant cumulative impacts regarding the depletion of groundwater or interference with recharge. Therefore, the project's contribution to potentially significant cumulative impacts would not be considerable.

Sustainable Groundwater Management Plan Consistency

Groundwater levels and storage in the ESJSB have historically been declining due to groundwater pumping and are projected to continue to decline in the future due to additional growth and use of groundwater. Some cumulative projects listed in Table 4-1 may require groundwater pumping in the

future and contribute to declining groundwater levels and storage. MICUP does not propose groundwater extraction or recovery and would not contribute to significant cumulative impacts related to declining groundwater levels and storage in the ESJSB.

The ESJSB GSP identifies PMAs, including some cumulative projects listed in Table 4-1, to offset groundwater pumping and increase recharge to reduce overdraft conditions. MICUP would further increase recharge and offset groundwater pumping. A demand reduction program would be implemented to achieve sustainability and management of groundwater sustainability indicators in compliance with SGMA requirements for the ESJSB GSP. Since MICUP increases groundwater levels and storage, the demand reduction program needed to achieve compliance with the ESJSB GSP would be substantially reduced in scope compared to the program that would be required without implementation of MICUP.

The incremental impacts of the proposed project combined with impacts of cumulative projects in the ESJSB would not contribute to significant cumulative impacts to groundwater supplies, groundwater recharge, groundwater quality, or conflict with the ESJSB GSP. The proposed project's contribution to significant cumulative effects would not be considerable.

Mitigation Measures

Mitigation Measures GEO-1, HAZ-1, SW-1, SW-2, SW-3, SW-4, SW-5, and GW-1.

Level of Significance

Less than Significant with Mitigation

Overall Level of Cumulative Significance

Less than Significant with Mitigation

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4.11 Noise

4.11.1 Introduction

This section describes the existing conditions related to noise and vibration within the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas) as well as the regulatory framework. This section also evaluates the possible impacts related to noise and vibration that could result from implementation of the proposed project.

Information included in this section is based on the San Joaquin County General Plan, San Joaquin County Code, City of Stockton General Plan, City of Stockton Municipal Code, City of Lodi General Plan, City of Lodi Municipal Code, as well as existing noise measurement results and project-specific noise modeling results, both of which are included as Appendix J to this EIR.

4.11.2 Environmental Setting

Characteristics of Sound and Noise

Sound is a vibration that transmits through a medium (such as a gas, liquid, or solid) created by a moving or vibrating source, which is capable of being detected by the hearing organs. *Noise* is defined as sound that is loud, unpleasant, unexpected, or undesired, and may therefore be classified as a more specific group of sounds. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and, in the extreme, hearing impairment.[1]

Noise levels are commonly measured in decibels (dB) using the A-weighted sound pressure level (dBA). The A-weighting scale is an adjustment to the actual sound pressure levels so that they are consistent with the human hearing response, which is most sensitive to frequencies around 4,000 hertz (Hz) and less sensitive to frequencies around and below 100 Hz.[2] Decibels are measured on a logarithmic scale that quantifies sound intensity in a manner similar to the Richter scale used to measure earthquake magnitudes. A doubling of the energy of a noise source, such as the doubling of vehicle traffic volumes, results in a noise level increase of 3 dB, whereas dividing the energy in half results in a 3 dB decrease .[3] Table 4.11-1 shows various noise sources and typical corresponding noise levels in dBA.

[1] California Department of Transportation (Caltrans). 2013. Technical Noise Supplement to the Traffic Noise Analysis Protocol. (CT-HWANP-RT-13-069.25.2) September. Available at: http://www.dot.ca.gov/hq/env/noise/pub/TeNS_Sept_2013B.pdf (accessed December 2024).
[2] Kinsler, Lawrence E., R. Frey, Austin, B. Coppens, Alan and V. Sanders, James. Fundamentals of Acoustics, 4th Edition. ISBN 0-471-84789-5. Wiley-VCH, December 1999.
[3] Crocker, Malcom J (Editor). 2007. Handbook of Noise and Vibration Control Book, ISBN: 978-0-471-39599-7, Wiley-VCH, October.

Table 4.11-1 Typical A-Weighted Noise Levels for Various Noise Sources

Indoor Noise Source	Noise Level (dBA)	Outdoor Noise Sources
(Threshold of Hearing in Laboratory)	0	–
Library	30	Quiet Rural Nighttime
Refrigerator Humming	40	Quiet Suburban Nighttime
Quiet Office	50	Quiet Urban Daytime
Normal Conversation at 3 feet	60	Normal Conversation at 3 feet
Vacuum Cleaner at 10 feet	70	Gas Lawn Mower at 100 feet
Hair Dryer at 1 foot	80	Freight Train at 50 feet
Food Blender at 3 feet	90	Heavy-duty Truck at 50 feet
Inside Subway Train (New York)	100	Jet Takeoff at 2,000 feet
Smoke Detector Alarm at 3 feet	110	Unmuffled Motorcycle
Rock Band near stage	120	Chainsaw at 3 feet
–	130	Military Jet Takeoff at 50 feet
–	140	(Threshold of Pain)

Source: Data compiled by Rincon in 2022.

Human perception of noise has no simple correlation with sound energy (i.e., the perception of sound is not linear in terms of dBA or in terms of sound energy). Two sources, each containing the same sound energy, do not "sound twice as loud" as one source. It is widely accepted that the average healthy human ear can detect changes (either increases or decreases) of 3 dBA, which is recognized as being barely perceptible to most people. Similarly, a change of 5 dBA is readily perceptible and a change of 10 dBA sounds twice (or half) as loud.[3]

The level and frequency content of sound change as it travels from the source to a receiver. The most obvious change is the decrease in level as the distance from the source increases. The manner by which sound is reduced with distance depends on factors such as the type of source (e.g., a point or line source), the path the sound travels, site and atmospheric conditions, and the presence of intervening structures or other obstacles. Noise from a point source (e.g., construction equipment, industrial machinery, ventilation units) typically is reduced at a rate of 6 dBA per each doubling of distance away from the source. Noise from a line source (e.g., roadway, pipeline, railroad) typically is reduced at a rate of 3 dBA per each doubling of distance away from the source.[1] The propagation of noise is also affected by the absorption characteristics of the ground: a hard site, such as a parking lot or smooth body of water, provides no absorption/attenuation and the changes in noise levels with distance result simply from the geometric spreading of the source (i.e., 3 or 6 dBA reduction per doubling of distance for a point source or line source, respectively). Conversely, a soft site, such as soft dirt, grass, or scattered bushes and trees, may provide additional absorption/attenuation, potentially reducing noise levels an additional 1.5 dBA per doubling of distance away from the source.[1] Noise levels may also be reduced by intervening structures. The amount of reduction provided by the "shielding" of these features depends on the size of the structure/s, the location of the structure/s relative to the noise source and receivers, and the frequency content of the noise levels. Natural terrain features, such as hills, dense woods, and man-made features, such as buildings and walls, can substantially alter noise levels. Generally, any large structure blocking the line of sight between a noise source and receiver will provide at least a 5-dBA

reduction in source noise levels at the receiver.[4] The presence of building structures can substantially reduce noise levels from the exterior to the interior as well. The FHWA's guidelines indicate that modern building construction generally provides an exterior-to-interior noise level reduction of 20 to 35 dBA with closed windows.

The impact of noise is not a function of loudness alone. The time of day at which noise occurs and the duration of the noise are also important factors when considering potential noise impacts. Most noise that lasts for more than a few seconds is variable in its amplitude (i.e., the noise level continuously fluctuates over time). Consequently, a variety of noise descriptors have been developed. One of the most frequently used noise metrics is the equivalent continuous sound level (L_{eq}), which considers both duration and the sound power level of the source. L_{eq} is defined as the single steady A-weighted level equivalent to the same amount of energy as that contained in the actual fluctuating levels over time. The extent of sound level fluctuations over a period of time is characterized by the minimum (L_{min}) and maximum (L_{max}) sound pressure levels, which represent the lowest and highest sound pressure levels measured during a given period, respectively.

The sound level that is exceeded "n" percent of time during a given sample period in the percentile noise level is represented as L_n. For example, the L_{50} level is the statistical indicator of the time-varying noise signal that is exceeded 50 percent of the time (during each sampling period); that is, half of the sampling time, the changing noise levels are above this value and half of the time they are below it. This is called the "median sound level." The L_{10} level, likewise, is the value that is exceeded 10 percent of the time (i.e., near the maximum), and this is often known as the "intrusive sound level." The L_{90} is the sound level exceeded 90 percent of the time and is often considered the "effective background level" or "residual noise level."

Noise that occurs at night tends to be more disturbing than noise that occurs during the day. Community noise is usually measured using the Day-Night Average Level (L_{dn} or DNL), which is the 24-hour average noise level with a +10 dBA penalty for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.) hours. It is also measured using the Community Noise Equivalent Level (CNEL), which is the 24-hour average noise level with a +5 dBA penalty for noise occurring during evening hours (7:00 p.m. to 10:00 p.m.) and a +10 dBA penalty for noise occurring during nighttime hours (10:00 p.m. to 7:00 a.m.).[1] Noise levels described by the L_{dn} (or DNL) and CNEL usually differ by about 1 dBA. The relationship between the peak-hour L_{eq} value and the L_{dn} (or DNL)/CNEL depends on the distribution of noise occurring during the day, evening, and night.

Characteristics of Vibration

Groundborne vibration of concern in environmental analysis consists of the oscillatory waves that move from a source through the ground to adjacent structures. The number of cycles per second of oscillation makes up the vibration frequency, described in terms of Hz. The frequency of a vibrating object describes how rapidly it oscillates. The normal frequency range of most groundborne vibration that can be felt by the human body ranges between less than 1 Hz to 200 Hz.[3]

While people have varying sensitivities to vibrations at different frequencies, in general they are most sensitive to low-frequency vibration. Vibration in buildings, such as that from nearby construction activities, may cause windows, items on shelves, and pictures on walls to rattle. Vibration of building components can also take the form of an audible low-frequency rumbling noise, referred to as groundborne noise. Groundborne noise is usually only a problem when the

[4] Federal Highway Administration (FHWA). 2011. Highway Traffic Noise Analysis and Abatement Policy and Guidance. (FHWA-HEP-10-025). December. (accessed December 2024)

originating vibration spectrum is dominated by frequencies in the upper end of the range (60 to 200 Hz), or when foundations or utilities, such as sewer and water pipes, physically connect the structure and the vibration source.[5] Although groundborne vibration is sometimes noticeable in outdoor environments, it is almost never annoying to people who are outdoors. The primary concern of vibration is that it can be intrusive and annoying to building occupants and vibration-sensitive land uses.

Vibration amplitudes are usually expressed in peak particle velocity (PPV), or root mean squared (RMS) vibration velocity. The PPV and RMS velocity are normally described in inches per second (in/sec). *PPV* is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is often used in monitoring of blasting vibration because it is related to the stresses that are experienced by buildings.[6]

Noise-Sensitive Land Uses

Noise exposure goals for various types of land uses reflect the varying noise sensitivities associated with those uses. The San Joaquin County General Plan Public Health and Safety Element defines noise-sensitive land uses as “[p]laces where people live, sleep, recreate, worship, and study…because intrusive noise can be disruptive to these activities." The General Plan Public Health and Safety Element specifies the following as noise-sensitive uses: “residential development, lodging, hospitals, nursing homes, schools, day care centers”.[7]

Project Area

Noise-sensitive land uses are located sporadically throughout the project area (particularly the NSJWCD and SEWD areas) and more densely within the City of Stockton area that is a predominantly residential city. The project area also includes noise-sensitive land uses such as hotels and motels; group homes; churches; schools and other learning institutions; and libraries.

Existing Noise Conditions

The existing noise environment in the project area varies depending on location. NSJWCD project components would be located near existing sensitive receptors, including a pump station situated near existing residences in unincorporated San Joaquin County. Noise measurements were conducted near sensitive receptors located in the vicinities of proposed MICUP facilities to determine baseline ambient noise levels. These noise measurements and existing noise sources in each jurisdiction are explained further below. Note that no airports or airport-related contours overlap with the project component areas.

[5] Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment. November. Available at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf (accessed December 2024).
[6] California Department of Transportation (Caltrans). 2020. Transportation and Construction Vibration Guidance Manual. Available at: https://dot.ca.gov/-/media/dot-media/programs/environmental-analysis/documents/env/tcvgm-apr2020-a11y.pdf (accessed December 2024).
[7] San Joaquin, County of. 2016. San Joaquin County General Plan Policy Document. December. https://www.sjgov.org/commdev/cgi-bin/cdyn.exe?grp=planning&htm=gp2035 (accessed December 2024)

San Joaquin County

Noise sources in San Joaquin County primarily consist of roadway traffic, aircraft operations, commercial and industrial uses, agricultural operations, active recreation areas, and mining operations. NSJWCD project components would include replacement and expansion of the North System Pump Station, located in a primarily agricultural portion of northeastern San Joaquin County. The pump station would be situated approximately 150 feet southeast of the nearest residence and would introduce additional noise in this area during construction and operation. To characterize the existing noise environment at sensitive receptors near this pump station, one long-term (LT), 24-hour noise measurement was conducted on January 16 through 17, 2025 using a SoftdB Piccolo-II, ANSI Type 2 integrating sound level meter, which was calibrated before and after the measurements. The measurement was conducted along North Tretheway Road, approximately 1,300 feet south of Acampo Road, as shown in Figure 4.11-1. Noise measurement results are shown in Table 4.11-2.

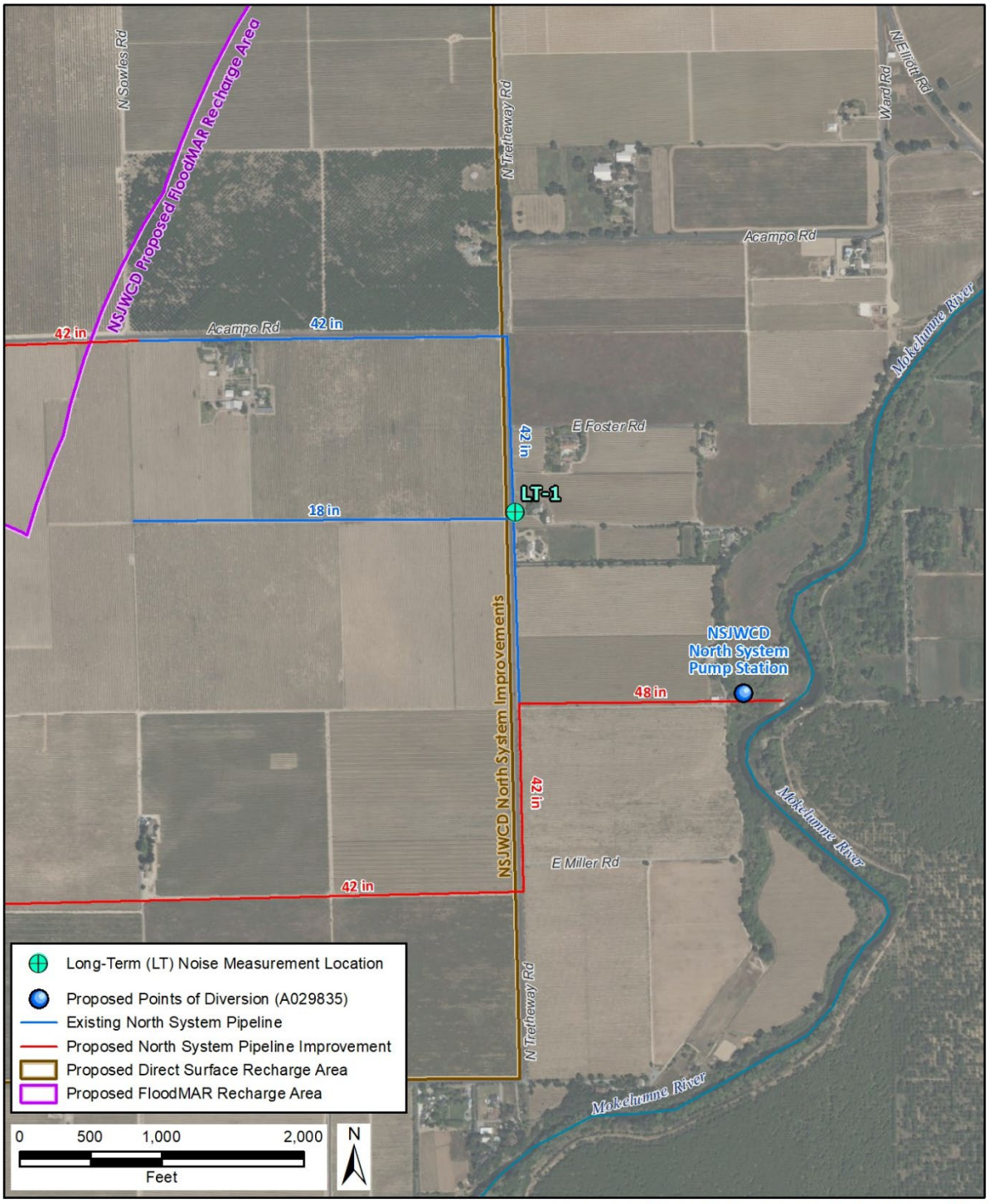
Table 4.11-2 Existing Long-Term Noise Measurement Results (LT-1)

Sample Time	dBA L_{eq}	Sample Time[1]	dBA L_{eq}
24-hour Measurement – January 16 – 17, 2025			
11:00 a.m.	57	11:00 p.m.	40
12:00 p.m.	56	12:00 a.m.	39
1:00 p.m.	56	1:00 a.m.	42
2:00 p.m.	55	2:00 a.m.	47
3:00 p.m.	57	3:00 a.m.	46
4:00 p.m.	56	4:00 a.m.	40
5:00 p.m.	56	5:00 a.m.	50
6:00 p.m.	56	6:00 a.m.	54
7:00 p.m.	41	7:00 a.m.	60
8:00 p.m.	53	8:00 a.m.	54
9:00 p.m.	40	9:00 a.m.	57
10:00 p.m.	48	10:00 a.m.	56
CNEL			**56.8**
L_{eq}			**54.2**
Daytime L_{eq}			**55.8**
Nighttime L_{eq}			**48.0**
L_{min}			**35.5**
L_{max}			**86.6**

dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level; CNEL = Community Noise Equivalent Level; Daytime L_{eq} = average sound level during daytime hours (7:00 a.m. to 10:00 p.m.); Nighttime L_{eq} = average sound level during nighttime hours (10:00 p.m. to 7:00 a.m.); L_{min} = minimum sound level; L_{max} = maximum sound level

See Figure 4.11-1 for approximate noise measurement location; see Appendix J for graphical long-term noise measurement results.

Figure 4.11-1 Approximate Existing Noise Measurement Location (LT-1)



GEI Consultants, 2026

City of Lodi

Primary noise sources in the City of Lodi include roadway traffic, railroad noise, airport operations, industrial operations, construction, and operation of small-scale equipment (mechanical equipment such as pumps and fans and portable power equipment such as leaf blowers and drills). NSJWCD project components would include installation of new pipelines and recharge basins just outside the Lodi city limits. To characterize the existing noise environment at sensitive receptors in this vicinity, one long-term (LT), 24-hour noise measurement was conducted on January 16 through 17, 2025 using a SoftdB Piccolo-II, ANSI Type 2 integrating sound level meter, which was calibrated before and after the measurements. The measurement was conducted approximately 350 feet north of East Handel Road, as shown in Figure 4.11-2. Noise measurement results are shown in Table 4.11-3.

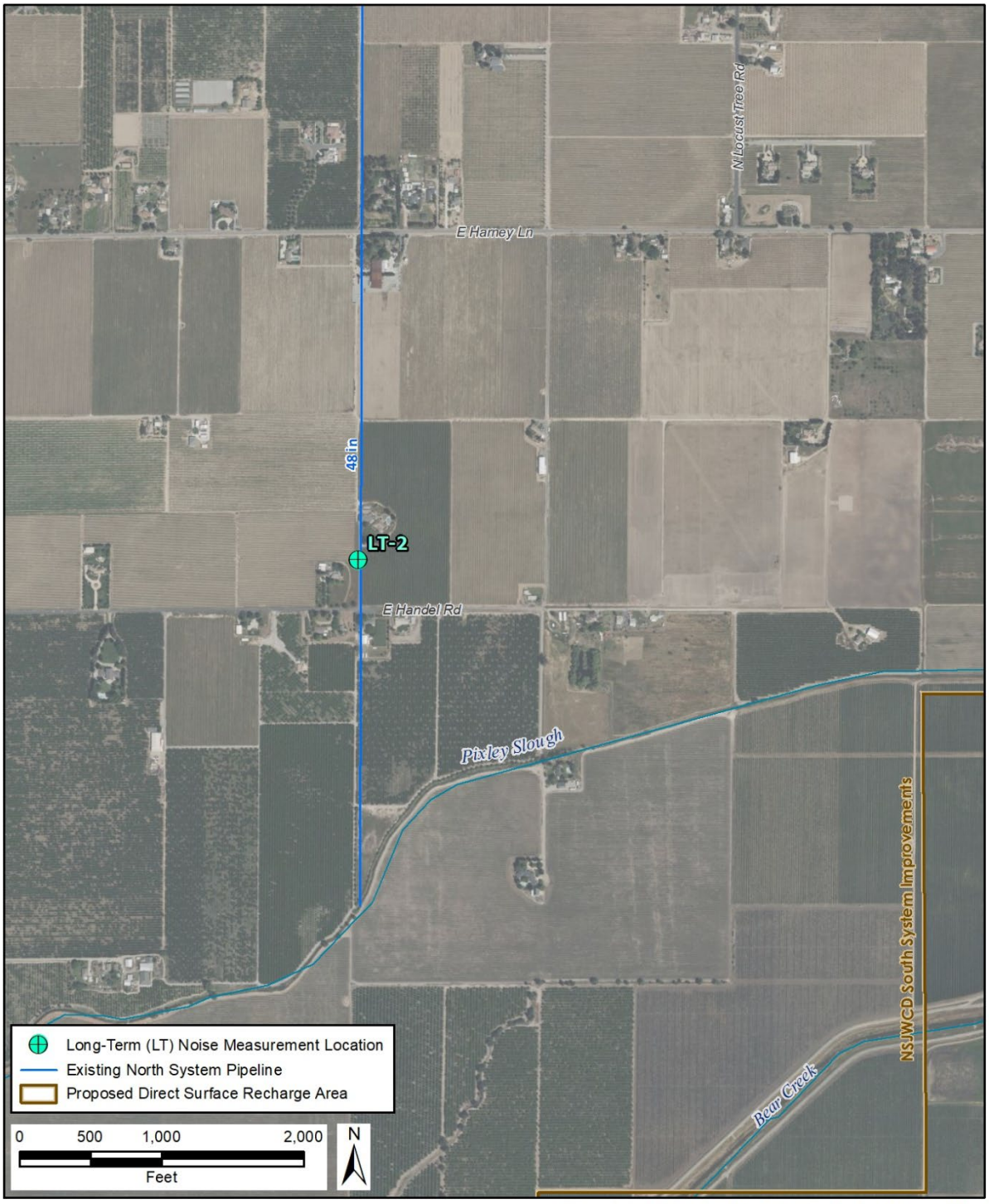
Table 4.11-3 Long-Term Noise Measurement Results (LT-2)

Sample Time	dBA L_{eq}	Sample Time[1]	dBA L_{eq}
24-hour Measurement – January 16 – 17, 2025			
10:00 a.m.	45	10:00 p.m.	42
11:00 a.m.	41	11:00 p.m.	40
12:00 p.m.	42	12:00 a.m.	39
1:00 p.m.	57	1:00 a.m.	39
2:00 p.m.	44	2:00 a.m.	40
3:00 p.m.	40	3:00 a.m.	40
4:00 p.m.	44	4:00 a.m.	42
5:00 p.m.	43	5:00 a.m.	43
6:00 p.m.	43	6:00 a.m.	47
7:00 p.m.	43	7:00 a.m.	48
8:00 p.m.	43	8:00 a.m.	48
9:00 p.m.	43	9:00 a.m.	45
CNEL			**49.8**
L_{eq}			**46.3**
Daytime L_{eq}			**47.7**
Nighttime L_{eq}			**42.0**
L_{min}			**37.1**
L_{max}			**74.7**

dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level; CNEL = Community Noise Equivalent Level; Daytime L_{eq} = average sound level during daytime hours (7:00 a.m. to 10:00 p.m.); Nighttime L_{eq} = average sound level during nighttime hours (10:00 p.m. to 7:00 a.m.); L_{min} = minimum sound level; L_{max} = maximum sound level

See Figure 4.11-2 for approximate noise measurement location; see Appendix J for graphical long-term noise measurement results.

Figure 4.11-2 Approximate Existing Noise Measurement Location (LT-2)



GEI Consultants, 2026

City of Stockton

Noise sources in the City of Stockton primarily include mobile sources of noise such as vehicle traffic on major roadways, aircraft operations at the Stockton Municipal Airport, freight train movements on railroads, and industrial uses at the Port of Stockton. Other sources of noise in the City include stationary sources such as commercial and industrial operations (processing machinery, loading dock activity, and mechanical equipment), construction, and public facilities.[8]

4.11.3 Regulatory Framework

Federal Regulations

Occupational Health and Safety Administration

The federal government regulates occupational noise exposure common in the workplace through the Occupational Health and Safety Administration (OSHA) under the EPA. Noise limitations would apply to the operation of construction equipment and could also apply to any proposed industrial land uses. Noise exposure of this type is dependent on work conditions and is addressed through a facility's Health and Safety Plan, as required under OSHA, and is not addressed further in this analysis.

State Regulations

California General Plan Guidelines

State law requires general plans to include a Noise Element under Government Code Section 65302(f). The California General Plan Guidelines, published by the Governor's Office of Planning and Research, indicate acceptable, specific land use types in areas with specific noise exposure. The guidelines also offer adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. These guidelines are advisory, and local jurisdictions have the authority to set specific noise standards based on local conditions.

Local Regulations

San Joaquin County General Plan Public Health and Safety Element

The Public Health and Safety Element of the San Joaquin County General Plan provides guidance for how to protect residents, workers, visitors, and properties within the County from unreasonable risks associated with natural and manmade hazards, including noise. The Public Health and Safety element summarizes adopted noise standards used to quantify noise impacts and addresses ways to reduce or eliminate existing and future conflicts between land uses and annoying or unhealthy levels of noise. The following policies contained within the Public Health and Safety Element are relevant to the proposed project:

[8] Stockton, City of. 2018. Envision Stockton 2040 General Plan Update and Utility Master Plan Supplements Draft EIR. June. https://www.stocktonca.gov/business/planning___engineering/general_plan.php (accessed January 2025).

Goal PHS-9: To protect County residents from the harmful and nuisance effects of exposure to excessive noise.

- **Policy PHS-9.1:** Noise Standards for New Land Uses

  The County shall require new development to comply with the noise standards shown in [Table 4.11-5][9] through proper site and building design, such as building orientation, setbacks, barriers, and building construction practices.

- **Policy PHS-9.4:** Acceptable Vibration Levels

  The County shall require construction projects anticipated to generate a significant amount of vibration to ensure acceptable interior vibration levels at nearby vibration-sensitive uses based on FTA criteria.

- **Policy PHS-9.5:** Alleviate Existing Noise Problems

  The County shall seek to alleviate existing community noise problems.

- **Policy PHS-9.6:** Enforcement of State and Federal Noise Regulations

  The County shall continue to enforce State and Federal noise laws regarding vehicle operation, equipment, and building insulation.

- **Policy PHS-9.9:** Noise Exemptions

  The County shall support the exemption of the following noise sources from the standards in this section:

  - Emergency warning devices and equipment operated in conjunction with emergency situations, such as sirens and generators which are activated during power outages. The routine testing of such warning devices and equipment shall also be exempt provided such testing occurs during the hours of 7:00 a.m. to 10:00 p.m.
  - Activities at schools, parks, or playgrounds, provided such activities occur during daytime hours.
  - Activities associated with County-permitted temporary events and festivals.

San Joaquin County Code of Ordinances

Section 9-404.020 of the San Joaquin County Code of Ordinances exempts the following sources from its noise regulations:

c. **Construction:** Noise associated with construction, provided such activities do not take place before 6:00 a.m. or after 9:00 p.m. on any day.

i. **Public Works Construction Projects, Maintenance, and Repair:** Street, utility, and similar construction projects, or the maintenance or repair thereof, undertaken by, under contract to, or at the direction of the County, the State of California, or a public utility. These activities include street sweeping, debris and litter removal, removal of downed wires, restoring electrical service, repairing traffic signals, unplugging sewers, vacuuming catch basins, repairing of damaged poles, removal of abandoned vehicles, and repairing of water hydrants, watermains, gas lines, oil lines, sewers, storm drains, roads, and sidewalks.

[9] Note that this General Plan table with San Joaquin County non-transportation noise level performance standards is included later in this section under Specific Thresholds of Significance.

j. **Utility Facilities:** Facilities for utilities including, without limitation, electric power transformers and related equipment, sewer lift stations, wastewater processing, wells, and pumping stations.

City of Stockton General Plan Safety Element

The Safety Element of the Envision Stockton 2040 General Plan aims to improve public safety and reduce the risk of hazards within the City of Stockton, including noise. The following actions and policies contained within the City of Stockton's Safety Element are relevant to the proposed project:

- **Policy SAF-2.8:** Protect the community from health hazards and annoyance associated with excessive noise levels.
  - **Action SAF-2.8A:** Prohibit new commercial, industrial, or other noise-generating land uses adjacent to existing sensitive noise receptors such as residential uses, schools, health care facilities, libraries, and churches if noise levels are expected to exceed 70 dBA Community Noise Equivalent (CNEL) (decibels on A-weighted scale CNEL) when measured at the property line of the noise sensitive land use.
  - **Action SAF-2.8D:** Grant exceptions to the noise standards for commercial and industrial uses only if a recorded noise easement is conveyed by the affected property owners.

City of Stockton Municipal Code

Chapter 16.60 of the City of Stockton Municipal Code (SMC) contains noise standards applicable to noise generated within the City of Stockton. Specifically, Section 16.60.020 specifies activities that are exempt from the City of Stockton's noise standards, including:

f. Public Health and Safety Activities: All transportation, flood control, and utility company maintenance and construction operations at any time on public rights-of-way, and those situations that may occur on private property deemed necessary to serve the best interest of the public and to protect the public's health and wellbeing, including, debris and limb removal, removal of damaged poles and vehicles, removal of downed wires, repairing traffic signals, repair of water hydrants and mains, gas lines, oil lines, and sewers, restoring electrical service, street sweeping, unplugging sewers, vacuuming catch basins, etc. The regular testing of motorized equipment and pumps shall not be exempt.

In addition, the SMC contains restrictions on construction equipment, stating that "[o]perating or causing the operation of tools or equipment on private property used in alteration, construction, demolition, drilling, or repair work between the hours of 10:00 p.m. and 7:00 a.m., so that the sound creates a noise disturbance across a residential property line, except for emergency work of public service utilities" shall be deemed a violation of the provisions on the SMC.

City of Lodi General Plan

The Noise Element of the City of Lodi General Plan identifies existing noise sources within the City of Lodi and establishes policies to mitigate potential impacts through both preventative and responsive actions. Relevant policies applicable to the proposed project are presented below.

GUIDING POLICIES

- **N-G1:** Protect humans, the natural environment and property from manmade hazards due to excessive noise exposure.
- **N-G2:** Protect sensitive uses, including schools, hospitals, and senior care facilities, from excessive noise.

IMPLEMENTING POLICIES

- **N-P1:** Control and mitigate noise at the source where feasible, as opposed to at the receptor end.
- **N-P2:** Encourage the control of noise through site design, building design, landscaping, hours of operation, and other techniques for new development deemed to be noise generators.
- **N-P4:** Discourage noise sensitive uses such as residences, hospitals, schools, libraries, and rest homes from locating in areas with noise levels above 65db. Conversely, do not permit new uses likely to produce high levels of noise (above 65db) from locating in or adjacent to areas with existing or planned noise-sensitive uses.
- **N-P7:** Require developers of potentially noise-generating new developments to mitigate the noise impacts on adjacent properties as a condition of permit approval. This should be achieved through appropriate means, such as:
  - Dampening or actively canceling noise sources
  - Increasing setbacks for noise sources from adjacent dwellings
  - Using soundproofing materials and double-glazed windows
  - Screening and controlling noise sources, such as parking and loading facilities, outdoor activities, and mechanical equipment
  - Using open space, building orientation and design, landscaping and running water to mask sounds
  - Controlling hours of operation, including deliveries and trash pickup.
- **N-P8:** Update Noise Ordinance regulations to address allowed days and hours of construction, types of work, construction equipment (including noise and distance thresholds), notification of neighbors, and sound attenuation devices.

City of Lodi Municipal Code

Chapter 9.24 of the City of Lodi Municipal Code contains regulations applicable to noise generated within the City of Lodi. Section 9.24.030(C) states "It is unlawful for any person, firm or corporation to cause, permit, or generate any noise or sound as described herein between the hours of ten p.m. and seven a.m. which exceeds the ambient noise level at the property line of any residential property (or, if a condominium or apartment house within any adjoining apartment) as determined at the time of such reading by more than five decibels. This section shall be applicable whether such noise or sound is of a commercial or noncommercial nature."

4.11.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 *CEQA Guidelines* Appendix G significance criteria questions related to Noise.

Would MICUP (the proposed project):

a) Generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

b) Generate excessive groundborne vibration or groundborne noise levels?

c) If located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the project area to excessive noise levels?

Approach to Analysis

Construction Noise

Temporary noise levels caused by construction activity would be a function of the noise generated by construction equipment, the location and sensitivity of nearby land uses, and the timing and duration of noise-generating activities. Construction noise was estimated using FHWA Roadway Construction Noise Model (RCNM), which predicts construction noise levels for a variety of construction operations based on empirical data and the application of acoustical propagation formulas.[10] Construction noise modeling results are included in Appendix J.

Stationary On-Site Operational Noise

The primary onsite stationary noise sources associated with project components under MICUP during operation would include outdoor pumps at pump stations and ASR wells. Information regarding pump manufacturers and models are not known at this time; therefore, reference noise levels for these noise sources are based on data contained in the *Noise Control for Buildings, Manufacturing Plants, Equipment and Products* document.[11] Using reference noise data contained in this document, noise levels associated with pumps at pump stations and ASR wells were estimated at various distances away from the equipment where sensitive receptors currently exist or where potential sensitive receptors may exist (for project components which do not have finalized locations).

Groundborne Vibration

Project components facilitated under MICUP would not include substantial vibration sources during operation; therefore, construction activities have the greatest potential to generate groundborne vibration affecting nearby sensitive receptors. Construction vibration levels that could occur due to buildout of project components under MICUP are based on reference vibration levels for various construction equipment published by the FTA and distances to existing or potential sensitive receptors.

EIR Scoping Comments Consideration

No comments relevant to CEQA were received in response to the EIR NOP specific to noise and vibration that need to be addressed in the impacts discussion.

Specific Thresholds of Significance

For purposes of this analysis, the following thresholds are used to evaluate the significance of noise impacts resulting from implementation of the proposed project.

[10] Federal Highway Administration (FHWA). 2006. FHWA Highway Construction Noise Handbook. (FHWAHEP-06-015; DOT-VNTSC-FHWA-06-02). Available at: http://www.fhwa.dot.gov/environment/construction_noise/handbook (accessed December 2024).
[11] Hoover & Keith, Inc. 1981. Noise Control for Buildings, Manufacturing Plants, Equipment and Products.

Construction Noise

None of the jurisdictions in which the MICUP project components are located (i.e., San Joaquin County, City of Stockton, or City of Lodi) have established quantitative noise limits for construction. In addition, the County Code contains an exemption from its noise regulations for construction noise. In absence of quantitative construction noise limits and, in order to present a comprehensive environmental review of potential noise impacts, construction noise was evaluated to limits recommended by the FTA in the *Federal Transit Noise and Vibration Impact Assessment Manual*,[5] which are shown in Table 4.11-4. The criteria shown in Table 4.11-4 are based on the potential for adverse community reaction and vary depending on land use type.

Table 4.11-4 FTA Construction Noise Criteria

	L_{eq}, equip (8-hour), dBA	
Land Use	**Day (7:00 a.m. to 10:00 p.m.)**	**Night (10:00 p.m. to 7:00 a.m.)**
Residential	80	70
Commercial	85	85
Industrial	90	90

dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level

Based on the noise limits shown in Table 4.11-4, construction noise impacts associated with implementation of the proposed project would be considered significant if construction noise levels were to exceed an average level of 80 dBA L_{eq} over an 8-hour daytime period at residential property lines. Additionally, nighttime construction work associated with well drilling may occur during limited periods of time. Noise associated with nighttime construction was evaluated to the nighttime noise limits of the jurisdiction where construction would occur: for construction occurring in unincorporated areas of San Joaquin County and the City of Stockton, the County's nighttime noise limit of 45 dBA L_{eq} was used to evaluate construction noise impacts.

Operational Noise

Regulations applicable to operational noise impacts associated with MICUP project components vary depending on the jurisdiction each project component is located in. For project components located in unincorporated areas of the County and the City of Stockton,[12] operational noise impacts were evaluated to the exterior noise limits established by the County, which are shown in Table 4.11-5 below. Operational noise produced by MICUP project components was conservatively assumed to occur during nighttime hours, therefore the County's stricter nighttime noise limit of 45 dBA L_{eq} was used to evaluate operational noise impacts for project components located within San Joaquin County and the City of Stockton.

[12] The City of Stockton does not define quantitative noise limits applicable to operational noise, therefore the limits established by San Joaquin County were used for evaluating noise impacts associated with MICUP projects located within Stockton.

Table 4.11-5 San Joaquin County Non-Transportation Noise Level Performance Standards for Noise-Sensitive Uses at Outdoor Activity Areas

Noise Level Descriptor	Daytime[2] (7:00 a.m. to 10:00 p.m.)	Nighttime[2] (10:00 p.m. to 7:00 a.m.)
Hourly L_{eq} (dB)	50	45
Maximum Level (dB)	70	65

[1] These standards apply to new or existing residential areas affected by new or existing non-transportation sources.

[2] Each of the noise level standards specified shall be reduced by 5 dB for impulsive noise, single tone noise, or noise consisting primarily of speech or music.

Source: Table PHS-1 of San Joaquin County 2035 General Plan Public Health and Safety Element (San Joaquin County 2016).

For project components located in the City of Lodi, operational noise impacts were evaluated based on the provisions of Section 9.24.030(C) of the City of Lodi's Municipal Code, which specifies that a significant impact would occur if project-generated noise – occurring between the hours of 10:00 p.m. and 7:00 a.m. – were to increase the ambient noise level at a residential property line by 5 dBA or more.

Vibration

Operation of MICUP project components would not include any sources of substantial vibration, therefore the highest levels of vibration expected would result during construction. None of the jurisdictions in which the project components associated with MICUP are located (i.e., San Joaquin County, City of Stockton, or City of Lodi) have established quantitative vibration limits for construction. Therefore, construction vibration was evaluated to limits recommended by the FTA in the *Transit Noise and Vibration Impact Assessment Manual*,[5] which are shown in Table 4.11-6. The criteria shown in Table 4.11-6 represent the limits at which minor architectural (i.e., non-structural) damage may occur to structures of various construction types.

Table 4.11-6 FTA Vibration Damage Criteria

Building Category		PPV (in/sec)
I.	Reinforced concrete, steel, or timber (no plaster)	0.5
II.	Engineered concrete and masonry (no plaster)	0.3
III.	Nonengineered timber and masonry buildings	0.2
IV.	Buildings extremely susceptible to vibration damage	0.12

PPV = peak particle velocity; in/sec = inches per second

Based on the vibration limits shown in Table 4.11-6, construction vibration impacts associated with implementation of the MICUP would be considered significant if construction vibration levels were to exceed 0.12 in/sec PPV at any nearby fragile/historic structures and/or 0.2 in/sec PPV at any nearby residential structures.

Impact Evaluation

Ambient Noise Compared to Standards

Significance Criterion a:	Would the proposed plan generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?

IMPACT NOI-1 CONSTRUCTION AND OPERATION OF MICUP PROJECT COMPONENTS WOULD INCREASE NOISE LEVELS, POTENTIALLY AFFECTING NEARBY NOISE-SENSITIVE LAND USES. OPERATIONAL AND DAYTIME CONSTRUCTION NOISE IMPACTS WOULD BE MITIGATED; HOWEVER NIGHTTIME WELL DRILLING IMPACTS WOULD REMAIN SIGNIFICANT AND UNAVOIDABLE.

Construction

North San Joaquin Water Conservation District

NSJWCD project components would involve expansion of existing pump stations, pipeline improvements and extensions, and construction of new recharge facilities (including new ASR wells and recharge basins). These project components and their expected noise impacts are discussed further in the following sections.

EXPANDED PUMP STATIONS

NSJWCD currently operates three pumping stations on the Mokelumne River relevant to the MICUP Project: the North System, South System, and CalFed System Pump Stations. The North System Pump Station would be completely replaced and expanded, while the South System Pump Station would be upgraded and expanded to accommodate additional pumps. No changes are proposed to the CalFed System Pump Station; however, additional pipelines would be added to this system to utilize its excess capacity and divert MICUP water. Construction associated with these pump stations would include the use of heavy-duty construction equipment such as excavators, compactors, loaders, telehandlers, and water trucks based on the equipment list provided by NSJWCD. A conservative scenario consisting of two excavators, one compactor, two loaders, and one telehandler was assumed for construction of each pump station. It was also conservatively assumed that all equipment would be operating simultaneously. Construction equipment would continuously be moving around each site throughout the course of a workday. Due to the complex and mobile nature of construction activity within a project site, the FTA *Transit Noise and Vibration Impact Assessment Manual* recommends evaluating construction noise impacts from the center of the construction site, stating that the distance variable in its recommended construction noise calculation "assumes that all equipment operates at the center of the project."[13] As such, construction noise impacts were evaluated from the approximate center of each site, which was assumed to be the center of each pump station.

[13] Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment. November. Available at: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf (accessed December 2024).

Estimated noise levels associated with construction of NSJWCD pump stations are presented at the nearest sensitive receptors relative to each pump station, as shown in Table 4.11-7. As shown in Table 4.11-7, noise levels associated with construction of each pump station would not exceed the FTA's noise threshold of 80 dBA L_{eq} (8-hour) at the nearest respective sensitive receptors and would continue to decrease at sensitive receptors located farther away. Temporary noise impacts associated with construction of NSJWCD pump stations would be less than significant.

Table 4.11-7 Estimated Construction Noise Levels at Sensitive Receptors (NSJWCD Pump Stations)

Partner Agency	Project Component	Construction Activity	RCNM Reference Noise Level at 50 feet[1]	Nearest Sensitive Receptor	Distance to Nearest Sensitive Receptor (feet)	Construction Noise Level at Nearest Sensitive Receptor (dBA L_{eq} [8-hour])
NSJWCD	North System	Replacement and expansion of existing pump station	86[2]	Residence located to the east	150	77
	South System	Upgrade and expansion of existing pump station	86[2]	Residence located to the northeast	825	62

Note: RCNM = Roadway Construction Noise Model; dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level; NSJWCD = North San Joaquin Water Conservation District

[1] RCNM reference noise levels at 50 feet were determined from the center of the equipment.

[2] Noise levels associated with construction of all pump stations were determined based on simultaneous operation of two excavators, one compactor, two loaders, and one telehandler.

Source: Roadway Construction Noise Model. See Appendix J for construction noise modeling outputs.

PIPELINE IMPROVEMENTS AND EXTENSIONS

Construction of NSJWCD project components would include improvements and extensions to existing aging pipelines within the North System, South System, and CalFed System. North System and South System pipelines would be replaced with larger-diameter concrete pipes to improve the performance of the overall systems. Additional pipelines would be added to the CalFed System to distribute water to nearby farmland for irrigation, Flood-MAR, or direct recharge. These construction activities would generate noise at nearby sensitive receptors located along the pipeline footprints. Construction associated with pipeline improvements and extensions would include the use of heavy-duty construction equipment such as excavators, compactors, loaders, telehandlers, and water trucks based on the equipment list provided by NSJWCD. A conservative scenario consisting of two excavators, one compactor, two loaders, and one telehandler was assumed for construction of the pipelines. It was also conservatively assumed that all equipment would be operating simultaneously, and that construction noise would occur along the center of pipeline footprints.

Construction noise levels associated with pipeline improvements and extensions were estimated at various distances away from the equipment to present how the noise level would vary depending on distance from the equipment. Estimated noise levels associated with pipeline improvements and extensions are summarized in Table 4.11-7. Based on the noise levels shown in Table 4.11-7, construction noise associated with pipeline improvements and extensions would exceed the FTA's threshold of 80 dBA L_{eq} (8-hour) at sensitive receptors located within 100 feet of construction activity. Therefore, temporary noise impacts associated with pipeline improvements and extensions

of NSJWCD project components would be potentially significant if construction activity were to occur within an average daily distance of 100 feet of a sensitive receptor. Implementation of Mitigation Measure NOI-1 would be required to reduce construction noise impacts to less-than-significant levels for receptors located within this proximity to construction activity.

Conversely, construction noise levels associated with NSJWCD pipeline improvements and extensions would not exceed the FTA's 80 dBA L_{eq} (8-hour) threshold at receptors located an average daily distance of 100 feet or farther from construction activity, and noise impacts at these farther receptors would be less than significant.

Table 4.11-8 Estimated Construction Noise Levels (NSJWCD Pipeline Extensions and Improvements)

Partner Agency	Project Component	Construction Activity	RCNM Reference Noise Level (dBA L_{eq} [8-hour])[1]	Construction Noise Level (dBA L_{eq} [8-hour])		
			Distance from Center of Equipment (feet)			
			50	100	150	200
NSJWCD	North System	Pipeline improvements	86[2]	80	77	74
	CalFed System	Pipeline extensions	86[2]	80	77	74
	South System	Pipeline improvements	86[2]	80	77	74

Note: RCNM = Roadway Construction Noise Model; dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level; NSJWCD = North San Joaquin Water Conservation District

[1] RCNM reference noise levels at 50 feet were determined from the center of the equipment.

[2] Noise levels associated with construction of project components were determined based on simultaneous operation of two excavators, one compactor, two loaders, and one telehandler.

Source: Roadway Construction Noise Model. See Appendix J for construction noise modeling outputs.

DIRECT RECHARGE FACILITIES (ASR WELLS AND RECHARGE BASINS)

Construction of new NSJWCD recharge facilities would involve the installation of up to 20 ASR wells and up to 1,000 acres of new recharge basins. The final locations of these wells and recharge basins have not yet been determined, but would be located within the proposed ASR well recharge area shown in Figure 3-3. Therefore, it was assumed that construction activity could occur anywhere within this proposed recharge area. Construction noise levels at sensitive receptors would vary depending on the types of construction equipment used, the durations of use, and the distance between the noise sources (i.e., equipment) and surrounding sensitive receptors. Equipment used to construct the ASR wells and recharge facilities would include dozers, excavators, compactors, front-end loaders, water trucks, drill rigs, and scrapers, per information provided by NSJWCD. It was conservatively assumed that one excavator, one compactor, two front-end loaders, one water truck, and one drill rig truck would be operated simultaneously during construction of the ASR wells. For construction of the recharge basins, it was conservatively assumed that one dozer, one excavator, one compactor, one front-end loader, one water truck, and one scraper would be operated simultaneously.

Construction noise levels associated with NSJWCD recharge facilities (i.e., ASR wells and recharge basins) are shown in Table 4.11-9. Noise levels shown in Table 4.11-9 are presented at various distances away from the equipment to provide an understanding of how these noise levels would change depending on distances from the equipment and from potential sensitive receptors. Based on the noise levels shown in Table 4.11-9, noise levels associated with construction of the ASR wells

would exceed the FTA's threshold of 80 dBA L_{eq} (8-hour) if construction activity were to occur within an average daily distance of 80 feet of sensitive receptors, and noise impacts would be potentially significant at these receptors. Implementation of Mitigation Measure NOI-1 would be required to reduce construction noise impacts to less-than-significant levels for receptors located within this proximity of construction activity.

Conversely, construction noise levels associated with NSJWCD ASR wells would not exceed the FTA's 80 dBA L_{eq} (8-hour) threshold at receptors located 80 feet and farther from construction activity, and noise impacts upon these farther receptors would be less than significant. Noise associated with construction of the recharge basins would exceed the FTA's threshold of 80 dBA L_{eq} (8-hour) if construction activity were to occur within an average daily distance of 100 feet of nearby sensitive receptors, and noise impacts would be potentially significant at these receptors. Construction noise levels associated with NSJWCD recharge basins would not exceed the FTA's 80 dBA L_{eq} (8-hour) threshold at receptors located 100 feet and farther from construction activity, and noise impacts upon these farther receptors would be less than significant.

Table 4.11-9 Estimated Construction Noise Levels (NSJWCD Recharge Facilities)

Partner Agency	Project Component	Construction Activity	RCNM Reference Noise Level (dBA L_{eq} [8-hour])[1]	Construction Noise Level (dBA L_{eq} [8-hour])		
			Distance from Center of Equipment (feet)			
			50	100	150	200
NSJWCD	Recharge Facilities	Construction of ASR wells	84[2]	78	75	72
		Construction of recharge basins	86[3]	80	77	74

Note: RCNM = Roadway Construction Noise Model; dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level; NSJWCD = North San Joaquin Water Conservation District; ASR = aquifer storage and recovery

[1] RCNM reference noise levels at 50 feet were determined from the center of the equipment.

[2] Noise levels associated with construction of ASR wells were determined based on simultaneous operation of one excavator, one compactor, two loaders, one water truck, and one drill rig.

[3] Noise levels associated with construction of the recharge basins were determined based on simultaneous operation of one dozer, one excavator, one compactor, one loader, one water truck, and one scraper.

Source: Roadway Construction Noise Model. See Appendix J for construction noise modeling outputs.

Construction of NSJWCD ASR wells could require a drill rig to be operated constantly up to 24 hours a day during a limited period of time to maintain the well hole and to create a casing for the upper segment of the well. This work could occur in unincorporated areas of San Joaquin County during nighttime hours; therefore, noise associated with this work would be subject to the County's nighttime noise limit of 45 dBA L_{eq}. Nighttime construction of ASR wells was assumed to involve the use of an auger drill rig. Noise levels associated with nighttime construction of NSJWCD ASR wells are presented in Table 4.11-10 at various distances to show how the noise level may change with distance as final locations for ASR wells have not yet been determined. Based on the noise levels shown in Table 4.11-10, noise associated with nighttime construction of NSJWCD ASR wells would not exceed the County's 45 dBA L_{eq} threshold at receptors located 2,100 feet and farther from this construction activity, and noise impacts upon these farther receptors would be less than significant. However, noise associated with nighttime construction of NSJWCD ASR wells would exceed the County's nighttime threshold of 45 dBA L_{eq} if construction activity were to occur within approximately 2,100 feet of nearby sensitive receptors, and noise impacts would be potentially significant at these closer receptors.

Table 4.11-10 Estimated Construction Noise Levels (NSJWCD Nighttime ASR Well Construction)

Partner Agency	Project Component	Construction Activity	Construction Noise Level (dBA L_{eq}) Distance (feet) 50[1]	100	200	500	1,000	2,000	3,000
NSJWCD	Recharge Facilities	Nighttime ASR well construction	78	72	66	58	52	46	42

Note: dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level; NSJWCD = North San Joaquin Water Conservation District; ASR = aquifer storage and recovery

[1] Reference noise level at 50 feet was determined based on operation of an auger drill rig.[10]

OVERALL NSJWCD PROJECT COMPONENTS

Mitigation Measure NOI-1 would instate project-specific construction noise management plans that would include an evaluation of potential noise impacts during construction for specified project components once project details have been finalized. If construction noise levels are found to exceed applicable thresholds, Mitigation Measure NOI-1 would also include construction noise control measures to limit noise impacts during construction such that noise levels are reduced to below applicable thresholds. The effective use of construction noise reduction measures, including temporary noise barriers (as required under Mitigation Measure NOI-1), can achieve up to 20 dBA of noise reduction.[14,15] Daytime construction noise impacts for all NSJWCD facilities would be less than significant with mitigation. However, depending on the final locations of ASR wells relative to nearby sensitive receptors, implementation of Mitigation Measure NOI-1 may or may not reduce nighttime construction noise levels to below the County's nighttime noise limit of 45 dBA L_{eq}. Therefore, NSJWCD nighttime construction noise impacts related to well construction would be significant and unavoidable.

Stockton East Water District

SEWD project components would include the West Linden, Mosher Creek at Tully Dam, and East Mosher Creek at Messick Road project components, which are discussed further in the following sections. These project components would involve construction of new Mokelumne Aqueduct turnouts, ASR and dry wells, and recharge basins. Noise impacts associated with construction of each project component are presented in Table 4.11-11 based on the construction equipment list provided by SEWD. Note that noise levels in Table 4.11-11 are presented at various distances away from the center of equipment to show how noise impacts would vary with distance to potential sensitive receptors, as the final locations of project components and construction work areas are not yet known.

[14] Bies, Hansen, and Howard. 2018. Engineering Noise Control Fifth Edition.
[15] Harris, Cyrill 1991. Handbook of Acoustical Measurements and Noise Control. October.

Table 4.11-11 Estimated Construction Noise Levels (SEWD Project Components)

Partner Agency	Project Component	Construction Activity	RCNM Reference Noise Level (dBA L_{eq} [8-hour])[1]	Construction Noise Level (dBA L_{eq} [8-hour])		
			Distance from Center of Equipment (feet)			
			50	100	150	200
SEWD	West Linden	Construction of ASR and dry wells	87[2]	81	77	75
	Mosher Creek at Tully Dam	Construction of recharge basin and dry wells	86[3]	80	77	74
	East Mosher Creek at Messick Road	Construction of recharge basin	86[3]	80	77	74

Note: RCNM = Roadway Construction Noise Model; dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level; SEWD = Stockton East Water District; ASR = aquifer storage and recovery

[1] RCNM reference noise levels at 50 feet were determined from the center of the equipment.

[2] Noise levels associated with construction of the West Linden project component were determined based on simultaneous operation of two excavators, one compactor, two loaders, one telehandler, and one drill rig.

[3] Noise levels associated with construction of the Mosher Creek at Tully Dam and East Mosher Creek at Messick Road project components were determined based on simultaneous operation of one dozer, one excavator, one compactor, one loader, one water truck, and one scraper.

Source: Roadway Construction Noise Model. See Appendix J for construction noise modeling outputs.

WEST LINDEN (NEW TURNOUT AND WELLS)

Construction of the West Linden project component would include installation of a new turnout on the Mokelumne Aqueduct to convey surface water to agricultural land that only has access to groundwater. The project would also include installation of up to 4 ASR wells and up to 142 dry wells within the West Linden Project Area, which is bounded by Jack Tone, Baker, Duncan, and Eight Mile Roads. Construction would involve the use of heavy-duty equipment such as excavators, compactors, loaders, telehandlers, water trucks, and drill rigs based on the equipment list provided by SEWD. It was assumed that construction of each well would involve the use of two excavators, one compactor, two loaders, one telehandler, and one drill rig and that all equipment would be operating simultaneously.

The final locations of the ASR and dry wells have not yet been determined; therefore, construction may occur anywhere within the West Linden Project Area. Construction noise levels were calculated from the center of the above equipment operating and presented at various distances from the center of the equipment to provide an understanding of how noise levels may change based on distance from the equipment. Estimated noise levels associated with construction of the West Linden Project are presented in Table 4.11-11. Based on the noise levels shown in Table 4.11-11, construction activity occurring within an average daily distance of 105 feet of sensitive receptors would produce noise levels exceeding the FTA's threshold of 80 dBA L_{eq} (8-hour), and noise impacts would be potentially significant at these receptors.

Construction activity occurring 105 feet or farther from sensitive receptors would not produce noise levels exceeding 80 dBA L_{eq} (8-hour), and noise impacts would be less than significant at these receptors.

The West Linden project component would include construction of ASR wells, which could require a drill rig to be operated constantly for up to 24 hours a day during a limited period to maintain the well hole and to create a casing for the upper segment of the well. This work would occur in

unincorporated areas of San Joaquin County during nighttime hours; therefore, noise associated with this work would be subject to the County's nighttime noise limit of 45 dBA L_{eq}. Nighttime construction of ASR wells was assumed to involve the use of an auger drill rig. Noise levels associated with nighttime construction of SEWD ASR wells are presented in Table 4.11-12 at various distances to show how the noise level may change with distance as final locations for ASR wells have not yet been determined. Based on the noise levels shown in Table 4.11-12, noise associated with nighttime construction of SEWD ASR wells would not exceed the County's 45 dBA L_{eq} threshold at receptors located 2,100 feet and farther from this construction activity, and noise impacts upon these farther receptors would be less than significant. However, noise associated with nighttime construction of SEWD ASR wells would exceed the County's nighttime threshold of 45 dBA L_{eq} if construction activity were to occur within approximately 2,100 feet of nearby sensitive receptors, and noise impacts would be potentially significant at these closer receptors.

Table 4.11-12 Estimated Construction Noise Levels (SEWD Nighttime ASR Well Construction)

Partner Agency	Project Component	Construction Activity	Construction Noise Level (dBA L_{eq}) Distance (feet) 50[1]	100	200	500	1,000	2,000	3,000
SEWD	West Linden	Nighttime ASR well construction	78	72	66	58	52	46	42

Note: dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level; SEWD = Stockton East Water District; ASR = aquifer storage and recovery

[1] Reference noise level at 50 feet was determined based on operation of an auger drill rig.[10]

MOSHER CREEK AT TULLY DAM

The Mosher Creek at Tully Dam project component would involve construction of a 104-acre area recharge basin and dry wells within the Mosher Creek at Tully Dam project area. Construction of this project component would involve the use of heavy-duty equipment such as dozers, excavators, compactors, loaders, water trucks, and scrapers based on the equipment list provided by SEWD. It was conservatively assumed that construction would include the use of one dozer, one excavator, one compactor, one front-end loader, one water truck, and one scraper and that all equipment would be operating simultaneously.

Eight fields within this project component area have been identified as potential recharge locations, but a final location has not yet been determined. It was assumed that construction may occur anywhere within this project component area. Therefore, construction noise levels were calculated from the center of the above equipment and are presented at various distances away to provide an understanding of how noise levels may change based on distance from the equipment. Estimated noise levels associated with construction of the Mosher Creek at Tully Dam project component are presented in Table 4.11-11. Based on the noise levels shown in Table 4.11-11, construction associated with the Mosher Creek at Tully Dam project component would produce noise levels exceeding the FTA's 80 dBA L_{eq} (8-hour) threshold at sensitive receptors located within an average daily distance of 100 feet of construction activity, and noise impacts upon these sensitive receptors would be potentially significant.

Construction activities occurring 100 feet and farther from nearby sensitive receptors would not produce noise levels exceeding the FTA's 80 dBA L_{eq} (8-hour) threshold, and noise impacts upon these farther receptors would be less than significant.

EAST MOSHER CREEK AT MESSICK ROAD

The East Mosher Creek at Messick Road project component would involve construction of an 80-acre recharge basin to increase groundwater recharge. Construction of this project component would involve the use of heavy-duty equipment such as dozers, excavators, compactors, loaders, water trucks, and scrapers based on the equipment list provided by SEWD. It was conservatively assumed that construction would include the use of one dozer, one excavator, one compactor, one front-end loader, one pickup truck, and one scraper and that all equipment would be operating simultaneously.

The project component would be located within the East Mosher Creek Recharge Area and be composed of one or more of seven possible fields within this project component area; however, a final location has not yet been determined. It was assumed that construction may occur anywhere within this project component area. Therefore, construction noise levels were calculated from the center of the above equipment operating and are presented at various distances away to provide an understanding of how noise levels may change based on distance from the equipment. Estimated noise levels associated with construction of the East Mosher Creek at Messick Road project component are presented in Table 4.11-11. Based on the noise levels shown in Table 4.11-11, construction associated with the East Mosher Creek at Messick Road project component would produce noise levels exceeding the FTA's 80 dBA L_{eq} (8-hour) threshold at sensitive receptors located within an average daily distance of 100 feet of construction activity, and noise impacts upon these sensitive receptors would be potentially significant.

Construction activities occurring 100 feet or farther from nearby sensitive receptors would not produce noise levels exceeding the FTA's 80 dBA L_{eq} (8-hour) threshold, and noise impacts upon these farther receptors would be less than significant.

OVERALL SEWD PROJECT COMPONENTS

Mitigation Measure NOI-1 would implement project-specific construction noise management plans that would include an evaluation of potential noise impacts during construction for specified project components once project details have been finalized. If construction noise levels are found to exceed applicable thresholds, Mitigation Measure NOI-1 would also include construction noise control measures to limit noise impacts during construction such that noise levels are reduced to below applicable thresholds. The effective use of construction noise reduction measures, including temporary noise barriers (as required under Mitigation Measure NOI-1), can achieve up to 20 dBA of noise reduction.[14,15] Daytime construction noise impacts for all SEWD proposal facilities would be less than significant with mitigation. However, depending on the final locations of ASR wells relative to nearby sensitive receptors, implementation of Mitigation Measure NOI-1 may or may not reduce nighttime construction noise levels to below the County's nighttime noise limit of 45 dBA L_{eq}. Therefore, SEWD nighttime construction noise impacts related to well construction would be significant and unavoidable.

City of Stockton

The City of Stockton project components would consist of construction of new dry wells and recharge basins co-located at the Delta Water Treatment Plant (DWTP) and up to 70 acres of new

groundwater recharge basins, as well as lateral pipelines to convey water to these basins. These new dry wells and recharge basins would be capable of receiving MICUP water through the City of Stockton's existing diversion and pipeline on the San Joaquin River or through existing canals and pipelines owned and operated by WID. Noise impacts associated with City of Stockton project components are discussed further in the following section.

DWTP RECHARGE BASINS

The DWTP Recharge Basins would include nine new dry wells and new recharge basins totaling 43.5 acres, co-located at the DWTP. New DWTP recharge basins would be situated as close as approximately 1,380 feet from the nearest residence located to the east. Construction of these project components was assumed to involve the use heavy-duty equipment such as dozers, excavators, compactors, loaders, water trucks, drill rigs, and scrapers based on assumptions made of similar MICUP project components of other Partner Agencies. For construction of the dry wells, it was conservatively assumed that two excavators, one compactor, one loader, one water truck, and one drill rig would be operating simultaneously. For construction of the recharge basins, it was conservatively assumed that one dozer, one excavator, one compactor, one loader, one water truck, and one scraper would be operating simultaneously.

Construction equipment would continuously be moving around the site throughout the course of a workday, therefore, it was assumed that construction would occur at the approximate center of the recharge basin area, assumed to be as close as approximately 1,380 feet from the nearest sensitive receptor (i.e., single-family residence located to the east). Estimated construction noise levels associated with City of Stockton DWTP recharge basins are shown in Table 4.11-13. As shown in Table 4.11-13, noise levels associated with construction of City of Stockton DWTP recharge basins would not exceed the FTA's threshold of 80 dBA L_{eq} (8-hour) at the nearest sensitive receptors. Therefore, noise impacts associated with construction of City of Stockton DWTP recharge basins would be less than significant.

Table 4.11-13 Estimated Construction Noise Levels (City of Stockton DWTP Recharge Basins)

Partner Agency	Project Component	Construction Activity	RCNM Reference Noise Level (dBA L_{eq} [8-hour])	Construction Noise Level (dBA L_{eq} [8-hour])		
			Distance from Center of Equipment (feet)			
			50	1,380	1,440	1,530
City of Stockton	DWTP Recharge Basins	Construction of dry wells	86[2]	57	56	56
		Construction of recharge basins	86[3]	58	57	57

Note: RCNM = Roadway Construction Noise Model; dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level

[1] RCNM reference noise levels at 50 feet were determined from the center of the equipment.

[2] Noise levels associated with construction of City of Stockton dry wells were determined based on simultaneous operation of two excavators, one compactor, one loader, one water truck, and one drill rig.

[3] Noise levels associated with construction of City of Stockton recharge basins were determined based on simultaneous operation of one dozer, one excavator, one compactor, one loader, one water truck, and one scraper.

Source: Roadway Construction Noise Model. See Appendix J for construction noise modeling outputs.

STORMWATER BASINS

The City of Stockton would divert MICUP water to the four existing stormwater basins shown in Figure 3-10 for groundwater recharge. The City would utilize existing infrastructure to convey MICUP water to these existing stormwater basins. No new pipelines or other infrastructure would be constructed; therefore, this project component would not generate additional construction noise. There would be no noise impacts associated with construction of City of Stockton stormwater basins.

RECHARGE BASINS

The City of Stockton would construct new groundwater recharge basins encompassing up to 70 acres, as well as lateral pipelines to convey water to these basins. The final locations of the recharge basins are not known at this time, but would be constructed anywhere within a 0.5-mile buffer on either side of existing WID canals (i.e., within the Proposed Direct Surface Recharge Area shown in Figure 3-10). Based on information provided by the City, equipment expected to be used during construction of the recharge basins would include dozers, excavators, compactors, loaders, water trucks, and scrapers. A conservative scenario consisting of one dozer, one excavator, one compactor, one loader, one water truck, and one scraper was modeled. It was assumed that all construction equipment would be diesel-powered and be operating simultaneously.

Construction noise levels associated with the above equipment operating simultaneously were calculated at various distances away to present how the noise level varies with distance from the equipment. Depending on the final locations of the recharge basins relative to nearby sensitive receptors, construction noise impacts would vary. Estimated construction noise levels are shown in Table 4.11-14. As shown in Table 4.11-14, noise levels associated with construction of the recharge basins would exceed the FTA's threshold of 80 dBA L_{eq} (8-hour) at sensitive receptors located within an average daily distance of 100 feet of construction activity, and noise impacts upon these receptors would be potentially significant.

Noise levels at sensitive receptors located 100 feet or farther from construction activity would not exceed 80 dBA L_{eq} (8-hour) and noise impacts at these farther receptors would be less than significant.

Table 4.11-14 Estimated Construction Noise Levels (City of Stockton Recharge Facilities)

Partner Agency	Project Component	Construction Activity	RCNM Reference Noise Level (dBA L_{eq} [8-hour])	Construction Noise Level (dBA L_{eq} [8-hour])		
			Distance from Center of Equipment (feet)			
			50	100	150	200
City of Stockton	Recharge Facilities	Construction of recharge basins	86[2]	80	77	74

Note: RCNM = Roadway Construction Noise Model; dBA = A-weighted decibel; L_{eq} = equivalent continuous sound level

[1] RCNM reference noise levels at 50 feet were determined from the center of the equipment.

[2] Noise levels associated with construction of City of Stockton recharge facilities were determined based on simultaneous operation of one dozer, one excavator, one compactor, one loader, one water truck, and one scraper.

Source: Roadway Construction Noise Model. See Appendix J for construction noise modeling outputs.

OVERALL CITY OF STOCKTON PROJECT COMPONENTS

Mitigation Measure NOI-1 would require project-specific construction noise management plans that would include an evaluation of potential noise impacts during construction for specified project components once project details have been finalized. If construction noise levels are found to exceed applicable thresholds, Mitigation Measure NOI-1 would also include construction noise control measures to limit noise impacts during construction such that noise levels are reduced to below applicable thresholds. The effective use of construction noise reduction measures, including temporary noise barriers (as required under Mitigation Measure NOI-1), can achieve up to 20 dBA of noise reduction.[14,15] Daytime construction noise impacts for all City of Stockton proposal facilities would be less than significant with mitigation.

Summary

Based on the discussion and conclusions presented in the above sections by Partner Agency area and components about construction noise, a summary of construction noise impacts for each project component, as well as the associated level of significance of construction noise for each project component, is presented in Table 4.11-15.

Table 4.11-15 Summary of Level of Significance for Construction Noise Impacts

Partner Agency	Project Component	Construction Activity	Level of Significance	Average Daily Distance to Sensitive Receptor Where Construction Threshold Would Be Exceeded (feet)	Level of Significance After Implementation of Mitigation Measure NOI-1
NSJWCD	North System	Replacement and expansion of existing pump station	Less than Significant	–	–
		Pipeline improvements	**Potentially Significant**	100	Less than Significant with Mitigation
	CalFed System	Pipeline extensions	**Potentially Significant**	100	Less than Significant with Mitigation
	South System	Upgrade and expansion of existing pump station	Less than Significant	–	–
		Pipeline improvements	**Potentially Significant**	100	Less than Significant with Mitigation
	Recharge Facilities	Construction of ASR wells	**Potentially Significant**	80	Less than Significant with Mitigation
		Nighttime ASR well construction	**Potentially Significant**	2,100	**Significant and Unavoidable**
		Construction of recharge basins	**Potentially Significant**	100	Less than Significant with Mitigation
SEWD	West Linden	Construction of ASR and dry wells	**Potentially Significant**	105	Less than Significant with Mitigation
		Nighttime ASR well construction	**Potentially Significant**	2,100	**Significant and Unavoidable**
	Mosher Creek at Tully Dam	Construction of recharge basin and dry wells	**Potentially Significant**	100	Less than Significant with Mitigation
	East Mosher Creek at Messick Road	Construction of recharge basin	**Potentially Significant**	100	Less than Significant with Mitigation
City of Stockton	DWTP Recharge Basins	Construction of dry wells	Less than Significant	–	–
		Construction of recharge basins	Less than Significant	–	–
	Recharge Facilities	Conveyance of water to stormwater basins	No Impact	–	–
		Construction of recharge basins	**Potentially Significant**	100	Less than Significant with Mitigation

Note: NSJWCD = North San Joaquin Water Conservation District; ASR = aquifer storage and recovery; SEWD = Stockton East Water District; DWTP = Delta Water Treatment Plant;

Operation

North San Joaquin Water Conservation District

NSJWCD project components and their associated operational noise impacts are discussed further in the following sections.

EXPANDED PUMP STATIONS

During operation, the primary source of noise associated with NSJWCD projects would be outdoor pumps at expanded pump stations. The North System Pump Station (which currently is not operational) would be completely replaced and expanded, while the South System Pump Station would be upgraded to accommodate additional pumps. Noise impacts associated with these upgraded and expanded pump stations are discussed in this section.

The existing North System and South Pump Stations are located in unincorporated areas of San Joaquin County. As such, the respective noise regulations of each jurisdiction (as discussed in the *Specific Thresholds of Significance* section above) were used to evaluate operational noise produced by these project components. For the pump stations in San Joaquin County, the County's exterior daytime and nighttime noise limits of 50 and 45 dBA L_{eq}, respectively, were used. Specifications for the pumps are not yet known at this time. Therefore, it was assumed that each pump station would include a 50 horsepower (hp) pump. Based on reference sound data, a 50 hp pump operating between 1,600 and 1,800 revolutions per minute (rpm) produces a sound pressure level of 89 dBA at three feet away (Hoover & Keith 1981). Assuming that each pump station would include a new 50-hp pump, noise levels at the nearest sensitive receptors were calculated. Noise levels were estimated assuming each pump operates as a point source of noise, which has a characteristic noise reduction of approximately 6 dBA per doubling of distance away from the source. Noise levels associated with each pump station at nearby sensitive receptors are shown in Table 4.11-16.

Table 4.11-16 Estimated Operational Noise Levels at Sensitive Receptors (NSJWCD Pump Stations)

Partner Agency	Project Component	Operational Noise Source	Reference Noise Level at 3 feet (dBA)[1]	Nearest Sensitive Receptor	Distance to Nearest Sensitive Receptor (feet)	Operational Noise Level at Nearest Sensitive Receptor (dBA)	Threshold for Impact (dBA)	Level of Significance
NSJWCD	North System	Expanded pump station	89	Residence located to the northwest	500	45	45[2]	Less than Significant
	South System	Upgraded pump station	89	Residence located to the northeast	825	40	45[2]	Less than Significant

Note: dBA = A-weighted decibels; NSJWCD = North San Joaquin Water Conservation District

[1] Reference noise level at 3 feet was determined from reference sound data for a 50-hp pump operating between 1,600 and 1,800 rpm.[11]

[2] This pump station is located in an unincorporated part of San Joaquin County; therefore, the impact threshold is based on the County's nighttime noise limit of 45 dBA. This is based on the conservative assumption that the pump station may be operating continuously during nighttime hours (10:00 p.m. to 7:00 a.m.).

As shown in Table 4.11-16, noise impacts associated with operation of the North System Pump Station expansion and South System Pump Station upgrades and proposed pump station would not exceed the respective noise limits at the nearest sensitive receptors. Therefore, operational noise impacts associated with NSJWCD pump stations would be less than significant.

PIPELINE IMPROVEMENTS AND EXTENSIONS

As pipelines are located underground and do not contain machinery that generates noticeable noise, operation of project components involving pipeline improvements and extensions would not generate noise at above-ground sensitive receptors. Therefore, NSJWCD operational noise impacts related to pipelines would be less than significant.

NEW RECHARGE FACILITIES (ASR WELLS AND RECHARGE BASINS)

Operation of NSJWCD project components would include up to 20 ASR wells and up to 1,000 acres of recharge basins within the proposed ASR well recharge area.

Recharge basins would consist of ponds and would not include any mechanical equipment or noise-generating sources. Therefore, these facilities would not generate noise levels at nearby sensitive receptors, and operational noise impacts associated with NSJWCD recharge basins would be less than significant.

The final locations of these ASR wells and recharge basins have not yet been determined but would be located somewhere within this proposed recharge area. Operational noise associated with each ASR well would consist primarily of pump noise. Specific manufacturer and model information are yet known, therefore the same assumptions for the pump stations discussed above (50-hp pump operating between 1,600 and 1,800 rpm) were used.

The final locations of the ASR wells are yet to be determined. Therefore, operational noise impacts associated with these wells would vary depending on the final locations relative to nearby sensitive receptors. Noise produced by pumps associated with ASR wells are assumed to potentially operate continuously during both daytime and nighttime hours; therefore, these noise impacts were evaluated to the County's more restrictive nighttime noise limit of 45 dBA (as shown in Table 4.11-5). Noise levels associated with ASR wells are presented at various distances away to present how noise impacts may change depending on distance to sensitive receptors. Operational noise levels associated with the ASR wells are shown in Table 4.11-17.

Table 4.11-17 Estimated Operational Noise Levels (NSJWCD ASR Wells)

Partner Agency	Project Component	Operational Noise Source	Operational Noise Level (dBA)[1] Distance (feet) 50	100	200	300	400	500	Impact Threshold (dBA)[2]
NSJWCD	ASR Wells	Pumps	65	59	53	49	46	45	45

Note: dBA = A-weighted decibel; NSJWCD = North San Joaquin Water Conservation District; ASR = aquifer storage and recovery

[1] Noise levels were calculated based on reference sound data for a 50-hp pump operating between 1,600 and 1,800 rpm, which produces a sound pressure level of 89 dBA at 3 feet.[11]

[2] ASR wells would be located in an unincorporated part of San Joaquin County; therefore, the impact threshold is based on the County's nighttime noise limit of 45 dBA. This is based on the conservative assumption that pumps associated with ASR wells may be operating continuously during nighttime hours (10:00 p.m. to 7:00 a.m.).

As shown in Table 4.11-17, ASR wells located 500 feet or farther from nearby sensitive receptors would not produce noise levels exceeding the County's nighttime noise limit of 45 dBA, and operational noise impacts at these farther receptors would be less than significant. However, operational noise levels associated with NSJWCD ASR wells may exceed the County's nighttime noise limit of 45 dBA if these ASR wells were to be located within 500 feet of a sensitive receptor, resulting in potentially significant noise impacts at these closer receptors.

MAINTENANCE ACTIVITIES

NSJWCD project components would involve operation and maintenance (O&M) of pumps, pipelines, and diversion structures. Pumping stations would require monitoring and controlling pumps to ensure they are working at the desired capacity and flow rates, which would include adjusting pump speeds, checking for leaks or malfunctions, and performing regular maintenance to keep pumps in good working condition. Diversion structures would require adjusting the flow of water as needed based on demand, monitoring the condition of the structures, and performing maintenance to ensure these structures continue to function properly. Maintenance activities associated with NSJWCD project components are not expected to generate substantial noise levels. In addition, maintenance activities would not require additional staff beyond existing maintenance activities and would not introduce additional vehicle trips on nearby roadways. Therefore, operational noise impacts associated with maintenance of NSJWCD project components would be less than significant.

OVERALL NSJWCD PROJECT COMPONENTS

Mitigation Measure NOI-2 would require project-specific operational noise analyses that would include evaluation of potential operational noise impacts for specified project components once project details have been finalized. If operational noise levels are found to exceed applicable thresholds, additional noise control measures would be implemented to reduce operational noise levels to below applicable thresholds. Therefore, NSJWCD operational noise impacts related to wells would be less than significant with mitigation.

Stockton East Water District

SEWD project components and their expected operational noise impacts are discussed further in the following sections.

BECKMAN ASR WELL

The Beckman ASR Well, which is currently not operational, would undergo extensive upgrades including an inspection, a redevelopment process, new well pump, new piping, and new valving to become operational again. The primary operational noise source associated with the Beckman ASR Well would be a pump. Following the discussion in the *Stationary On-Site Operational Noise* section, the Beckman ASR Well pump was assumed to be a 50-hp pump that would operate between 1,600 and 1,80 rpm, which would produce a sound pressure level of 89 dBA at three feet away (Hoover & Keith Inc. 1981). It is assumed that this pump may operate continuously throughout daytime and nighttime hours. Table 4.11-18 presents estimated operational noise levels associated with the Beckman ASR Well pump at the nearest sensitive receptor. As shown in Table 4.11-18, the noise level at the nearest sensitive receptor – a residence located approximately 2,000 feet to the northwest of the Beckman ASR Well – would be approximately 33 dBA, which would not exceed the

County's nighttime noise limit of 45 dBA. Therefore, operational noise impacts associated with the SEWD Beckman ASR Well would be less than significant.

Table 4.11-18 Estimated Operational Noise Levels (SEWD Beckman ASR Well)

Partner Agency	Project Component	Operational Noise Source	Reference Noise Level at 3 feet (dBA)[1]	Nearest Sensitive Receptor	Distance to Nearest Sensitive Receptor (feet)	Operational Noise Level at Nearest Sensitive Receptor (dBA)	Threshold for Impact (dBA)	Level of Significance
SEWD	Beckman ASR Well	Pump	89	Residence located to the northwest	2,000	33	45[2]	Less than Significant

Note: dBA = A-weighted decibels; SEWD = Stockton East Water District; ASR = aquifer storage and recovery

[1] Reference noise level at 3 feet were determined from reference sound data for a 50-hp pump operating between 1,600 and 1,800 rpm.[11]

[2] This pump would be located in an unincorporated part of San Joaquin County; therefore, the impact threshold is based on the County's nighttime noise limit of 45 dBA. This is based on the conservative assumption that the pump may be operating continuously during nighttime hours (10:00 p.m. to 7:00 a.m.).

WEST LINDEN PROJECT COMPONENT

The West Linden project component would involve development of a new turnout on the Mokelumne Aqueduct, up to 4 ASR wells, and up to 142 dry wells within the West Linden Project area. During operation, the primary noise sources associated with the project would be pumps at the ASR wells.

The dry wells would not include any noise-generating equipment and are not expected to generate noise at nearby sensitive receptors. Operational noise impacts associated with the West Linden Project dry wells would be less than significant.

Specifications for the pump have not yet been determined; therefore, it was assumed that each ASR well would include a 50-hp pump. Based on reference sound data, a 50-hp pump operating between 1,600 and 1,800 rpm produces a sound pressure level of 89 dBA at three feet away (Hoover & Keith Inc. 1981). Final locations of ASR wells (and associated pumps) have not yet been determined; therefore, operational noise levels were calculated and presented at various distances away to provide an understanding of how noise impacts may change with distance to potential sensitive receptors. Operational noise levels associated with the ASR well pumps are shown in Table 4.11-19.

Table 4.11-19 Estimated Operational Noise Levels (SEWD West Linden ASR Wells)

Partner Agency	Project Component	Operational Noise Source	Operational Noise Level (dBA)[1] Distance (feet) 50	100	200	300	400	500	Impact Threshold (dBA)[2]
SEWD	West Linden ASR Wells	Pumps	65	59	53	49	46	45	45

Note: dBA = A-weighted decibel; SEWD = Stockton East Water District; ASR = aquifer storage and recovery

[1] Noise levels were calculated based on reference sound data for a 50-hp pump operating between 1,600 and 1,800 rpm, which produces a sound pressure level of 89 dBA at 3 feet.[11]

[2] ASR wells would be located in an unincorporated part of San Joaquin County; therefore, the impact threshold is based on the County's nighttime noise limit of 45 dBA. This is based on the conservative assumption that pumps associated with ASR wells may be operating continuously during nighttime hours (10:00 p.m. to 7:00 a.m.).

As shown in Table 4.11-19, ASR wells located 500 feet or farther from nearby sensitive receptors would not produce noise levels exceeding the County's nighttime noise limit of 45 dBA, and operational noise impacts at these farther receptors would be less than significant. However, operational noise levels associated with the West Linden ASR wells would exceed the County's nighttime noise limit of 45 dBA if these ASR wells were to be located within 500 feet of a sensitive receptor, resulting in potentially significant noise impacts at these closer receptors.

MOSHER CREEK AT TULLY DAM

Once operational, the Mosher Creek at Tully Dam project component would include a recharge basin and dry wells within the project area. Neither the recharge basin nor dry wells would include any noise-generating equipment, therefore these project components would not generate noise at nearby sensitive receptors. Therefore, operational noise impacts associated with the Mosher Creek at Tully Dam project component would be less than significant.

EAST MOSHER CREEK AT MESSICK ROAD

Once operational, the East Mosher Creek at Messick Road project component would include a recharge basin, which would consist of a pond. Operation of the recharge basin would not include any noise-generating equipment, therefore would not generate noise at nearby sensitive receptors. Therefore, operational noise impacts associated with the East Mosher Creek at Messick Road project component would be less than significant.

MAINTENANCE ACTIVITIES

Once operational, SEWD project components would require O&M of the pressurized sand filtration processes, wells, pipelines, and recharge basins. Pressurized sand filtration processes, ASR and dry wells would require removal of debris, checking for standing water, and regular inspections and cleanings to prevent clogs and maintain proper drainage. Pipelines would require monitoring of water flow through pipes, checking for leaks and blockages, and maintaining pipelines to prevent corrosion and other damage. Recharge basins would require regular sediment removal, vegetation management, debris clearing, water quality monitoring, and periodic inspections to maintain efficiency and prevent blockages. ASR wells would require water quality monitoring, pump maintenance, regular inspections to ensure well integrity, and optimization by adjusting pump schedules and monitoring of drawdown levels. These maintenance activities are not expected to generate substantial noise levels. In addition, maintenance activities would not require additional staff beyond existing maintenance activities and would not introduce additional vehicle trips on nearby roadways. Therefore, operational noise impacts associated with maintenance of SEWD project components would be less than significant.

OVERALL SEWD PROJECT COMPONENTS

Mitigation Measure NOI-2 would require a project-specific operational noise analysis for the West Linden project component. This project-specific noise analysis would include evaluation of potential operational noise impacts once project details have been finalized. If operational noise levels are found to exceed applicable thresholds, additional noise control measures would be implemented to reduce operational noise levels to below applicable thresholds. Therefore, SEWD operational noise impacts related to wells would be less than significant with mitigation.

City of Stockton

City of Stockton project components and their associated operational noise impacts are discussed further in the following sections.

DRY WELLS AND RECHARGE BASINS

Once operational, City of Stockton project components would include development of up to 143.5 acres of new recharge basins and nine new dry wells. These project components would not include any noise-generating equipment. As such, these project components would not generate noise at nearby sensitive receptors. Therefore, operational noise impacts associated with City of Stockton dry wells and recharge basins would be less than significant.

MAINTENANCE ACTIVITIES

Maintenance activities associated with City of Stockton dry wells would include removing debris, checking for standing water, and regular inspections and cleanings to prevent clogs and maintain proper drainage. Maintenance of recharge basins would include regular sediment removal, vegetation management, debris clearing, and periodic inspections to maintain efficiency and recharge rate and to prevent blockages. These maintenance activities are not expected to generate substantial noise. In addition, maintenance activities would not require additional staff and would not introduce additional vehicle trips on nearby roadways. Therefore, operational noise impacts associated with City of Stockton project components maintenance would be less than significant.

Summary

Based on the discussion and conclusions presented in the above sections by Partner Agency area and components about operational noise, a summary of operational noise impacts for each project component, as well as the associated level of significance of operational noise for each project component, is presented in Table 4.11-20.

Table 4.11-20 Summary of Level of Significance for Operational Noise Impacts

Partner Agency	Project Component	Operational Noise Source	Level of Significance	Level of Significance After Implementation of Mitigation Measure NOI-2
NSJWCD	North System	Expanded pump station	Less than Significant	–
		Maintenance activities	Less than Significant	–
	South System	Upgraded pump station	Less than Significant	–
		Maintenance activities	Less than Significant	–
	Recharge Facilities	ASR wells	**Potentially Significant**[1]	Less than Significant with Mitigation
		Recharge basins	Less than Significant	–
		Maintenance activities	Less than Significant	–
SEWD	Beckman ASR Well	ASR well pump	Less than Significant	–
		Maintenance activities	Less than Significant	–
	West Linden	ASR wells	**Potentially Significant**[2]	Less than Significant with Mitigation
		Maintenance activities	Less than Significant	–
	Mosher Creek at Tully Dam	Recharge basin and dry wells	Less than Significant	–
		Maintenance activities	Less than Significant	–
	East Mosher Creek at Messick Road	Recharge basin	Less than Significant	–
		Maintenance activities	Less than Significant	–
City of Stockton	DWTP Recharge Basins	Dry wells	Less than Significant	–
		Recharge basins	Less than Significant	–
		Maintenance activities	Less than Significant	–
	Recharge Facilities	Stormwater basins	Less than Significant	–
		Recharge basins	Less than Significant	–
		Maintenance activities	Less than Significant	–

Note: NSJWCD = North San Joaquin Water Conservation District; ASR = aquifer storage and recovery; SEWD = Stockton East Water District; DWTP = Delta Water Treatment Plant

[1] Operation of the NSJWCD ASR well would produce noise levels exceeding applicable noise thresholds if located within 500 feet of a sensitive receptor.

[2] Operation of the SEWD West Linden ASR well would produce noise levels exceeding applicable noise thresholds if located within 500 feet of a sensitive receptor.

Mitigation Measures[16]

NOI-1 Prepare Project-Specific Construction Noise Management Plan prior to Construction and Implement during Construction

Once the precise locations of project components and construction work areas have been finalized, the implementing agency shall determine whether construction noise will exceed the applicable standards of the local jurisdiction at the nearest sensitive receptor. If construction noise will exceed the noise standards, then the implementing agency shall retain a qualified acoustical expert to prepare a construction noise management plan. The plan shall detail expected durations of construction activities, construction equipment lists, and resulting noise levels at nearby sensitive land uses. Measures to reduce construction noise shall be provided. Construction noise reduction measures may include, but are not limited to, the following:

- **Mufflers.** All construction equipment, fixed or mobile, shall be operated with closed engine doors and shall be equipped with properly operating and maintained mufflers consistent with manufacturers' standards.
- **Stationary Equipment.** All stationary construction equipment shall be placed so that emitted noise is directed away from the nearest sensitive receptors.
- **Equipment Staging Areas.** Equipment staging shall be located in areas that will create the greatest distance feasible between construction-related noise sources and noise-sensitive receptors.
- **Smart Back-up Alarms.** Mobile construction equipment shall have smart back-up alarms that automatically adjust the sound level of the alarm in response to ambient noise levels. Alternatively, back-up alarms shall be disabled and replaced with human spotters to ensure safety when mobile construction equipment is moving in the reverse direction in compliance with applicable safety laws and regulations.
- **Electrically Powered Tools and Facilities.** Electrical power shall be used to run air compressors and similar power tools and to power any temporary structures, such as construction trailers or caretaker facilities, where feasible.
- **Noise Disturbance Coordinator**. The Partner Agency of the respective project component shall designate a "noise disturbance coordinator" responsible for responding to any local complaints about construction noise. The disturbance coordinator shall determine the cause of any noise complaint and shall require that reasonable measures be implemented to correct the problem. A telephone number for the disturbance coordinator shall be posted at the construction site.
- **Notification of Nearby Residents.** At least 21 days prior to the start of construction activities, all residents within 500 feet of the project site shall be notified of the planned construction activities. The notification shall include a brief description of the project, the activities that would occur, the hours when construction would occur, and the overall duration of the construction period. The notification shall include the telephone number of the designated noise disturbance coordinator.

[16] In addition to mitigation measures NOI-1 and NOI-2 provided here, the City of Stockton has prepared a project-specific CEQA study for the DWTP Project. This project-specific study includes mitigation measures that reiterate the requirements detailed here in NOI-1 and NOI-2 for reducing noise during construction and operation of the project.

- **Temporary Noise Barriers.** Erect temporary noise barriers, where feasible, when construction noise is predicted to exceed the acceptable standards (e.g., 80 dBA L_{eq} (8-hour) at noise-sensitive land uses during the daytime or applicable County thresholds during the nighttime) and when the anticipated construction duration is greater than is typical (e.g., two years or longer). Heights of temporary noise barriers shall be determined based on the location and orientation of construction work areas relative to nearby sensitive receptors. Temporary noise barriers shall be constructed with a solid material with a density of at least 1.5 pounds per square foot with no gaps from the ground to the top of the barrier. If a sound blanket is used, barriers shall be constructed with solid material with a density of at least 1 pound per square foot with no gaps from the ground to the top of the barrier and be lined on the construction side with acoustical blanket, curtain or equivalent absorptive material rated sound transmission class (STC) 32 or higher.

NOI-2 CONDUCT PROJECT-SPECIFIC OPERATIONAL NOISE ANALYSES AND REDUCE NOISE TO STANDARDS AT PROXIMATE SENSITIVE RECEPTORS PRIOR TO OPERATION

Once the layout and locations of the ASR wells have been finalized, the implementing agency shall determine whether operational noise will exceed the applicable standards of the local jurisdiction at the nearest sensitive receptor. If operational noise will exceed the noise standards, then the implementing agency shall be required to implement additional feasible measures to reduce noise generated at nearby sensitive receptors. Such additional measures may include, but are not limited to, selecting quieter equipment, installing equipment in sound-attenuating enclosures, installing acoustical louvers, and/or constructing noise barriers (consisting of a barrier, berm, or combination of the two). The implementing agency shall verify that these additional measures are included on the final site plan prior to issuing construction permits.

Level of Significance

Significant and Unavoidable

Groundborne Vibration and Noise Generation

Significance Criterion b:	Would the proposed plan result in generation of excessive groundborne vibration or groundborne noise levels?

IMPACT NOI-2 CONSTRUCTION OF MICUP COMPONENTS MAY TEMPORARILY GENERATE GROUNDBORNE VIBRATION, POTENTIALLY AFFECTING NEARBY STRUCTURES LOCATED WITHIN CERTAIN DISTANCES. TO REDUCE VIBRATION IMPACTS DURING CONSTRUCTION, PREPARATION OF A VIBRATION CONTROL PLAN WOULD BE REQUIRED. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION.

Construction

Construction of MICUP project components would generate temporary levels of vibration that would vary depending on the equipment and distances to sensitive receptors. Operation of construction equipment causes vibration that spreads through the ground and diminishes in magnitude as the distance increases from the source. Occupants in buildings (especially those with foundations in the soil) located in the vicinity of a construction site may respond to these vibrations in various ways; at the lowest levels, these vibrations may not be perceptible, while at moderate levels, these vibrations may be experienced as low rumbling sounds and perceptible vibrations, which may be disruptive to occupants. At the highest levels, slight damage may occur to the building

structure. Levels of vibration at which minor architectural (i.e., non-structural) damage may occur to buildings of various construction types are presented in Table 4-11-21, which are based on guidance by the FTA. These vibration thresholds are 0.12 in/sec PPV for fragile/historic structures, 0.2 in/sec PPV for residential structures, and 0.3 in/sec for commercial structures.

Typical vibration levels for expected equipment types used during construction of the proposed project are presented in Table 4-11-21 at various distances away from the equipment to provide an understanding of how vibration impacts may vary with distance from the equipment to a nearby building or other structure. Vibration levels that exceed one or more of the FTA's vibration thresholds are bolded and underlined.

Table 4-11-21 Typical Vibration Levels Produced by Various Construction Equipment

	Vibration Level (in/sec PPV)[1]				
	Distance from Equipment (feet)				
Equipment	**10**	**15**	**20**	**25**	**50**
Vibratory Roller	**0.830**[2,3]	**0.452**[2,3]	**0.293**[2,3]	**0.210**[2,3]	0.074
Large Earthmoving Equipment such as a Bulldozer or Excavator (100 hp or more)	**0.352**[2,3]	**0.191**[2]	**0.124**[2]	0.089	0.042
Caisson Drill Rig	**0.352**[2,3]	**0.191**[2]	**0.124**[2]	0.089	0.042
Loaded Truck	**0.300**[2,3]	**0.164**[2]	0.106	0.076	0.036
Small Earthmoving Equipment such as a Bulldozer or Excavator (less than 100 hp)	0.012	0.006	0.004	0.003	0.001

Note: in/sec = inches per second; PPV = peak particle velocity; hp = horsepower

[1] Vibration levels shown in bolded and underlined text exceed one or more of the FTA criteria shown in Table 4.11-4. Superscript numbers specify the threshold exceeded by each piece of equipment, explained below.

[2] Exceeds the 0.12 in/sec PPV FTA damage threshold for extremely fragile/historic structures.

[3] Exceeds the 0.2 in/sec PPV FTA damage threshold for residential structures.

Based on the vibration levels shown in Table 4-11-21, a vibratory roller would produce vibration levels that could exceed the FTA's threshold of 0.12 in/sec PPV at fragile/historic structures located within 37 feet of the equipment and would produce vibration levels that could exceed the threshold of 0.2 in/sec PPV at residential structures located within 26 feet of the equipment. Large earthmoving equipment (rated at 100 hp or more) and a caisson drill rig would each produce vibration levels that could exceed the 0.12 in/sec PPV threshold at fragile/historic structures located within 21 feet of these equipment types and would each produce vibration levels that could exceed the 0.2 in/sec PPV threshold at residential structures located within 15 feet of these equipment types. A loaded truck would produce vibration levels that could exceed the 0.12 in/sec PPV threshold at fragile/historic structures located within 15 feet of the equipment and would produce vibration levels that could exceed the 0.2 in/sec PPV threshold at residential structures located within 10 feet of the equipment.

Depending on the final location of project components and construction work areas, construction vibration impacts would vary depending on distance from the equipment to nearby sensitive receptors and the structural integrity of affected structures. If located within certain distances, as shown in Table 4-11-21, vibration impacts generated during construction of the proposed project may be potentially significant.

Mitigation Measure NOI-5 would require the use of alternative construction equipment types that produce lower levels of vibration, thus reducing vibration impacts at nearby sensitive structures. In

addition, Mitigation Measure NOI-5 would include a Vibration Control Plan consisting of monitoring of vibration levels during construction, reporting of any damages and/or exceedances above applicable thresholds, repairing any potential damage resulting from construction, as necessary. Therefore, construction-related vibration impacts for all three Partner Agency areas would be less than significant with mitigation.

Operation

Operation of project components facilitated by development of the proposed project would not include substantial sources of vibration (such as railway operations, heavy truck traffic, industrial/heavy machinery activity, etc.); therefore, operation of the proposed project is not expected to generate levels of vibration exceeding the thresholds recommended by the FTA. Therefore, operation-related vibration impacts for all three Partner Agency areas would be less than significant.

Mitigation Measures

NOI-3 Prepare and Implement a Vibration Control Plan during Construction

For construction activities involving large earthmoving equipment within 21 feet of a fragile/historic structure or within 15 feet of any residential structure (including non-engineered timber and masonry buildings without plaster) and construction activities involving a roller within 37 feet of a fragile/historic structure or within 26 feet of a residential structure (including non-engineered timber and masonry buildings without plaster), the implementing agency shall prepare a Vibration Control Plan prior to the commencement of construction activities.

The Vibration Control Plan shall be prepared by a qualified acoustical consultant or engineer and shall include methods required to minimize vibration during construction, including, but not limited to:

- Use of alternative construction equipment for compaction activities (e.g., use of a static/pneumatic roller in lieu of a vibratory roller) within 37 feet of a fragile/historic structure and within 26 feet of a residential structure to reduce vibration impacts to these structures.
- Use of alternative construction equipment for earthmoving activities (e.g., use of equipment limited to 100 hp or less) within 21 feet of a fragile/historic structure and within 15 feet of a residential structure to reduce vibration impacts to these structures.
- Vibration monitoring prior to and during demolition, earthmoving, and compaction operations occurring within 15 feet of a building.
- Use of rubber-tired equipment rather than metal-tracked equipment.
- Avoiding the use of vibrating equipment when allowed by best engineering practices.

The Vibration Control Plan shall include a pre-construction survey letter establishing baseline conditions at extremely fragile buildings/historical resources and/or residential structures where potential impacts cannot be avoided using alternative equipment and construction techniques. The survey letter shall determine conditions that exist prior to the commencement of construction activities for use in evaluating potential damages caused by construction. Fixtures and finishes susceptible to damage shall be documented photographically and in writing prior to construction. The survey letter shall provide a shoring design to protect such buildings and structures from potential damage. At the conclusion of vibration-causing activities, the qualified acoustical

consultant or engineer shall issue a follow-up letter describing damage, if any, to impacted buildings and structures. If historical, the letter shall include recommendations for any repair, as necessary, in conformance with the Secretary of the Interior Standards. Repairs shall be undertaken and completed by the contractor and monitored by a qualified structural engineer in conformance with all applicable codes including the California Historical Building Code (Part 8 of Title 24).

The Vibration Control Plan, prepared as outlined above, shall be documented by a qualified acoustical consultant or engineer and shall be provided to the County upon request.

Level of Significance

Less than Significant with Mitigation

Airport Activity Noise

Significance Criterion c:	For location within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the proposed plans expose people residing or working in the project area to excessive noise levels?

IMPACT NOI-3 PROJECT COMPONENTS FACILITATED BY MICUP WOULD BE LOCATED OUTSIDE OF THE NOISE CONTOURS FOR ALL NEARBY AIRPORTS AND WOULD NOT EXPOSE WORKERS TO EXCESSIVE AIRCRAFT-RELATED NOISE. NO IMPACTS RELATED TO EXPOSURE TO AIRPORT-RELATED NOISE WOULD OCCUR.

Construction

Potential noise impacts related to location proximate to a private airstrip or public use airport are limited to operational impacts. No respective construction impacts related to effects of airport activity noise would occur.

Operation

North San Joaquin Water Conservation District

The closest airports to the NJSWCD project areas are the Lodi Airport – located approximately 3.0 and 5.0 miles from the North System and South System Recharge Areas, respectively – and Kingdon Airpark – located approximately 8.5 and 6.75 miles from the North System and South System Recharge Areas, respectively. NSJWCD project areas would not be located within the noise contours of either airport according to the land use compatibility plan for both airports.[17] As such, NSJWCD project components would not expose people working in the project vicinities to excessive aircraft-related noise levels. Therefore, no NSJWCD operational impacts related to consistency with noise land use compatibility standards and effects of airport activity noise would occur.

Stockton East Water District

The closest airports to the SEWD project area are the Lodi Airport – located 11.5, 11.0, and 13.5 miles from the West Linden, Mosher Creek at Tully Dam, and East Mosher Creek at Messick Road project areas – and the Kingdon Airpark – located approximately 10.5, 12.0, and 14.5 miles from the

[17] Coffman Associates, Inc. 2009. Airport Land Use Compatibility Plan Update, San Joaquin County Aviation System. https://www.sjcog.org/DocumentCenter/View/17/2009-San-Joaquin-County-ALUCP---Amended-January-2018?bidId= (accessed January 2025).

West Linden, Mosher Creek at Tully Dam, and East Mosher Creek at Messick Road project areas, respectively. None of the SEWD project areas would be located within the noise contours of either airport according to the land use compatibility plan for both airports.[17] As such, SEWD project components would not expose people working in the project vicinities to excessive aircraft-related noise levels. Therefore, no SEWD operational impacts related to consistency with noise land use compatibility standards and effects of airport activity noise would occur.

City of Stockton

The closest airport to the City of Stockton project component area is the Kingdon Airpark, located approximately two miles northwest of the Delta Water Treatment Plant. This project component area would not be located within the noise contours of this airport according to the land use compatibility plan for the airport.[17] As such, City of Stockton project components would not expose people working in the project vicinity to excessive aircraft-related noise levels. Therefore, no City of Stockton operational impacts related to consistency with noise land use compatibility standards and effects of airport activity noise would occur.

Mitigation Measures

No mitigation is required.

Level of Significance

No Impact

4.11.5 Cumulative Impacts

The geographic scope of the cumulative noise analysis includes unincorporated San Joaquin County, the City of Stockton, and the City of Lodi. The cumulative analysis considers the nearby past, present, and reasonably foreseeable future plans and projects listed in Table 4-1 (see Chapter 4.0*, Environmental Impact Analysis*).

Construction Noise

Construction noise generated by implementation of MICUP project components, in combination with construction activities for other cumulative projects that may be constructed simultaneously could, without mitigation, substantially increase noise levels in the vicinity of future projects. Mitigation measures have been identified to help reduce noise from equipment during construction of MICUP project components, however, finalized locations and details for many project components have not yet been determined and corresponding construction work areas are not known at this time. If construction of other cumulative projects and MICUP project components were to occur simultaneously and in close proximity to each other (especially during nighttime hours), construction noise from individual projects may combine to create a significant cumulative impacts to nearby sensitive receptors. Although this scenario is unlikely, and mitigation measures to reduce construction noise of individual MICUP project components would be implemented to the extent feasible, the potential remains for a cumulatively considerable increase in construction noise resulting from implementation of cumulative projects and MICUP project components. Thus, cumulative impacts related to construction noise would be significant and unavoidable.

Some cumulative projects (including Project Numbers 12, 19, 24 as shown in Table 4-1 in Chapter 4.0 , *Environmental Impact Analysis*) would be located within or adjacent to MICUP project

component areas. Depending on construction schedules and expected pieces of construction equipment to be used, noise levels generated during construction of cumulative projects may vary. If construction noise levels associated with cumulative projects were much higher than those associated with MICUP project components, MICUP project construction noise impacts would not be considerably cumulative. However, if construction noise levels associated with cumulative projects were lower or comparable to those associated with MICUP project components and construction of cumulative and MICUP project components were to occur simultaneously, construction noise impacts would be significant and unavoidable. Due to the potential for construction of cumulative projects to generate similar levels of noise and occur simultaneously in close proximity to MICUP construction activity, construction noise impacts would remain significant and unavoidable.

Operational Stationary Noise

Development facilitated by MICUP project components would introduce new stationary noise sources to the ambient noise environment in the vicinity of the project component areas, including new mechanical equipment such as pumps. These noise sources may combine with other nearby cumulative projects to result in higher noise levels. However, operational noise from these sources typically is localized and rapidly attenuates within an urbanized setting due to the effects of intervening structures and topography that provide shielding to receptors. Additionally, cumulative projects and MICUP project components would be required to comply with the applicable noise standards contained in the San Joaquin County Code and respective city municipal codes to ensure that noise associated with new stationary sources would be maintained below required thresholds. Therefore, cumulative impacts related to operational stationary noise would be less than significant.

Operational Mobile Noise

As discussed in Impact NOI-1, MICUP project components would not require additional staff beyond existing maintenance activities and would therefore not introduce additional vehicle trips on nearby roadways. Due to this, noise increases associated with MICUP project components would be negligible and would not meaningfully contribute to a cumulative increase in mobile noise when accounting for other cumulative projects. Therefore, cumulative impacts related to operational mobile (roadway vehicle) noise would be less than significant.

Groundborne Vibration and Noise

Although other cumulative projects and MICUP project components may simultaneously undergo construction in close proximity to one another, vibration rapidly attenuates through the ground with distance and the potential for groundborne vibration and noise impacts is within localized distances (e.g., within approximately 25 feet of a vibratory roller). Depending on the final locations of construction work areas for MICUP project components, construction equipment may be operated in close proximity to nearby sensitive structures and expose them to increased levels of vibration. However, mitigation measures are provided to substantially reduce construction vibration impacts to the extent feasible, and when also accounting for construction of cumulative projects, the potential for cumulative vibration impacts would be low. Therefore, cumulative impacts related to groundborne vibration and noise would be less than significant.

Overall Level of Cumulative Significance

Significant and Unavoidable

4.12 Transportation

4.12.1 Introduction

This section describes existing conditions related to roadway, transit, bicycle, and pedestrian circulation systems in the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas) as well as the relevant regulatory framework. This section also evaluates impacts of the proposed project related to the potential for conflict with existing programs, plans, ordinances, or policies addressing the circulation system; conflict with *CEQA Guidelines* Section 15064.3(b); increased hazards due to geometric design features or incompatible uses; or result in inadequate emergency access.

The information in this section is based on information in the San Joaquin County General Plan, Stockton General Plan, Lodi General Plan, San Joaquin Council of Governments (SJCOG) 2022 Regional Transportation Plan (RTP) and Sustainable Communities Strategy (SCS), and other publicly available planning documents.

4.12.2 Environmental Setting

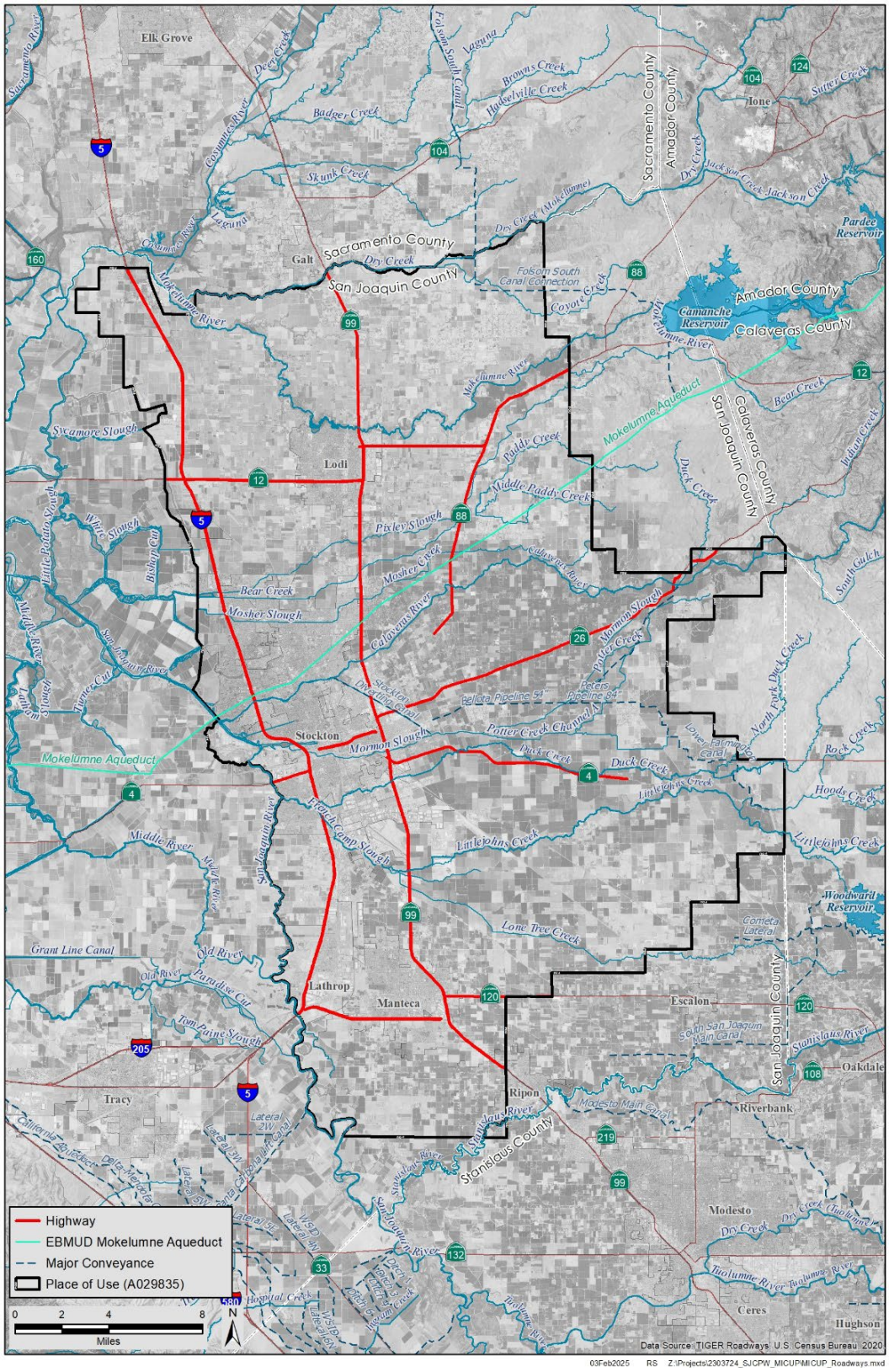
Existing regional transportation networks and facilities in San Joaquin County include an intermodal system consisting of the State and interstate highway system, the inland Stockton Port, bicycle, pedestrian, and bus routes, passenger and freight rail, and commercial passenger airline service. The San Joaquin County transportation system has been designed to meet the multiple needs of both residents and businesses. The following environmental setting discussion focuses on roadway, passenger transit, bicycle, and pedestrian systems and facilities within and that serve the project area (defined as the Place of Use that also encompasses the three Partner Agency jurisdiction areas).

Roadway System

Regional Highways

San Joaquin County, including the unincorporated areas of San Joaquin County and the Cities of Stockton and Lodi, has an established network of roadways that serve the transportation needs of residents, visitors, and businesses. Together, Interstate (I)-5 and the State highway system provide inter-regional connectivity to and throughout the County and project area from all directions (Figure 4.12-1). I-5 and SR-99 are the major north-south routes, while SR-4, SR-12, and SR-120 are east-west routes connecting between I-5 and SR-99 and beyond, as described below. SR-26 and SR-88 are both east-west routes branching from SR-99 eastward.

Figure 4.12-1 Existing Regional Highways



GEI Consultants, 2026

- **I-5** is a major north-south freeway that runs from the Mexican to Canadian border, connecting California, Oregon, and Washington. I-5 is located near the western boundary of the MICUP Place of Use area.
- **SR-99** is a major north-south freeway that spans through the Central Valley. SR-99 spans from the I-5 freeway near the unincorporated community of Wheeler Ridge in Kern County at its southerly extent to SR-36 near I-5 in the City of Red Bluff at its northerly extent. SR-99 is located within the center of the MICUP Place of Use area.
- **SR-4** is an east-west route that spans from the City of Hercules near I-80 to SR-89 near the unincorporated communities of Markleeville and Loope in Alpine County. SR-4 is located in the southern portion of the MICUP Place of Use area.
- **SR-12** is an east-west route that stretches from SR-116 in the City of Sebastopol to SR-49 near the unincorporated community of San Andreas in Calaveras County. Along its route, SR-12 briefly converges with SR-88 and SR-26. It is situated within the northern portion of the MICUP Place of Use area.
- **SR-120** is an east-west route with a western terminus at I-5 in the City of Lathrop and its eastern terminus at U.S. Route 6 in the unincorporated community of Benton. It is located in the southernmost portion of the MICUP Place of Use area.
- **SR-26** is an east-west route that stretches from SR-99 in the City of Stockton within San Joaquin County to SR-88 near the unincorporated community of Pioneer in Amador County. SR-26 spans the center of the MICUP Place of Use area.
- **SR-88** is an east-west route that runs from the City of Stockton to the Nevada state line, where it continues as Nevada SR-88 before terminating at U.S. Route 395. SR-88 spans the center of the MICUP Place of Use area.

Arterials, Collectors, and Local Streets

The project area also includes secondary arterial, collector, and local roads that serve regional and local roadway transportation needs. Arterials are major streets carrying the traffic of local and collector streets to and from freeways and other major streets. Collectors are streets for traffic moving between arterial and local streets, generally providing direct access to properties. Local roads provide direct access to properties and are often designed to discourage commute traffic. Following is a discussion of the arterials, collectors, and local roads setting within each of the MICUP Partner Agency jurisdiction areas.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The North San Joaquin Water Conservation District (NSJWCD) is situated east and north of the City of Lodi. Relevant arterials, collectors, and local roads in the NSJWCD project component area include:

- Liberty Road
- Jahant Road
- Acampo Road
- Alpine/Bruella Road
- Brandt Road
- Tretheway Road
- Kettleman Lane
- Harney Lane
- Live Oak Road
- Sowles Road
- Victor Road

STOCKTON EAST WATER DISTRICT

The Stockton East Water District (SEWD) spans the San Joaquin Valley from the western boundary of the City of Stockton to the eastern San Joaquin County line. Relevant arterials, collectors, and local roads in the SEWD project component area include:

- Jack Tone Road
- Duncan Road
- Tokay Colony Road
- Live Oak Road
- Eight Mile Road
- Tully Road
- Frazier Road
- Eight Mile Road
- Comstock Road
- Baker Road
- Clements Road

CITY OF STOCKTON

The City of Stockton is located in California's Central Valley, approximately 30 miles south of Sacramento and 60 miles east of San Francisco. Relevant arterials, collectors, and local roads in the City of Stockton project component area include:

- Lower Sacramento Road
- Eight Mile Road
- Holman Road
- Rindge Tract Road
- Armstrong Road

Emergency Vehicle Routes

San Joaquin County has identified neighborhood evacuation maps for neighborhoods within the County, described below with respect to the MICUP Partner Agencies, and shown in Figure 4.12-2.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

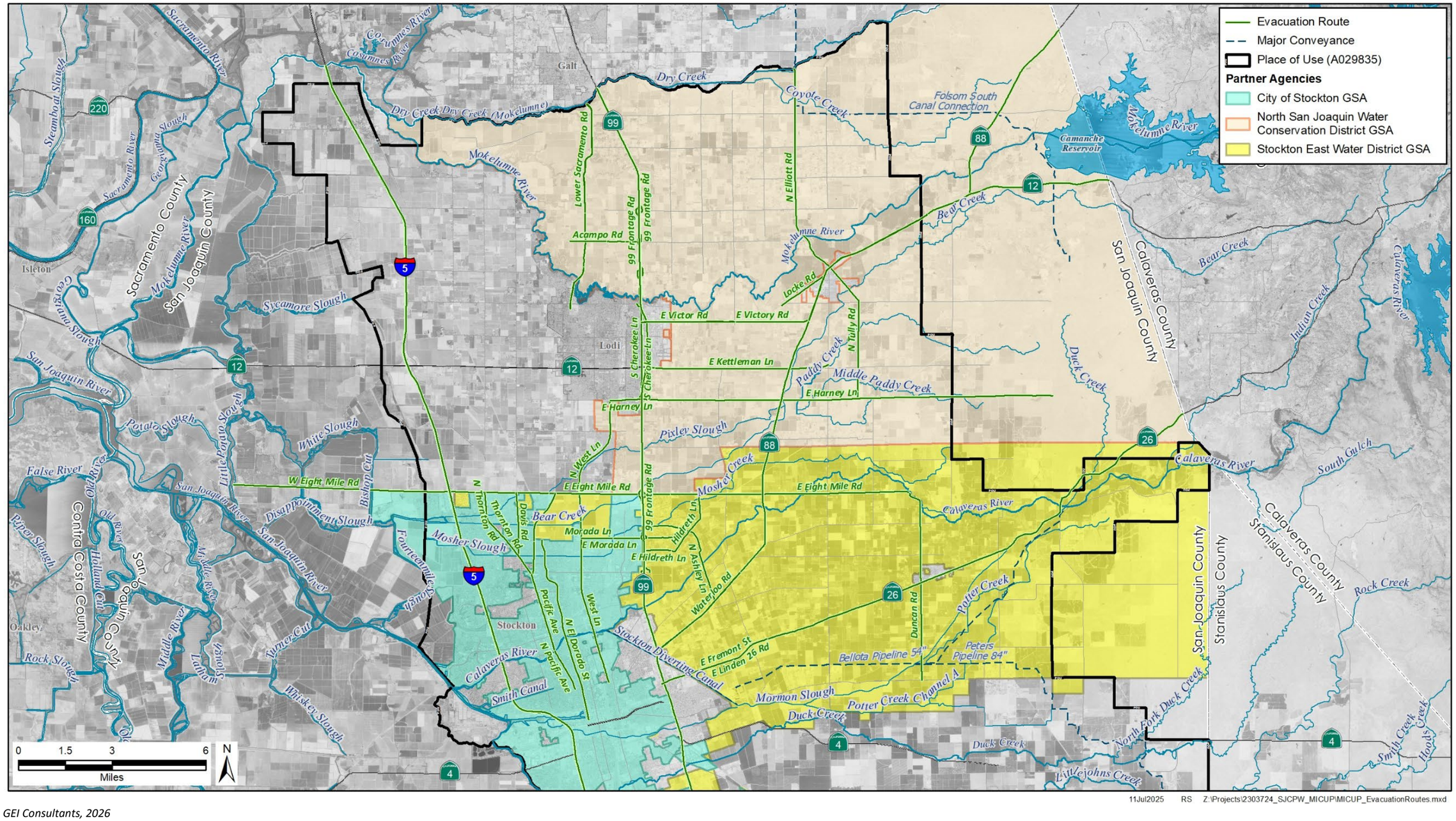
The NSJWCD project area includes the Lockeford Evacuation Zone and Beckman Road Evacuation Zone. The Lockeford Evacuation Zone identifies SR-12, SR-88, Elliott Road, Tully Road, Locke Road, and a portion of Tretheway Road south of the river from Locke Road to SR-12, as evacuation routes.[1] The Beckman Road Evacuation Zone identifies an evacuation route from Victor Road and Kettleman Lane to SR-99[2].

STOCKTON EAST WATER DISTRICT

The SEWD project area is located partially within and west of the Linden Evacuation Zone, which identifies an evacuation route from Duncan Road (both north and south) to SR-26 (both east and west)[3].

[1] San Joaquin County Office of Emergency Services. 2010. Lockeford Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/lockeford_public_Streetmap.pdf. Accessed: December 2024.
[2] San Joaquin County Office of Emergency Services. 2010. Beckman Road Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/Lodi_BeckmanRoad_Public_Streetmap.pdf. Accessed: December 2024.
[3] San Joaquin County Office of Emergency Services. 2019. Linden Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/Linden_Public_Symbology_English.pdf. Accessed: December 2024.

Figure 4.12-2 San Joaquin County Evacuation Routes



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CITY OF STOCKTON

The City of Stockton project area is located between the Bear Creek Evacuation Zone and the Harney Lane Evacuation Zone. These zones identify the following evacuation routes:[4,5]

- Eight Mile Road, east to SR-99 and west to I-5;
- Lower Sacramento Road, north and south to Eight Mile Road and Harney Lane;
- Thornton Road, south;
- Davis Road, north to Eight Mile Road and south to Thornton Road;
- West Lane, north and south;
- Morada Lane, east; and
- Hutchins Street, south.

Pedestrian and Bicycle Facilities

Both bicycling and walking within the San Joaquin County are active transportation alternatives due to the relatively flat topography and temperate climate during much of the year. Overall, pedestrian and bicycle facilities in the County are concentrated in urban and suburban centers, such as in the Cities of Stockton and Lodi.

Pedestrian Facilities

Pedestrian facilities typically include features such as sidewalks, crosswalks, curb ramps, and benches. As follows is a discussion of the County's pedestrian facilities within each of the MICUP Partner Agencies jurisdiction areas.

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The NJSWCD is in unincorporated northeastern San Joaquin County and is primarily characterized by agricultural land use. A review of Google Earth Imagery was conducted, and no pedestrian facilities were identified in the NJSWCD project areas where pipelines are proposed or in proposed recharge areas.[6]

STOCKTON EAST WATER DISTRICT

The SEWD project area is in unincorporated eastern San Joaquin County and is primarily characterized by agricultural land use. A review of Google Earth Imagery was conducted, and no pedestrian facilities were identified in the areas where pipelines are proposed or in proposed recharge areas.[7]

CITY OF STOCKTON

The City of Stockton project area includes the DWTP site. There are no public pedestrian facilities within the DWTP site, or on the roadways in the vicinity of the DWTP (N Lower Sacramento Road, Eight Mile Road, or Armstrong Road). Pipelines and recharge basins would be located within 0.5-

[4] San Joaquin County Office of Emergency Services. 2018. Harney Lane Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/Lodi_HarneyLane_Public_Streetmap.pdf. Accessed: December 2024.
[5] San Joaquin County Office of Emergency Services. 2010. Bear Creek Evacuation Zone. Available: https://sjmap.org/evacmaps/pdfs/NorthStockton_BearCreek_Public.pdf. Accessed: December 2024.
[6] Google Earth. 2024. Available: https://earth.google.com/web/. Accessed: December 2024.
[7] Ibid

miles of the WID South Main Canal and south of Armstrong Road. A portion of this area is located within unincorporated eastern San Joaquin County and is primarily characterized by agricultural land use. A review of Google Earth Imagery was conducted, and no pedestrian facilities were identified in the areas where pipelines are proposed or in proposed recharge areas. The project area is also partially located within the City of Stockton where pedestrian facilities are located and proposed project components may overlap with pedestrian facilities.

Bicycle Facilities

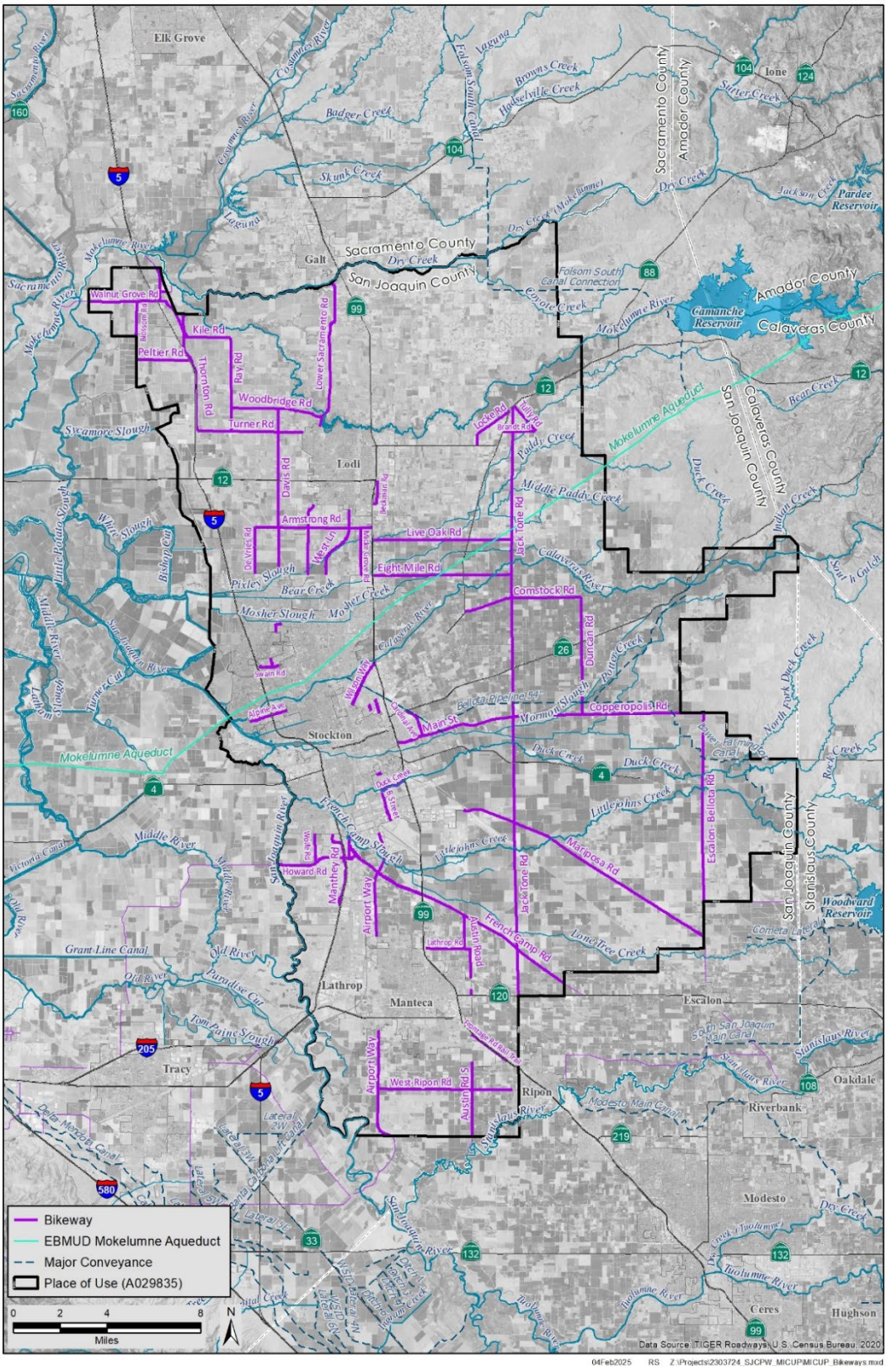
Bicycle facilities are features that provide primarily for and promote bicycle travel. Four categories of bikeways are specified in the Caltrans Highway Design Manual and Sections 885.1 et seq. of the California Streets and Highways Code.[8] These categories are:

- **Class I Bikeway (Off-Street Bike Path or Multi-Use Path):** Bike paths provide a separate right-of-way and are designated for the exclusive use of people riding bicycles and walking with minimal cross-flow traffic.
- **Class II Bikeway (On-Street Bike Lane):** Bike lanes provide designated street space for bicyclists, typically adjacent to the outer vehicle travel lanes. Bike lanes include special lane markings, pavement legends, and signage. Bike lanes may be enhanced with painted buffers between vehicle lanes and/or parking, and green paint at conflict zones (such as driveways or intersections).
- **Class III Bikeway (Bike Route):** Bike routes provide enhanced mixed-traffic conditions for bicyclists through signage, striping, and/or traffic calming treatments, and provide continuity to a bikeway network. Bike routes are typically designated along gaps between bike trails or bike lanes, or along low-volume, low-speed streets. Bicycle boulevards provide further enhancements to bike routes by encouraging slow speeds and discouraging non-local vehicle traffic, often using traffic calming measures. Bicycle boulevards can also feature special wayfinding signage to nearby destinations or other bikeways.
- **Class IV Bikeway (Separated Bikeway)**: Separated Bikeways, also referred to as cycle tracks or protected bikeways, are bikeways for the exclusive use of bicycles which are physically separated from vehicle traffic. Separations may include grade separation, flexible posts, physical barriers, or on-street parking.

As follows is a discussion of the County's bicycle facilities within each of the MICUP Partner Agency jurisdiction areas. Regional bikeways are shown in Figure 4.12-3.

[8] California Department of Transportation (Caltrans) 2020. Highway Design Manual. Seventh Edition. December 31, 2020. https://dot.ca.gov/-/media/dot-media/programs/design/documents/hdm-complete-12312020a11y.pdf (accessed October 2022).

Figure 4.12-3 Regional Bikeways within the Place of Use



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NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The NJSWCD is in unincorporated northeastern San Joaquin County and is primarily characterized by agricultural land use. A review of Google Earth Imagery was conducted, and no bicycle facilities were identified in NSJWCD areas where pipelines are proposed or in proposed recharge areas.[9]

STOCKTON EAST WATER DISTRICT

The SEWD project area is in unincorporated eastern San Joaquin County, primarily characterized by agricultural land use. A review of Google Earth Imagery was conducted, and no bicycle facilities were identified in SEWD areas where pipelines are proposed or in proposed recharge areas.[10]

CITY OF STOCKTON

The City of Stockton project area includes the DWTP site. There are no public bicycle facilities within the DWTP site, or on the roadways in the vicinity of the DWTP (N Lower Sacramento Road, Eight Mile Road, or Armstrong Road). Pipelines and recharge basins would be located within 0.5-miles of the WID South Main Canal and south of Armstrong Road. A portion of this area is located within unincorporated eastern San Joaquin County and is primarily characterized by agricultural land use and a portion of this area is located within the City of Stockton. There are various Class II bicycle facilities located within the area and project components may overlap with bicycle facilities.

Transit Service

San Joaquin County's central location within the Central Valley provides access to surrounding cities and communities, as well as to other parts of the Central Valley and San Francisco Bay Area. While the suburban and rural setting lends itself to vehicle use as a preferred mode of travel, trips can also be made by public transit in the form of passenger bus or rail. Existing passenger bus and rail transit lines and stops are shown in Figure 4.12-4. As follows is a discussion of the County's transit facilities within each of the MICUP district jurisdiction areas.

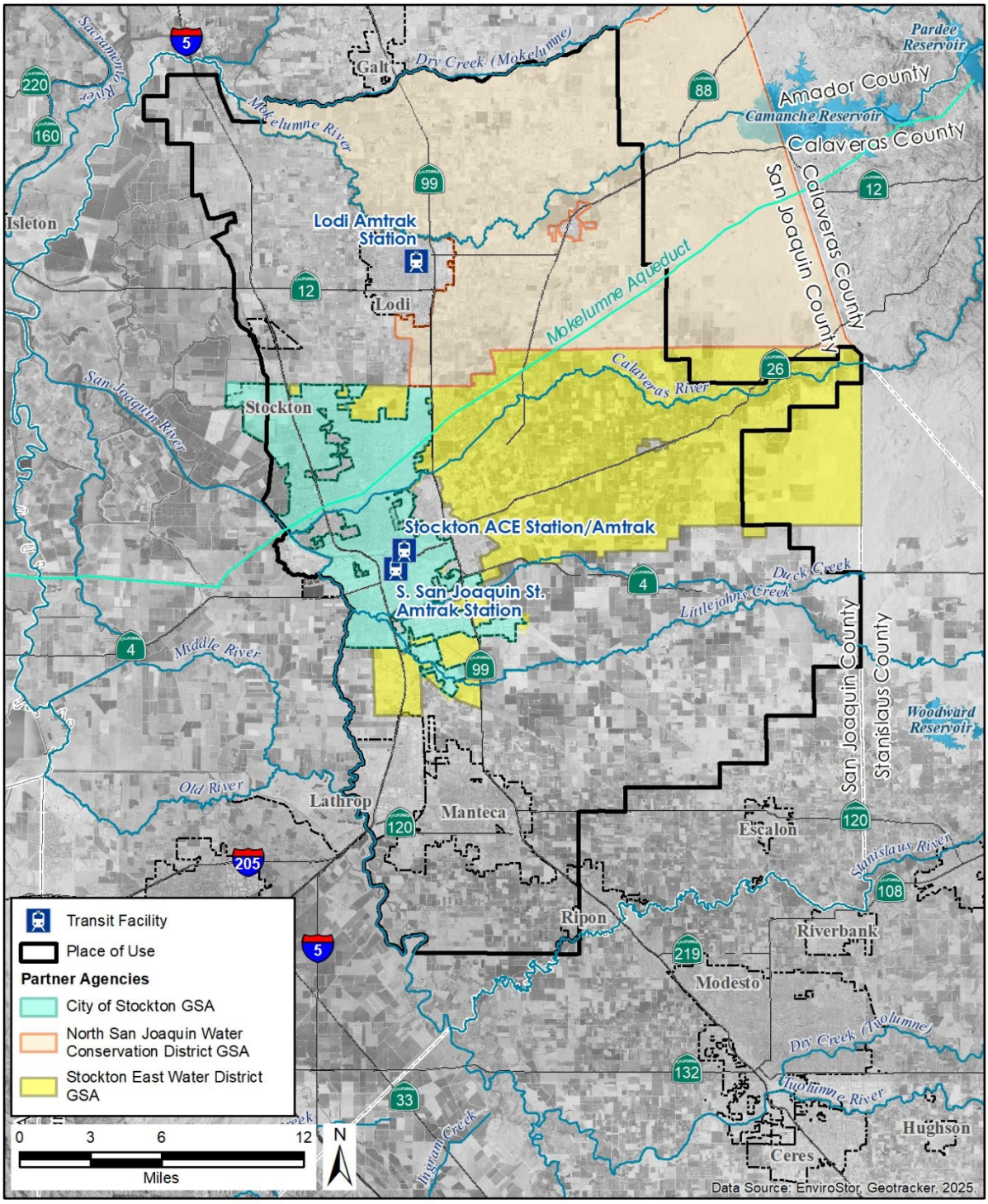
SAN JOAQUIN REGIONAL TRANSIT DISTRICT

The San Joaquin Regional Transit District (SJRTD) provides bus service throughout San Joaquin County with the Hopper service. The Hopper provides fixed-route service to the cities of Stockton, Lathrop, and Manteca as well as to the community of French Camp. Additional intercity bus lines provide service to Tracy[11].

SJRTD's Interregional Commuter Service offers bus service to passengers traveling to Alameda, Contra Costa, Santa Clara, and Sacramento counties, including feeder service to BART for employees working in San Francisco and the East Bay. The SJRTD intercity Route 91 connects Ripon, Manteca, and Stockton and Routes 26 and 90 connect Tracy, Lathrop, French Camp, and Stockton, while Routes 93 and 23 link Stockton to Lodi[12]. The interregional service is designed to meet the needs of commuters who travel distances greater than 50 miles one way. Greyhound and Amtrak also provide interregional bus service.

[9] Google Earth. 2024. Available: https://earth.google.com/web/. Accessed: December 2024.
[10] Ibid
[11] San Joaquin Regional Transit District. 2024. Hopper. Available: https://sanjoaquinrtd.com/hopper-1/. Accessed January 2025.
[12] San Joaquin Regional Transit District. 2024. All Routes. Available: https://sanjoaquinrtd.com/all-routes/#Commuter. Accessed January 2025.

Figure 4.12-4 San Joaquin County Transit Service



GEI Consultants, 2026

GRAPELINE

GrapeLine is the public transit bus service offered by the City of Lodi. In addition to the GrapeLine, Lodi also provides a dial-a-ride/ADA VineLine service. The GrapeLine connects with the SJRTD to provide service to Stockton and connects with South County Transit/Link service to provide service to Galt, allowing riders to access transit services in Stockton, Elk Grove and Sacramento. Greyhound and Amtrak also provide services at the Lodi Transit Station[13].

SAN JOAQUIN REGIONAL RAIL COMMISSION

The San Joaquin Regional Rail Commission (SJRRC) is a joint powers authority that implements a rail system in San Joaquin County, including the Altamont Commuter Express (ACE) rail service and the Amtrak San Joaquins.[14] ACE offers service to passengers traveling to Santa Clara, Alameda, and San Joaquin counties, with stations in the cities of San Jose, Santa Clara, Fremont, Pleasanton, Livermore, Tracy, Lathrop, and Stockton. ACE also provides connections to AC Transit, Bay Area Rapid Transit, Caltrain, Capitol Corridor, Santa Clara Valley Transportation Authority's Wheels and light rail services, and the 92X ACE Express route, allowing riders to access transit services in other portions of San Francisco, San Mateo, Alameda, Contra Costa, Santa Clara, and Sacramento counties.[15] Amtrak San Joaquins is a rail service provides intercity passenger rail service throughout the San Joaquin Valley and beyond with trains running multiple times per day between San Francisco, Sacramento, and Bakersfield, and stops in Stockton, Modesto, Merced, Martinez, Emeryville and Fresno. Amtrak Thruway buses connect riders from stops along the Amtrak San Joaquins to Southern California destinations.[16]

Project Area

NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT

The project components in the NJSWCD jurisdiction area are located in an unincorporated area of northeastern San Joaquin County without bus or rail transit services.

STOCKTON EAST WATER DISTRICT

The project components in the SEWD jurisdiction area are in an unincorporated area of eastern San Joaquin County without bus or rail transit services.

CITY OF STOCKTON

The City of Stockton jurisdiction area is located entirely on the DWTP site, across urbanized portions of the City of Stockton. There are no public bus or rail transit facilities within the DWTP site. While the Hopper 93 Bus runs between Stockton and Lodi along West Lane near the DWTP site, the bus does not stop near the DWTP site. Pipelines and recharge basins would be located within 0.5-miles of the WID South Main Canal and south of Armstrong Road. A portion of this area is located within unincorporated eastern San Joaquin County and is primarily characterized by agricultural land use without bus or rail transit services. Within the City of Stockton, ACE provides public rail service and Amtrak San Joaquin provides public rail service from Stockton to Sacramento.

[13] Community Connections. N.D. City of Lodi GrapeLine. Available: https://communityconnectionssjc.org/programs/details/grape_line/. Accessed January 2025.
[14] San Juaquin Regional Rail Commission. 2022. About Us. Available: https://www.sjrrc.com/about/. Accessed February 2025.
[15] Altamont Commuter Express. 2022. Route Map and Connections. Available: https://acerail.com/. Accessed February 2025.
[16] Amtrak. 2025. San Joaquins. Available: https://www.amtrak.com/san-joaquins-train. Accessed February 2025.

4.12.3 Regulatory Framework

Federal Regulations

Surface Transportation Assistance Act

The Surface Transportation Assistance Act of 1982 was enacted to address the nation's surface transportation infrastructure needs. It authorized significant appropriations for the construction and maintenance of highways, highway safety, and mass transit in both urban and rural areas. A notable feature of the Act was the five-cent increase in the per-gallon gas tax, with four cents allocated to interstate highways and bridges, and one cent dedicated to public transit. The Act also set a goal of ten percent participation for disadvantaged business enterprises in federal-aid projects. Additionally, the "Buy America" provision required the use of domestically produced materials for mass-transit-related procurements funded by federal funds. The Act included whistleblower protections for employees in the transportation industry who report noncompliance with safety regulations, safeguarding them from retaliation. Furthermore, it made funds available from the Highway Trust Fund for various transportation projects, including interstate resurfacing and substitute highway projects.

State Regulations

California Department of Transportation Encroachment Permits

An encroachment permit from Caltrans is required for all proposed activities related to the placement of encroachments within, under, or over the State highway rights of way. Any construction activities that would occur within the existing State highway right of way would have to comply with Caltrans permitting requirements. These requirements include a traffic control plan that adheres to the standards set forth in the California Manual of Uniform Traffic Control Devices in addition to provisions for coordination with local emergency services, training for flagmen for emergency vehicles traveling through the work zone, temporary lane separators that have sloping sides to facilitate crossover by emergency vehicles, and vehicle storage and staging areas for emergency vehicles. California Manual of Uniform Traffic Control Devices requirements also provide for construction work during off-peak hours and flaggers.

California Transportation Plan

The California Transportation Plan is prepared by the California State Transportation Agency (Caltrans) every five years to provide a long-range policy framework to meet the State's future mobility needs and reduce greenhouse gas (GHG) emissions to goals set by the California Global Warming Solutions Act of 2006 (Assembly Bill [AB 32], discussed in Section 4.7, *Greenhouse Gas Emissions and Energy*) and implementing legislation Senate Bill (SB) 375 (discussed below). The most recent California Transportation Plan was adopted in 2021.[17] The California Transportation Plan defines goals, performance-based policies, and strategies to achieve the State's collective vision for California's future Statewide, integrated, multimodal transportation system by envisioning a sustainable system that improves mobility and enhances quality of life. The California Transportation Plan is developed in collaboration with transportation stakeholders such as San Joaquin Council of Governments (SJCOG). Through ongoing engagement, the California

[17] California Department of Transportation. 2021. California Transportation Plan 2050. February 2021. Available at: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/ctp-2050-v3-a11y.pdf. Accessed December 2024.

Transportation Plan is intended to provide goals and visions to support a fully integrated, multimodal, sustainable transportation system that supports the quality of life, prosperous economy, human and environmental health, and social equity.

Senate Bill 743

On September 27, 2013, Governor Jerry Brown signed Senate Bill (SB) 743 into law. SB 743 changed the way transportation impact analysis is conducted as part of CEQA compliance. These changes eliminated automobile delay, level of service (LOS), and other similar measures of vehicular capacity or traffic congestion as a basis for determining significant impacts under CEQA.

Prior rules treated automobile delay and congestion as an environmental impact. SB 743 requires the *CEQA Guidelines* to prescribe an analysis that better accounts for transit and reductions of greenhouse gas emissions. In December 2018, Office of Planning and Research (OPR) released the final update to *CEQA Guidelines* consistent with SB 743, which recommends using vehicle miles traveled (VMT) as the most appropriate metric of transportation impact to align local environmental review under CEQA with California's long-term greenhouse gas emissions reduction goals. The *Guidelines* require all jurisdictions in California to use VMT-based thresholds of significance no later than July 1, 2020.

At the same time as the release of the updated *CEQA Guidelines,* OPR also released a non-binding *Technical Advisory on Evaluating Transportation Impacts in CEQA*, which outlines potential VMT analysis methodologies and thresholds of significance for use by agencies in California based on substantial evidence developed by OPR related to achievement of the State's greenhouse gas emissions reductions targets[18].

State CEQA Guidelines Section 15064.3 and OPR Technical Advisory

State CEQA Guidelines Section 15064.3 implements SB 743 and establishes VMT as the most appropriate measure of transportation impacts. The primary components of Section 15064.3 include:

- Identifies VMT as the most appropriate measure of transportation impacts;
- Declares that a project's effect on automobile delay shall not constitute a significant environmental impact (except for projects increasing roadway capacity);
- Creates a rebuttable presumption of no significant transportation impacts for (a) land use projects within one-half mile of either an existing major transit stop or a stop along an existing high quality transit corridor, (b) land use projects that reduce VMT below existing conditions, and (c) transportation projects that reduce or have no impact on VMT;
- Allows a lead agency to qualitatively evaluate VMT if existing models are not available; and
- Gives lead agencies discretion to select a methodology to evaluate a project's VMT, but requires lead agencies to document that methodology in the environmental document prepared for the project.

CEQA lead agencies were required to comply with the State Guideline Section 15064.3 no later than July 1, 2020.

[18] OPR. 2018. Technical Advisory on Evaluating Transportation Impacts in CEQA. Available at: https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf. Accessed December 2024.

Regional and Local Regulations

San Joaquin Council of Governments 2022 Regional Transportation Plan and Sustainable Communities Strategy

The SJCOG Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS) is a comprehensive long-range vision and investment plan that addresses the future transportation needs of San Joaquin County. Adopted on August 25, 2022, the RTP/SCS integrates transportation and land use planning to support sustainable growth, economic development, and environmental stewardship. The plan considers future population growth, housing needs, and public health goals, aiming to provide diverse transportation options that reduce greenhouse gas emissions and vehicle miles traveled. By aligning with state and federal regulations, the RTP/SCS ensures that transportation projects in the region qualify for necessary funding, promoting a financially and environmentally responsible approach to regional development.[19]

General Plans

A general plan's transportation/circulation element is an infrastructure plan and policy document used to determine the needed expansion or modification of the transportation network (including services) to accommodate planned population and employment growth. These elements generally address expectations for transportation network operations and safety based on goals and policies of the city or county for which they are adopted. The elements also often address goods movement, public transit, bicycle facilities and pedestrian facilities.

SAN JOAQUIN COUNTY

The San Joaquin County General Plan 2035 Public Facilities and Services Element contains a Transportation and Mobility Section, which provides the framework for the Countywide transportation system. The Transportation and Mobility Section focuses on multi-modal improvements to guide the funds for transportation within the county in a context-sensitive manner that benefits residents the most[20].

The following San Joaquin County General Plan 2035 transportation goals and policies are relevant to the proposed project:[21]

- **Goal TM-1.** Maintain a comprehensive and coordinated multimodal transportation system that enhances the mobility of people, improves the environment, and is safe, efficient, and cost effective.
  - **TM-1.1 Transportation System Safety.** The County shall manage the transportation system to ensure safe operating conditions.
  - **TM-1.2 Emergency Services.** The County shall coordinate the development and maintenance of all transportation facilities with emergency service providers to ensure continued emergency service operation and service levels.
  - **TM-1.9 Maintenance and Infrastructure.** The County shall, based on available resources, effectively operate and maintain transportation facilities and infrastructure to preserve the quality of the system.

[19] San Joaquin Council of Governments. 2022. Regional Transportation Plan and Sustainable Communities Strategy (RTP/SCS). August 2022. Available at: https://www.sjcog.org/608/Adopted-2022-RTPSCS-Plan. Accessed January 2025.
[20] Ibid.
[21] Ibid.

- **Goal TM-3.** Maintain a safe, efficient, and cost-effective roadway system for the movement of people and goods.
  - **TM-3.6 Right-of-Way Preservation.** The County shall strive to preserve road rights-of way necessary to implement the circulation system included in the General Plan using Special Purpose Plans or other means, where appropriate.

CITY OF STOCKTON

The City of Stockton General Plan, known as Envision Stockton 2040, was adopted by the City Council on December 4, 2018. This plan outlines the city's vision for growth and development over the next two decades, focusing on sustainable development, economic vitality, and enhanced quality of life for residents.[22] The Transportation Element of Envision Stockton 2040 is organized around four key goals: mobile community, active community, sustainable transportation, and effective transportation assessments.

The following City of Stockton General Plan transportation policies and actions are relevant to the proposed project:[23]

- **Policy TR-1.1.** Ensure that roadways safely and efficiently accommodate all modes and users, including private, commercial, and transit vehicles, as well as bicycles and pedestrians and vehicles for disabled travelers.
  - **Action TR-1.1A.** Direct truck traffic to designated truck routes that facilitate efficient goods movement and minimize risk to areas with concentrations of sensitive receptors, such as schools, for example by disallowing any new truck routes to pass directly on streets where schools are located, and vulnerable road users, like pedestrians and bicyclists.

CITY OF LODI

The City of Lodi General Plan was last updated in April 2010. The plan provides a set of policies and programs that form a blueprint for physical development throughout the community. The City of Lodi General Plan Transportation Element specifically seeks to provide access to employment, education, and recreation through improved access to commercial, industrial, recreational, and public service centers, while reducing the impact of airborne emissions. The Transportation Element takes an in-depth multimodal look at how residents could be even better served by a further improved transportation system.[24]

There are no transportation policies in the City of Lodi General Plan relevant to the proposed project:[25]

[22] Stockton, City of. 2018. Envision Stockton 2040 General Plan. Available at: https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/2040%20General%20Plan%20(1).pdf. Accessed January 2025.
[23] Ibid.
[24] Lodi, City of. 2010. General Plan. April 2010. Available at: https://www.lodi.gov/DocumentCenter/View/199/Final-General-Plan---Entire-Document-PDF. Accessed January 2025.
[25] ibid

4.12.4 Impacts and Mitigation Measures

Significance Criteria

San Joaquin County utilizes the following 2025 *CEQA Guidelines* Appendix G significance criteria questions related to Transportation.

Would MICUP (the proposed project):

a) Conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?
b) Conflict or be inconsistent *CEQA Guidelines* Section 15064.3, subdivision (b)?
c) Substantially increase traffic-related hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?
d) Result in inadequate emergency access?

Approach to Analysis

EIR Scoping Comments Consideration

No comments that pertain to transportation were received in response to publication of the Notice of Preparation for this EIR.

VMT Impact Methodology

Since SB 743 eliminated the use of LOS for CEQA impact analysis purposes, that method is not utilized in this analysis. The analysis in this document examines potential roadway transportation impacts under current CEQA criteria. The primary quantitative measure of roadway impacts is VMT. San Joaquin County has not adopted quantitative thresholds for the evaluation of VMT. The VMT analysis methodology utilizes the procedures described in the OPR's *Technical Advisory on Evaluating Transportation Impacts in CEQA*[26].

The Technical Advisory does not provide guidance or thresholds related to evaluating VMT during construction. However, Section 15064.4 of the *CEQA Guidelines* states that for many projects, a qualitative analysis of construction traffic may be appropriate. Therefore, construction-related VMT is evaluated qualitatively. The Technical Advisory does include screening thresholds for operation, as described below.

PROJECT-LEVEL VMT SCREENING THRESHOLDS FOR LAND USE PROJECTS

OPR recommends that lead agencies screen out potential VMT impacts using the following three screening criteria.

1. **Screening Threshold for Small Projects.** Absent substantial evidence indicating that a project would generate a potentially significant level of VMT, or inconsistency with an SCS or general plan, projects that generate or attract fewer than 110 trips per day generally may be assumed to cause a less-than-significant transportation impact.

[26] OPR. 2018. Technical Advisory on Evaluating Transportation Impacts in CEQA. Available at: https://opr.ca.gov/docs/20190122-743_Technical_Advisory.pdf. Accessed December 2024.

2. **Map-Based Screening for Residential and Office Projects.** Residential and office projects that locate in areas with low VMT, and that incorporate similar features (i.e., density, mix of uses, transit accessibility), will tend to exhibit similarly low VMT. Maps created with data from a travel survey or travel demand model can illustrate areas that are currently below threshold VMT (see recommendations below). Because new development in such locations would likely result in a similar level of VMT, such maps can be used to screen out residential and office projects from needing to prepare a detailed VMT analysis.
3. **Presumption of Less Than Significant Impact Near Transit Stations.** Proposed CEQA Guideline Section 15064.3, subdivision (b)(1), states that lead agencies generally should presume that certain projects (including residential, retail, and office projects, as well as projects that are a mix of these uses) proposed within one half mile of an existing major transit stop or an existing stop along a high quality transit corridor will have a less-than-significant impact on VMT. This presumption would not apply, however, if project-specific or location-specific information indicates that the project will still generate significant levels of VMT.

As will be discussed below, the proposed project would meet the Screening Threshold for Small Projects based on anticipated VMT per day during operation. Thus, the project does not require a full VMT assessment.

Specific Thresholds of Significance

San Joaquin County has not adopted quantitative thresholds for the evaluation of roadway or transit facilities, design feature hazards, or emergency access. However, the County applies the following qualitative transportation thresholds:

Roadway Facilities

The evaluation of roadway facilities shall consider if:

- A project disrupts or conflicts with existing roadway facilities; or
- A project conflicts with roadway policies adopted by the City of Stockton, City of Lodi, or San Joaquin County for their respective facilities.

Transit Facilities

The evaluation of transit facilities shall consider if:

- A project disrupts or conflicts with existing transit services or facilities; or
- A project conflicts with transit policies adopted by the City of Stockton, City of Lodi, or San Joaquin County for their respective facilities.

Bicycle and Pedestrian Facilities

The evaluation of bicycle and pedestrian facilities shall consider if:

- A project disrupts or conflicts with an existing or planned bicycle or pedestrian facility; or
- A project conflicts with policies related to bicycle and pedestrian activity adopted by adopted by the City of Stockton, City of Lodi, or San Joaquin County for their respective facilities.

Design Feature Hazards

The evaluation of impacts related to hazardous design features shall consider if a project creates an incompatible use that that introduce hazards to roadways.

Emergency Access

The evaluation of impacts related to emergency access shall consider if a project impedes or delays access for emergency responders during construction or operation.

Impact Evaluation

Consistency with Circulation System Programs

Significance Criterion a:	Would the proposed project conflict with a program, plan, ordinance or policy addressing the circulation system, including transit, roadway, bicycle and pedestrian facilities?

Impact TRA-1 IMPLEMENTATION OF THE PROPOSED PROJECT COULD CONFLICT WITH A PROGRAM, PLAN, ORDINANCE, OR POLICY ADDRESSING THE CIRCULATION SYSTEM DURING CONSTRUCTION. OPERATIONAL ACTIVITIES WOULD NOT CONFLICT WITH A PROGRAM, PLAN, ORDINANCE, OR POLICY ADDRESSING THE CIRCULATION SYSTEM. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT WITH THE IMPLEMENTATION OF MITIGATION.

The primary plans that address the circulation system in the project area are the RTP/SCS and the San Joaquin County and City of Stockton general plans. As discussed in Section 4.12.3, *Regulatory Framework*, there are no transportation policies in the City of Lodi General Plan relevant to the proposed project.

The RTP/SCS and the San Joaquin County and City of Stockton general plans address various modes of transportation, including roadway vehicle, transit, bicycle, and pedestrian, and include objectives and policies related to these modes of transportation. The roadways referenced above in Environmental Setting could be affected by construction worker commute trips, truck trips, and the presence of heavy equipment during construction and operation of the proposed project.

Construction

Construction of expanded and upgraded pump stations, diversions structures, and recharge facilities would not affect movement and circulation of roadway vehicles. Construction staging would occur onsite, outside of roadway ROWs at each project site, and construction vehicles traveling to and from these project sites would comply with state and local law related to truck routes. However, construction of proposed pipelines could affect roadways and the circulation system as pipelines could be installed in public roadway rights-of-way (ROWs) requiring lane and/or road closures, and construction disturbance could traverse under existing transit, bicycle, and/or pedestrian thoroughfares. The analysis of construction related impacts below for each Partner Agency is thus focused on impacts associated with proposed pipelines for MICUP.

North San Joaquin Water Conservation District

There are no pedestrian, bicycle, or transit facilities located within the NSJWCD project area. Therefore, construction related impacts are focused on potential conflicts with roadway facilities and potential conflicts with adopted roadway policies. Construction of up to approximately 189,000

linear feet of pipelines within the NSJWCD project area could create potential conflicts with roadway users when pipeline installation and construction staging occurs within public ROWs and/or causes temporary lane closures. Although construction vehicles would utilize designated truck routes when available, pipeline installation could also conflict with roadway users due to construction vehicles queuing within the public ROW waiting for entry to the construction sites, construction workers parking in non-designated parking areas, or construction debris on public streets.

Project construction would not conflict with the adopted RTP/SCS as the goals and policies contained therein are focused on the integration of transportation and land use planning to support sustainable growth, economic development, and environmental stewardship, and project construction would not affect regional land use. However, as described above, project construction could result in short-term circulation effects such as temporary alteration of the movement and circulation of roadway vehicles within the project area, which would conflict with Goal TM-1, Policy TM-1.1, Policy TM-1.2, Policy TM-1.9, Goal TM-3 and Policy TM-3.6 of the San Joaquin County General Plan. This would represent a potentially significant construction impact with respect to conflict with the San Joaquin County General Plan.

Construction impacts would be temporary in nature and following construction, all roadways would return to pre-construction conditions. Encroachment permits from Caltrans would also be required for construction impacts to facilities under its administration, such as SR-12. Nonetheless, Mitigation Measure TRA-1 would be required to reduce impacts related to a conflict with the San Joaquin County General Plan. Therefore, with respect to conflicts with circulation system policies, plan, or programs related to roadways, NSJWCD construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

Stockton East Water District

There are no pedestrian, bicycle, or transit facilities located within the SEWD project area. Therefore, construction related impacts are focused on potential conflicts with roadway facilities and potential conflicts with adopted roadway policies. Construction of up to approximately 95,000 linear feet of pipelines within the SEWD project area could create potential conflicts with roadway users when pipeline installation and construction staging occurs within public ROWs and/or causes temporary lane closures. Although construction vehicles would utilize designated truck routes when available, pipeline installation could also conflict with roadway users due to construction vehicles queuing within the public ROW waiting for entry to the construction sites, construction workers parking in non-designated parking areas, or construction debris on public streets.

Project construction would not conflict with the adopted RTP/SCS as the goals and policies contained therein are focused on the integration of transportation and land use planning to support sustainable growth, economic development, and environmental stewardship, and project construction would not affect regional land use. However, as described above, project construction could result in short-term circulation effects such as temporary alteration of the movement and circulation of roadway vehicles within the project area, which would conflict with Goal TM-1, Policy TM-1.1, Policy TM-1.2, Policy TM-1.9, Goal TM-3 and Policy TM-3.6 of the San Joaquin County General Plan as well as Policy TR-1.1 and Action TR-1.1A of the City of Stockton General Plan. This would represent a potentially significant construction impact with respect to conflict with the San Joaquin County General Plan.

Construction impacts would be temporary in nature and following construction, all roadways would return to pre-construction conditions. Encroachment permits from Caltrans would also be required for construction impacts to facilities under its administration, such as SR-88. Nonetheless, Mitigation Measure TRA-1 would be required to reduce impacts related to a conflict with the San Joaquin County General Plan. Therefore, with respect to conflicts with circulation system policies, plan, or programs related to roadways, SEWD construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

City of Stockton

The City of Stockton project area includes the DWTP. There are no pedestrian, bicycle, or transit facilities at or in the vicinity of the DWTP. However, construction of up to approximately 6,000 linear feet of pipelines within the City of Stockton project area to deliver water to new offsite recharge basins could create potential conflicts with roadway users when pipeline installation and construction staging occurs within public ROWs and/or causes temporary lane closures. Although construction vehicles would utilize designated truck routes when available, pipeline installation could also conflict with roadway users due to construction vehicles queuing within the public ROW waiting for entry to the construction sites, construction workers parking in non-designated parking areas, or construction debris on public streets.

Project construction would not conflict with the adopted RTP/SCS as the goals and policies contained therein are focused on the integration of transportation and land use planning to support sustainable growth, economic development, and environmental stewardship, and project construction would not affect regional land use. However, as described above, project construction could result in short-term circulation effects such as temporary alteration of the movement and circulation of roadway vehicles within the project area, which would conflict with Policy TR-1.1 of the City of Stockton General Plan and Goal TM-1, Policy TM-1.1, Policy TM-1.2, Policy TM-1.9, Goal TM-3 and Policy TM-3.6 of the San Joaquin County General Plan. This would represent a potentially significant construction impact with respect to conflicts with the City of Stockton General Plan and the San Joaquin County General Plan.

Construction impacts would be temporary in nature and following construction, all roadways would return to pre-construction conditions. Encroachment permits from Caltrans would also be required for construction impacts to facilities under its administration, such as US Highway 5. Nonetheless, Mitigation Measure TRA-1 would be required to reduce impacts related to a conflict with the City of Stockton General Plan and the San Joaquin County General Plan. Therefore, with respect to conflicts with circulation system policies, plan, or programs related to roadways, City of Stockton construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

Operation

Project operations would not directly or indirectly induce population growth that could generate additional roadway, transit, bicycle, or pedestrian trips thereby affecting the circulation system, as the proposed project would protect and help maintain sustainable groundwater supply rather than expand future water supplies (See Chapter 5.1, *Growth Inducing Impacts,* for additional discussion). Furthermore, the proposed project would not require daily employees for facilities operation. As such, project operation would not conflict with adopted RTP/SCS or general plans policies, plans, or programs regarding roadways, transit, bicycle, or pedestrian facilities. Specifically, project operation would not conflict with the adopted RTP/SCS because the proposed project is a water right project

rather than a land use project that could affect regional land use and transportation patterns, transit use, or local transportation policy implementation. Additionally, project operation would not conflict with the goals, policies, or actions of the San Joaquin County General Plan or the City of Stockton General Plan because the proposed project would not result in long-term circulation effects such as vehicle queues exceeding available storage, transit services or facilities disruption, or a hazardous condition that currently does not exist for pedestrians and bicyclists. Roadways would be returned to pre-construction conditions, and earthen berms would corral intentional flooding associated with operational Flood-MAR activities in order to not inundate nearby roadways and contain flooding within existing agricultural fields. Therefore, with respect to conflicts with circulation system programs related to roadway, pedestrian, bicycle, and transit facilities, no operational impacts would occur.

Mitigation Measures

TRA-1 Prepare and Implement Construction Transportation Management Plan

Prior to the start of construction, the Partner Agency implementing the project component that requires off-site staging, lane closures, or substantial hauling of cut and fill on a local street (i.e., not under Caltrans' jurisdiction) shall prepare a Construction Transportation Management Plan (TMP) and shall implement the plan during construction. The plan shall conform to the requirements of the agency with roadway jurisdiction and may include, but not be limited to, the following:

- **Construction Traffic Routes and Staging Locations**: The TMP shall identify construction staging site locations and potential road closures, alternate routes for detours, and planned truck routes for construction-related vehicle trips, including but not limited to haul trucks, material delivery trucks, and equipment delivery trucks. The TMP shall also identify alternative safe routes and policies to maintain safety along bicycle and pedestrian routes during construction. Construction vehicle routes shall avoid local residential streets and avoid peak morning and evening commute hours to the maximum extent practicable. Staging locations, alternate detour routes, and construction vehicle routes shall avoid other active construction projects within 0.25 mile of the project construction sites to the maximum extent practicable.
- **Coordination with Emergency Services**: The TMP shall include requirements to notify local emergency response providers, including relevant police and sheriff departments, ambulance services, and paramedic services at least one week prior to the start of work within public rights-of-way if lane and/or road closures are required. To the extent practicable, the duration of disruptions/closures to roadways and critical access points for emergency services shall be minimized.
- **Coordination with Active Transportation Facilities**: The TMP shall require coordination with owners/operators of any affected active transportation facilities to minimize the duration of disruptions/closures to bike paths, pedestrian trails, and adjacent access points.
- **Coordination with Transit Providers**: If the proposed project affects access to existing transit stops, the TMP shall also include temporary, alternative transit stops and directional signage, as determined in coordination with SJRTD, the City of Lodi, and SJRRC.
- **Coordination with Caltrans**: If the proposed project requires lane and/or road closures on State highways or State highway ramps, the TMP shall require coordination with Caltrans to ensure the TMP conforms with Caltrans' Transportation Management Plan Guidelines.

- **Coordination with Nearby Construction Sites**: The TMP shall identify all active construction projects within 0.25 mile of project construction sites and require coordination with the applicants and/or contractors of these projects during all phases of construction regarding the following:
  - All temporary lane and/or roadway closures shall be coordinated to limit overlap of roadway closures.
  - All major deliveries and haul truck trips shall be coordinated to limit the occurrence of simultaneous deliveries and haul truck trips.
  - Partner Agencies, their contractor(s), or their representative(s) shall meet on a regular basis with the applicant(s), contractor(s) or their representative(s) of active construction projects within 0.25 mile of the project construction sites during construction to address any outstanding issues related to construction vehicles.
- **Transportation Control and Safety**: The TMP shall provide for roadway vehicle control measures including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage of vehicular, bicycle, and pedestrian circulation and access by emergency responders.
- **Plan Approval**: The TMP shall be submitted to the respective jurisdiction's community development departments for review and approval.

Level of Significance

Less Than Significant with Mitigation

Vehicle Miles of Travel

Significance Criterion b:	Would the proposed project conflict or be inconsistent with *CEQA Guidelines* Section 15064.3, subdivision (b)?

Impact TRA-2 THE PROPOSED PROJECT WOULD MEET OPR'S SCREENING THRESHOLD FOR SMALL PROJECT AND, THUS, WOULD NOT CONFLICT OR BE INCONSISTENT WITH *CEQA GUIDELINES*, SECTION 15064.3(B). THIS IMPACT WOULD BE LESS THAN SIGNIFICANT.

CEQA Guidelines Section 15064.3(b) identifies criteria for evaluating transportation impacts. Specifically, the guidelines state that VMT exceeding an applicable threshold of significance may indicate a significant impact. According to CEQA Guidelines Section 15064.3(b)(3), a lead agency may include a qualitative analysis of construction and operational transportation. Currently, official measures and significance thresholds related to VMT have not yet been adopted by the Cities of Stockton or Lodi or San Joaquin County. However, as discussed below, the project is not expected to permanently affect VMT in the project area based on guidance provided by the Governor's Office of Planning and Research Technical Advisory on Evaluating Transportation Impacts in CEQA.

Construction

VMT generated project construction would be primarily associated with construction worker commutes, haul trips, truck deliveries, and detour routes. However, pursuant to *CEQA Guidelines* Section 15064.3(b), a quantitative analysis of VMT is typically limited to operational impacts. Therefore, construction-related VMT is evaluated qualitatively. Construction-related vehicle trips would be temporary in nature and would not result in long-term trip generation. While construction

activities may marginally generate VMT related to construction worker commutes, haul trips, truck deliveries, and detour route, construction would not substantially impact regional VMT. Construction impacts related to VMT would be less than significant.

Operation

Project operations would not directly or indirectly induce population growth that could generate VMT, as the proposed project would protect and help maintain sustainable groundwater supply rather than expand future water supplies (See Chapter 5.1, *Growth Inducing Impacts,* for additional discussion). Furthermore, the proposed project would not require daily employees for facilities operation. Rather, monitoring, maintenance, and inspection activities are anticipated to occur once per quarter, and current employees would be used for such activities. Therefore, MICUP operations can be presumed to result in a less-than-significant VMT impact based on OPR's Screening Threshold for Small Projects that generate fewer than 110 trips per day.

Mitigation Measures

No mitigation is required.

Level of Significance

Less Than Significant

Roadway Design Safety Hazards

Significance Criterion c:	Would the proposed project substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible use (e.g., farm equipment)?

Impact TRA-3 CONSTRUCTION OF THE PROPOSED PROJECT COULD CREATE INCOMPATIBLE USES THAT INTRODUCE HAZARDS TO ROADWAYS. OPERATIONAL ACTIVITIES WOULD NOT SUBSTANTIALLY INCREASE HAZARDS BECAUSE OF A GEOMETRIC DESIGN FEATURE OR INCOMPATIBLE USES. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT WITH MITIGATION.

Construction

Construction of expanded and upgraded pump stations, diversions structures, and recharge facilities would not affect roadway configurations such that design safety hazards could occur. However, construction of proposed pipelines could temporarily alter the configuration of intersections and roadways within the project area, as pipelines could be installed in public roadway ROWs requiring lane and/or road closures. Furthermore, equipment and materials needed for pipeline construction may be temporarily staged within the public ROW. These conditions could be considered incompatible uses that introduce hazards to roadways. The analysis of construction related impacts below for each Partner Agency is thus focused on impacts associated with proposed pipelines for MICUP.

North San Joaquin Water Conservation District

Construction of up to approximately 189,000 linear feet of pipelines within the NSJWCD project area could create incompatible uses that introduce hazards to roadways when pipeline installation and construction staging occurs within public ROWs and/or causes temporary lane closures. When

feasible, vacant areas near construction sites would be used to accommodate the storage of large construction vehicles and equipment, which would reduce incompatible uses within the NSJWCD project area. Furthermore, with implementation of Mitigation Measure TRA-1, construction traffic routes and staging locations would be identified, coordination with owners/operators of affected active transportation facilities would minimize conflicts between vehicle, bicycle, and/or pedestrian traffic, and roadway vehicle control measures would be implemented, including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage for vehicular, bicycle, and pedestrian travelers. Therefore, with respect to roadway design safety hazards, NSJWCD construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

Stockton East Water District

Construction of up to approximately 95,000 linear feet of pipelines within the SEWD project area could create incompatible uses that introduce hazards to roadways when pipeline installation and construction staging occurs within public ROWs and/or causes temporary lane closures. When feasible, vacant areas near construction sites would be used to accommodate the storage of large construction vehicles and equipment, which would reduce incompatible uses within the SEWD project area. Furthermore, with implementation of Mitigation Measure TRA-1, construction traffic routes and staging locations would be identified, coordination with owners/operators of affected active transportation facilities would minimize conflicts between vehicle, bicycle, and/or pedestrian traffic, and roadway vehicle control measures would be implemented, including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage for vehicular, bicycle, and pedestrian travelers. Therefore, with respect to roadway design safety hazards, SEWD construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

City of Stockton

Construction of up to approximately 6,000 linear feet of pipelines within the City of Stockton project area could create incompatible uses that introduce hazards to roadways when pipeline installation and construction staging occurs within public ROWs and/or causes temporary lane closures. When feasible, vacant areas near construction sites would be used to accommodate the storage of large construction vehicles and equipment, which would reduce incompatible uses within the City of Stockton project area. Furthermore, with implementation of Mitigation Measure TRA-1, construction traffic routes and staging locations would be identified, coordination with owners/operators of affected active transportation facilities would minimize conflicts between vehicle, bicycle, and/or pedestrian traffic, and roadway vehicle control measures would be implemented, including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage for vehicular, bicycle, and pedestrian travelers. Therefore, with respect to roadway design safety hazards, City of Stockton construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

Operation

Project operations would not directly or indirectly induce population growth that could require future development that could create incompatible uses or introduce hazards to roadways, as the proposed project would protect and help maintain sustainable groundwater supply rather than expand future water supplies (See Chapter 5.1, *Growth Inducing Impacts,* for additional discussion). Furthermore, the proposed project would not require daily employees for facilities operation.

Roadways would be returned to pre-construction conditions, and earthen berms would corral intentional flooding associated with operational Flood-MAR activities in order to not inundate nearby roadways and contain flooding within existing agricultural fields. Therefore, with respect to roadway design safety hazards, no operational impacts would occur.

Mitigation Measures

Mitigation Measure TRA-1 would apply.

Level of Significance

Less Than Significant with Mitigation

Emergency Vehicle Access

Significance Criterion d: Would the proposed project result in inadequate emergency access?

Impact TRA-4 **CONSTRUCTION OF THE PROPOSED PROJECT COULD IMPACT EMERGENCY SERVICES AND RESPONSE TIMES, AND COULD IMPEDE ACCESS TO EMERGENCY EVACUATION ROUTES. OPERATIONAL ACTIVITIES WOULD NOT AFFECT EMERGENCY VEHICLE ACCESS. THIS IMPACT WOULD BE LESS THAN SIGNIFICANT WITH THE IMPLEMENTATION OF MITIGATION.**

Construction

Construction of expanded and upgraded pump stations, diversions structures, and recharge facilities would not affect movement and circulation of roadway vehicles. Construction staging would occur onsite, outside of roadway ROWs at each project site, and construction vehicles traveling to and from these project sites would comply with state and local law related to truck routes. However, construction of proposed pipelines could have temporary effects on roadway vehicle flow and lane configurations at specific intersections and roadways due to potential lane and/or road closures, which would potentially impact emergency access and response times in the project area. Construction activities could also temporarily block access to some roadways that are currently used by emergency response vehicles or in emergency evacuations. The analysis of construction related impacts below for each Partner Agency is thus focused on impacts associated with proposed pipelines for MICUP.

North San Joaquin Water Conservation District

Construction of up to approximately 189,000 linear feet of pipelines within the NSJWCD project area could impact emergency access and response times in the project area. Furthermore, construction activities could temporarily block access to some routes that are currently used for emergency evacuations with the Lockeford Evacuation Zone and Beckman Road Evacuation Zone. However, with implementation of Mitigation Measure TRA-1, construction traffic routes and staging locations would be identified, coordination with emergency service providers would minimize disruptions/closures to roadways and critical access points for emergency services, and roadway vehicle control measures would be implemented, including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage. Therefore, with respect to emergency vehicle access, NSJWCD construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

Stockton East Water District

Construction of up to approximately 95,000 linear feet of pipelines within the SEWD project area could impact emergency access and response times in the project area. Furthermore, construction activities could temporarily block access to some routes that are currently used for emergency evacuations within the Linden Evacuation Zone. However, with implementation of Mitigation Measure TRA-1, construction traffic routes and staging locations would be identified, coordination with emergency service providers would minimize disruptions/closures to roadways and critical access points for emergency services, and roadway vehicle control measures would be implemented, including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage. Therefore, with respect to emergency vehicle access, SEWD construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

City of Stockton

Construction of up to approximately 6,000 linear feet of pipelines within the City of Stockton project area could impact emergency access and response times in the project area. Furthermore, construction activities could temporarily block access to some routes that are currently used for emergency evacuations within the Bear Creek Evacuation Zone. However, with implementation of Mitigation Measure TRA-1, construction traffic routes and staging locations would be identified, coordination with emergency service providers would minimize disruptions/closures to roadways and critical access points for emergency services, and roadway vehicle control measures would be implemented, including flag persons, warning signs, lights, barricades, cones, and/or detour routes to provide safe passage. Therefore, with respect to emergency vehicle access, City of Stockton construction impacts associated with pipeline construction or improvements would be less than significant with mitigation.

Operation

Project operations would not directly or indirectly induce population growth that could generate additional roadway, transit, bicycle, or pedestrian trips thereby affecting emergency vehicle access, as the proposed project would protect and help maintain sustainable groundwater supply rather than expand future water supplies (See Chapter 5.1, *Growth Inducing Impacts,* for additional discussion). Furthermore, the proposed project would not require daily employees for facilities operation. Roadways would be returned to pre-construction conditions, and earthen berms would corral intentional flooding associated with operational Flood-MAR activities in order to not inundate nearby roadways and contain flooding within existing agricultural fields. Therefore, with respect to emergency vehicle access, no operational impacts would occur.

Mitigation Measures

Mitigation Measure TRA-1 would apply.

Level of Significance

Less Than Significant with Mitigation

4.12.5 Cumulative Impacts

The geographic scope of potential cumulative transportation impacts is the project area, which includes unincorporated San Joaquin County and the Cities of Stockton and Lodi. This geographic scope is appropriate for evaluating transportation impacts, because it includes the regional and local transportation network that would primarily be impacted by the proposed project and cumulative development projects. It is possible that project construction would occur at the same time as some of the cumulative infrastructure and development projects considered part of the cumulative analysis. In addition to the proposed project, the cumulative analysis includes the projects and plans listed in Table 4-1 (refer to Chapter 4.0, *Environmental Impact Analysis*).

Cumulative Construction Impacts

Circulation, Roadway Design Safety, and Emergency Access

Overlapping cumulative construction activities, simultaneous lane/road closures, and simultaneous staging of construction equipment and materials in public ROW could result in cumulative construction impacts related to transportation circulation patterns in the project area and/or emergency access. Furthermore, cumulative construction activities could increase construction vehicles traveling on the same roadways within the project area. As such, cumulative impacts related to potential conflicts with roadway users, incompatible uses that introduce hazards, emergency access and response times, and access emergency evacuation routes would be potentially significant.

However, the proposed project would be required to implement Mitigation Measure TRA-1, which requires coordination with other active construction projects within 0.25 mile of project construction sites to minimize simultaneous lane and/or road closures, major deliveries, and haul truck trips. Mitigation Measure TRA-1 also requires designating alternate detour routes and construction transportation routes that avoid these projects to the maximum extent practicable. Therefore, with mitigation incorporated, the proposed project would not have a cumulatively considerable contribution to the significant cumulative impact related to construction transportation circulation roadway design safety, and emergency access.

Cumulative Operational Impacts

Circulation and Vehicle Miles Traveled

Operations related to buildout of cumulative development within the project area, including the projects assumed under buildout of the various jurisdictions' general plans across the East San Joaquin Groundwater Subbasin, would increase cumulative operational roadway vehicle volumes on local roadways. The cumulative increase in roadway vehicle volumes would have the potential to increase cumulative operational VMT in the project area. As such, cumulative impacts related to operational transportation circulation and VMT across the East San Joaquin Groundwater Subbasin would be potentially significant.

However, project-related VMT related to infrastructure operation and maintenance would be negligible in comparison to the high volumes of VMT generated by the types of residential, commercial, and industrial projects assumed under buildout of the various jurisdictions' general plans across the East San Joaquin Groundwater Subbasin. Furthermore, OPR provides the following guidance regarding cumulative impacts analysis and VMT:

> When using an absolute VMT metric, i.e., total VMT (as recommended below for retail and transportation projects), analyzing the combined impacts for a cumulative impacts analysis may be appropriate. However, metrics such as VMT per capita or VMT per employee, i.e., metrics framed in terms of efficiency (as recommended below for use on residential and office projects), cannot be summed because they employ a denominator. A project that falls below an efficiency-based threshold that is aligned with long-term environmental goals and relevant plans would have no cumulative impact distinct from the project impact. Accordingly, a finding of a less-than-significant project impact would imply a less than significant cumulative impact, and vice versa.

Therefore, the proposed project would not have a cumulatively considerable contribution to the significant cumulative impact related to operational transportation circulation and VMT.

Overall Level of Cumulative Significance

Less Than Significant with Mitigation

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4.13 Effects Found Not to Be Significant

Section 15128 of the *CEQA Guidelines* requires that an EIR briefly describe possible environmental effects that are determined not to be significant. This section discusses the environmental topics that are determined to not result in potentially significant environmental effects. The discussion of such environmental topics relies on the respective checklist questions listed in *CEQA Guidelines* Appendix G that are shown in italic text below.

4.13.1 Forestry Resources

c. Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)); timberland (as defined by Public Resources Code Section 4526); or timberland zoned Timberland Production (as defined by Government Code Section 51104(g))?

d. Would the project result in the loss of forest land or conversion of forest land to non-forest use?

e. Would the project involve other changes in the existing environment which, due to their location or nature, could result in conversion of forest land to non-forest use?

Construction and Operation

The MICUP project area does not include any forest land, timberland, or timberland production zones.[1] Therefore, no construction or operational impact would occur, and MICUP would not conflict with zoning for, or cause rezoning of, forest land or timberland zoned as Timberland Production. MICUP would not result in the loss of forest land or conversion of forest land to non-forest use. There would be no impact.

4.13.2 Population and Housing

a. Would the project induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

Construction

Impacts related to inducing substantial unplanned population growth in an area, either directly or indirectly, are limited to operational impacts. No respective construction impacts would occur from infrastructure facilitated by MICUP, as construction activities would be assumed to be implemented

[1] San Joaquin, County of. 2024. San Joaquin County District Viewer. https://sjmap.org/DistrictViewer/ (accessed December 2024); Lodi, City of. 2024. GIS External Property Viewer. https://maps.lodi.gov/Html5Viewer/index.html?viewer=GIS_External_Viewer.Lodi_Maps_Internal_Property_Viewer (accessed December 2024); Stockton, City of. 2023. City of Stockton Zoning District Map. https://cms3.revize.com/revize/stockton/Documents/Services/Information%20Technology/Maps%20&%20GIS%20Data/Printable%20Maps/ZoningDistrictMap.pdf (accessed December 2024); Manteca, City of. 2019. City of Manteca Zoning. https://data-manteca.opendata.arcgis.com/documents/1535a72480044c63b9f976b13ad10f3c/explore (accessed December 2024) ; Stanislaus, County of. 2024. Public Inquiry Map. https://stancounty-gis.maps.arcgis.com/apps/webappviewer/index.html?id=cde022e7ffe845f690a6a8e19322ceac (accessed December 2024) ; Calaveras, County of. 2024. Calaveras County Public Viewer. https://gisportal.calaverascounty.gov/portal/apps/webappviewer/index.html?id=6e2681937019448b8f4e761b22d11a6e (accessed December 2024); California Department of Conservation. 2024a. California Important Farmland Finder. https://maps.conservation.ca.gov/DLRP/CIFF/ (accessed December 2024; California Department of Conservation. 2024b. California Williamson Act Enrollment Finder. https://maps.conservation.ca.gov/dlrp/WilliamsonAct/App/index.html (accessed December 2024).

using the local workforce. Using the local workforce, there would be no new housing required to accommodate employees related to MICUP construction, and no population growth would occur as a result. Therefore, there would be no impact related to population growth as a result of MICUP construction.

Operation

The operation of the MICUP project would involve the diversion, storage, and distribution of water through upgraded and newly constructed infrastructure as well as ongoing monitoring and maintenance of these facilities. Each Partner Agency involved in MICUP would manage specific operational components and responsibilities as described in Chapter 3.0, *Project Description*.

North San Joaquin Water Conservation District and Stockton East Water District

Operational impacts would primarily involve increased monitoring and maintenance efforts for recharge ponds, pipelines, pumps, pump stations, and sediment removal from recharge basins and canals, as well as groundwater injection management through ASR wells. Operation of MICUP components, managed by NSJWCD or SEWD, would not induce unplanned population growth, as the project would not involve or support new habitable development or create new employment opportunities requiring an influx of residents. MICUP expansion of water diversion and storage infrastructure would result in recharging the underlying groundwater basin that supports existing agricultural irrigation within the Place of Use, and providing surface water supplies for direct consumption to existing agricultural and municipal uses. The project would enhance existing water infrastructure to improve efficiency and performance without extending infrastructure into previously undeveloped areas that could encourage population growth. Additionally, no new housing or commercial developments would be associated with MICUP project components, and staffing needs for monitoring and maintenance would be met by the existing local workforce. Therefore, there would be no direct or indirect operational NSJWCD or SEWD impacts related to inducing unplanned population growth.

City of Stockton

Operational activities would include regular inspections and maintenance of pipelines, dry wells, and recharge basins, as well as sediment removal and water quality monitoring to ensure compliance with environmental regulations. Operation of City of Stockton project components would not induce unplanned population growth, as it would not entail new habitable development. Furthermore, MICUP expansion of water diversion and storage infrastructure would be focused on recharging the underlying groundwater basin that provides water supply for existing municipal demands and agricultural irrigation within the Place of Use and would not result in new population growth in the region. MICUP would focus on enhancing existing water infrastructure to improve efficiency and performance and would not create new development opportunities. No new housing or commercial developments would be associated with City of Stockton project components, and the improvements would not extend infrastructure into previously undeveloped areas that could encourage population growth. Staffing of operational needs would be sourced from the local workforce and would not require new housing or services. Operation and maintenance of MICUP facilities would not require additional staff. Therefore, there would be no direct or indirect operational City of Stockton impacts related to inducing unplanned population growth.

b. Would the project displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

Construction and Operation

The MICUP project would not include construction or operational activities that could displace existing people or housing. The MICUP project would construct and operate new water infrastructure within agricultural areas, along roadway rights-of-way, or on vacant lands. No construction of replacement housing would be necessary. Therefore, the MICUP project would result in no construction or operational impact related to the displacement of people or housing.

4.13.3 Public Services

a. Would the project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

- *Fire protection?*
- *Police protection?*
- *Schools?*
- *Parks?*
- *Other public facilities?*

Construction

Proposed MICUP project components would benefit groundwater management and be confined to designated project areas. Construction of the MICUP project components would not result in additional demands on public services, nor would they interfere with service ratios, response times, or performance objectives for fire protection, police protection, schools, parks, or other public facilities. Furthermore, the proposed MICUP project would not involve the construction of new or expanded public service facilities such as fire or police stations, schools, libraries, or parks. Therefore, no physical construction impacts would occur related to the potential need for new or expanded public services and facilities.

Operation

Operation of MICUP project component facilities would require regular monitoring and inspections, maintenance of pump stations, sediment removal from recharge basins, and management of groundwater injection through ASR wells. These operational activities would not generate additional demand on public services. Activities such as inspections, maintenance, sediment removal, and water quality monitoring are routine and specific to the project, with no impact on the capacity or performance of fire protection, police protection, schools, parks, or other public facilities. Furthermore, operation of MICUP project components would not involve habitable uses (i.e., residences or commercial buildings), and, as such, would not result in the need for new or expanded public facilities related to fire, police, school, park, or other public services. Therefore, no physical operational impacts would occur related to the potential need for new or expanded public services and facilities.

4.13.4 Mineral Resources

1. *Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?*
2. *Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan?*

Construction and Operation

North San Joaquin Water Conservation District and Stockton East Water District

The project areas for the NSJWCD and SEWD improvements are not located within or adjacent to known mineral resource zones identified in the San Joaquin County General Plan, including those in Tracy, Lathrop, and Manteca.[2] As a result, construction and operation of MICUP project components would not impact the availability of known mineral resources of value to the region or the residents of the state. Furthermore, the project areas are not designated as locally important mineral resource recovery sites in a local general plan, specific plan, or other land use plan. As such, MICUP construction and operation would not result in the loss of availability of mineral resources or mineral resource recovery sites. Therefore, no impact related to mineral resources would occur.

City of Stockton

The City of Stockton is classified as a Mineral Resource Zone 1 (MRZ-1), indicating that there are no significant mineral resources present, according to the City of Stockton General Plan EIR.[3] As such, there is no potential for the MICUP project to impact the availability of known mineral resources or interfere with any locally important mineral resource recovery sites. As such, MICUP construction and operation would not result in the loss of availability of mineral resources or mineral resource recovery sites. Therefore, no impact related to mineral resources would occur.

4.13.5 Recreation

a. *Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?*

Construction

Impacts related to the potential increase in the use of existing parks or other recreational facilities are limited to operational impacts. No respective MICUP construction impacts related to increased recreational facility use would occur from construction of project components associated with MICUP.

[2] San Joaquin County, 2024. San Joaquin County District Viewer. https://sjmap.org/DistrictViewer/ (accessed December 2024).
[3] Stockton, City of. 2018. Envision Stockton 2040 General Plan and Utility Master Plan Supplements Draft EIR. June 2018. https://cms3.revize.com/revize/stockton/Documents/Business/Planning%20&%20Engineering/General%20Plan/EnvisionStockton2040GP_DEIR.pdf (accessed January 2025).

Operation

As described above in Section 4.14.2, Population and Housing, the proposed project would not induce growth of population or housing. Therefore, operation of the proposed project would not result in an increase in the use of existing parks or other recreational facilities relative to existing conditions. As such, there would be no deterioration of existing recreational facilities due to operation of the MICUP project components. There would be no operational impacts related to the deterioration of parks and recreational facilities.

b. Does the project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?

Construction

MICUP construction would not include recreational facilities. Therefore, MICUP would result in no physical construction impacts related to the construction or expansion of recreational facilities.

Operation

The MICUP Place of Use includes recreational facilities along the Mokelumne River such as Camanche Reservoir, Pardee Reservoir, Lodi Lake, Stillman Magee Park, and Mokelumne River Day Use Area. MICUP operations would not affect reservoir operations or reservoir levels and thus would not impact recreational activities at the reservoirs, like fishing, swimming, and water sports. The proposed project would only influence downstream river flows from Camanche and Pardee Reservoirs. Increased diversions from the lower Mokeumne River under MICUP operations would occur only during high-flow periods and would not affect recreational facilities along the river or require expansion of recreational facilities. Therefore, MICUP would result in no physical operational impacts related to the construction or expansion of recreational facilities.

4.13.6 Utilities and Service Systems

a. Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

The proposed MICUP components consist of new and expanded water facilities. The potential environmental impacts of constructing and operating these facilities are analyzed throughout this EIR and are not discussed further here. The following analysis focuses on the construction or relocation of wastewater treatment, storm water drainage and telecommunications facilities.

Construction

MICUP would not include new infrastructure or facilities related to wastewater, stormwater, or telecommunications; therefore, no impacts associated with constructing or operating wastewater, stormwater, or telecommunications facilities would occur. However, proposed MICUP components may require the relocation of existing wastewater, stormwater or telecommunications facilities during construction, or to avoid conflicts with proposed facilities. Potential impacts from the relocation of existing underground utilities, where necessary, would be associated with ground-disturbing activities and are captured in previous analysis of the ground-disturbing activities associated with new facility construction. The relocation of existing utilities would not introduce new environmental impacts or disruptions to utilities and service systems. In addition, the locations

of existing underground utilities would be identified prior to initiation of excavation activities, and such facilities would be avoided during construction activities. Therefore, potential MICUP construction impacts related to relocation of utility facilities and infrastructure would be less than significant.

Operation

Operational use and maintenance of the MICUP water facilities would not require or result in the relocation or construction of new or expanded wastewater treatment, stormwater drainage, or telecommunications facilities. Any facility construction or relocation required under the MICUP would be conducted during construction of the proposed project. Therefore, no MICUP operational impacts related to relocation of utility facilities or infrastructure would occur.

b. Have insufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry, and multiple dry years?

Construction

Construction of the proposed pump station improvements, replacement underground pipelines, and new recharge facilities would involve ground-disturbing activities that may require a temporary water supply for dust suppression, pressure testing, and cleaning facilities. Construction-related BMPs implemented under project component-specific SWPPPs would include measures to practice water conservation and avoid excess runoff of applied water, consistent with standard BMPs for construction. In addition, temporary water supply, if needed, would be provided from existing Partner Agency and the construction contractor. Therefore, MICUP construction impacts related to water supply availability would be less than significant.

Operation

The proposed project would be implemented within the Place of Use for Water Right Application 29835 (A029835), which is currently pending before the SWRCB. This EIR is being prepared as part of the water right application process. Unless and until the water right application is approved by the SWRCB, the proposed water supply for MICUP is not yet available. MICUP would only be implemented if the water right permit is issued.

MICUP does not propose any new or expanded pumping or use of groundwater from the Subbasin. MICUP would support existing demand for agricultural irrigation on currently cultivated lands that otherwise are supplied by groundwater pumping and would support existing municipal and industrial demands of the City of Stockon. In addition, the proposed MICUP diversions would be junior to all existing water rights on the Mokelumne River, with existing water right holders including WID, NSJWCD, Amador County, Calaveras County, EBMUD, and riparian and pre-1914 appropriative rights along the river. Maintenance activities associated with the operation of the new or expanded project facilities would not introduce a new water demand. Therefore, no MICUP operational impacts related to water supply availability would occur.

c. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

Construction

During construction of the proposed project components, wastewater collection and disposal would be required for on-site construction workers. When permanent sanitary facilities are not available near a project component construction site, temporary sanitary facilities would be provided on site by a third-party contractor for construction workers' use. The temporary facilities would be regularly serviced by the third-party contractor providing the facilities. No wastewater would be treated or disposed of onsite. Therefore, MICUP construction impacts related to wastewater treatment capacity would be less than significant.

Operation

There would be no wastewater generation or wastewater treatment demand as part of MICUP operations. In addition, maintenance of proposed project components would be conducted by existing staff of the Partner Agency responsible for the respective components. Operation and maintenance of the water diversion, storage, and infiltration activities included under the proposed project components would not require additional staff. As such, wastewater generation rates at the existing facility locations would not change during operations. Therefore, no MICUP operational impact associated with wastewater treatment capacity for any of the three Partner Agencies would occur.

d. Generate solid waste in excess of State or local standards or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

e. Comply with federal, state, and local management and reduction statutes and regulations related to solid waste?

Construction

North San Joaquin Water Conservation District

Projects within NSJWCD's jurisdiction would involve replacing existing facilities (North System Pump Station and CalFed Pump Station), upgrading or expanding existing facilities (South System Pump Station), and constructing new facilities (pipeline segments and ASR wells). Facility replacement would require demolition of existing facilities, generating construction waste which would require disposal. Solid waste would be disposed of at nearby landfills including the North County Landfill. As of 2019, the North County Landfill had a remaining disposal capacity of approximately 35,400,000 cubic yards. The North County Landfill and other landfills in the project area have sufficient capacity for construction and demolition debris generated by NSJWCD MICUP components. The proposed projects would not generate solid waste that would exceed the capacity of local infrastructure.

In accordance with the Integrated Waste Management Act (AB 939), presented in Section 4.13.3, *Regulatory Framework*, under "State Regulations," 50 percent of solid waste generated by proposed projects would be diverted from landfills. Construction and demolition waste would be recycled and diverted from landfills to the extent feasible. In addition, project activities are subject to the *Construction, Demolition, and Landscaping Debris Recycling and Diversion Ordinance of San Joaquin County*, codified in San Joaquin County Ordinance Code Title 5, *Health and Sanitation*, Division 2,

Solid Waste Collection and Disposal. Landscape debris including inert soil, vegetative, and excavation materials shall be diverted at a rate of 90 percent, and Diversion Reports shall be submitted to the San Joaquin County Department of Public Works for verification of such activities.

The proposed projects would not impair the attainment of solid waste reduction goals and would comply with statutes and regulations related to solid waste. Therefore, NSJWCD construction impacts related to landfill capacity or solid waste reduction regulations consistency would be less than significant.

Stockton East Water District

New underground pipelines would be constructed between groundwater pumps and adjacent parcels. In addition, the existing Beckman ASR Well would be upgraded with a new well pump, new piping, and new valving. Additional ASR wells may also be constructed adjacent to the Mokelumne Aqueduct. Construction may generate solid waste, such as excavated soil and demolition debris. Solid waste would be disposed of at nearby landfills, including the Foothill Sanitary Landfill. As of 2019, the Foothill Sanitary Landfill had a remaining disposal capacity of approximately 125,000,000 cubic yards. The Foothill Sanitary Landfill and other landfills in the project area have sufficient capacity for construction and demolition debris generated by SEWD MICUP components. Proposed projects would not generate solid waste that would exceed the capacity of local infrastructure.

In accordance with the Integrated Waste Management Act (AB 939), construction and demolition waste would be diverted from landfills to the extent feasible. SEWD projects are also subject to the *Construction, Demolition, and Landscaping Debris Recycling and Diversion Ordinance of San Joaquin County*, discussed above for projects within NSJWCD's jurisdiction. The proposed project components would not impair the attainment of solid waste reduction goals and would comply with statutes and regulations related to solid waste. Therefore, SEWD construction impacts related to landfill capacity or solid waste reduction regulations consistency would be less than significant.

City of Stockton

The City of Stockton's MICUP project components would involve the construction of new recharge basins, dry wells, and pipelines. Construction may generate solid waste, such as excavated soil and demolition debris. The North County Landfill and Foothill Sanitary Landfill have sufficient capacity for construction and demolition debris generated by City MICUP components. Therefore, the City of Stockton project component would not generate solid waste that would exceed the capacity of local infrastructure.

In addition, the City of Stockton project components would be conducted in accordance with applicable solid waste regulations, including the Integrated Waste Management Act (AB 939), which requires diversion of 50 percent of construction and demolition debris from landfills, the *Construction, Demolition, and Landscaping Debris Recycling and Diversion Ordinance of San Joaquin County*, which requires diversion of 90 percent of excavation materials, and the City of Stockton General Plan, which contains goals, policies, and actions to decrease solid waste generation and increase recycling of construction debris. The proposed project would not impair the attainment of solid waste reduction goals and would comply with statutes and regulations related to solid waste. Therefore, City of Stockton construction impacts related to landfill capacity or solid waste reduction regulations consistency would be less than significant.

Operation

There would not be solid waste generation or new sources of solid waste as part of MICUP operations by any of the three Partner Agency areas. Maintenance of proposed project components would be conducted by existing staff of the Partner Agency responsible for the respective component. Therefore, no MICUP operational impact associated with landfill capacity or solid waste reduction regulations consistency would occur.

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5 Growth and Irreversible Effects

This chapter discusses growth-inducing impacts and irreversible environmental impacts that would result from construction or operation of the proposed project.

5.1 Growth Inducing Impacts

There are two types of growth-inducing impacts that a project may have: direct and indirect. To assess the potential for growth-inducing impacts, the proposed project's characteristics that may encourage and facilitate activities that individually or cumulatively may affect the environment must be evaluated. CEQA Guidelines Section 15126.2(e) requires a discussion of a proposed project's potential to foster economic or population growth, including ways in which a project could remove an obstacle to growth. Growth does not necessarily create significant physical changes to the environment. However, depending upon the type, magnitude, and location of growth, it can result in significant adverse environmental effects. Direct growth-inducing impacts occur when the implementation of a project imposes new burdens on a community by directly inducing population growth or by leading to the construction of additional developments in the same area. Also included in this category are projects that remove physical obstacles to population growth (such as a new road into an undeveloped area or a wastewater treatment plant with excess capacity that could allow additional development in the service area). The proposed project would not entail housing or employment-generating uses and would not alter the planned location, distribution, or growth rate of the population.

Construction of infrastructure can facilitate and serve growth. Projects that physically remove obstacles to growth, or projects that indirectly induce growth, may also provide a catalyst for future unrelated development in an area such as a new residential community that requires additional public services to support residents. While the proposed project would entail extensions of water infrastructure, the potential additional water supply obtained via the proposed project would be limited to direct irrigation supply for existing agricultural demands (in lieu of pumping groundwater) and groundwater replenishment per the requirements of the ESJ GSP to support sustainable groundwater levels and pumping to serve existing agricultural and municipal uses.

5.1.1 Population and Employment Growth

As discussed in Section 4.14, *Effects Found Not to be Significant*, the proposed project would not result in the construction of new residences or employment-generating services. Specifically, the project would not create new employment opportunities requiring an influx of residents, as construction and operational activities would utilize the existing workforce. The proposed project would improve water supply availability and reliability to accommodate the existing San Joaquin County demand for agricultural irrigation, municipal use, and groundwater replenishment. The potential additional water supply obtained via the proposed project would be used for direct irrigation by existing agricultural demands (in lieu of pumping groundwater) and groundwater replenishment to support sustainable groundwater levels and pumping to serve existing agricultural and municipal uses. Without MICUP, groundwater demand reduction efforts could be imposed pursuant to the GSP if groundwater sustainability criteria cannot be achieved. For the reasons

discussed above, implementation of the proposed project would not lead to direct or indirect growth impacts beyond what is anticipated and planned for by San Joaquin County.

5.1.2 Removal of Obstacles to Growth

As discussed under Impact AG-2 and AG-3 in Section 4.2, *Agriculture and Land Use*, the proposed project components would be operated within the footprint of existing facilities and rights-of-way or within existing agricultural areas. MICUP would not introduce land uses inconsistent with the general character of the regional setting. By developing a supplemental water supply and improving groundwater sustainability, MICUP would directly support plans and policies intended to preserve existing agricultural and municipal uses in San Joaquin County.

In addition, as discussed in Section 4.14, *Effects Found Not to Be Significant,* because MICUP does not extend services into undeveloped areas, propose new housing or businesses, or create infrastructure that could attract additional population growth, it would not induce substantial unplanned population growth, either directly or indirectly. As such, MICUP operations would not conflict with land use policies of the SJCOG 2022 RTP/SCS Plan.

Therefore, because proposed project components would utilize and extend existing facilities, and new infrastructure would not be extended to serve new municipal or agricultural development, the proposed project would not remove obstacles to unplanned growth within the MICUP Place of Use.

5.2 Irreversible Environmental Effects

CEQA Guidelines Section 15126(c) requires that an EIR analyze the extent to which a project's primary and secondary effects would affect the environment and commit nonrenewable resources to uses that future generations would not be able to reverse. "Significant irreversible environmental changes" include the use of nonrenewable natural resources during the initial and continued phases of the project, should this use result in the unavailability of these resources in the future. Also, irreversible damage can result from environmental accidents associated with the project. Irretrievable commitments of these resources are required to be evaluated in an EIR to ensure that such consumption is justified.

CEQA also requires decision-makers to balance the benefits of a proposed plan or project against its unavoidable environmental risks in determining whether to approve a plan or project. This section addresses the use of non-renewable resources and irreversible impacts associated with the construction of proposed project components and implementation of the project.

Construction activity associated with planned development accommodated under the proposed project would include the use of construction materials and energy, some of which would be non-renewable resources. Consumption of these resources would occur with any development in the Central Valley region and are not unique to the MICUP Place of Use or the proposed project. Additional operation and maintenance activities associated with the operation of proposed project components would irreversibly increase local demand for non-renewable energy resources such as petroleum and natural gas. No new population and housing growth is estimated to result from implementation of the proposed project. In addition, the proposed project is not anticipated to significantly affect local or regional energy supplies; project impacts related to energy consumption are further evaluated in Section 4.7, *Greenhouse Gas Emissions and Energy*.

As discussed in Section 4.14, *Effects Found Not to Be Significant*, and above in Section 5.1, *Growth Inducing Impacts*, the proposed project would not extend services to development, propose new housing or businesses, or create infrastructure that could attract additional population growth. As such, the proposed project would not induce substantial unplanned population growth, either directly or indirectly, that would result in the commitment of nonrenewable resources needed to support unplanned population growth.

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6 Alternatives Analysis

6.1 Introduction

According to the California Environmental Quality Act (CEQA), an Environmental Impact Report (EIR) must describe a reasonable range of alternatives to a proposed project that would feasibly attain most of the basic project objectives and would avoid or substantially lessen any of the proposed project's significant environmental effects. Section 15126.6(f) of the CEQA Guidelines provides direction on the required alternatives analysis:

> The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. The alternatives shall be limited to ones that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only the ones that the lead agency determines could feasibly attain most of the basic objectives of the project. The range of feasible alternatives shall be selected and discussed in a manner to foster meaningful public participation and informed decision making.

The alternatives may include a different type of project, modification of the project, or suitable alternative project sites. An EIR need not consider every conceivable alternative to a project. Rather, the alternatives must be limited to ones that meet the project objectives, are feasible, and would avoid or substantially lessen at least one of the significant environmental effects of the project. "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors. Section 15126.6(b) of the CEQA Guidelines states an EIR:

> …must identify ways to mitigate or avoid the significant effects that a project may have on the environment, the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

Section 15126.6(d) of the CEQA Guidelines provides further guidance on the extent of the alternatives analysis required:

> The EIR shall include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the proposed project. A matrix displaying the major characteristics and significant environmental effects of each alternative may be used to summarize the comparison. If an alternative would cause one or more significant effects in addition to those that would be caused by the project as proposed, the significant effects of the alternative shall be discussed, but in less detail than the significant effects of the project as proposed.

The EIR must briefly describe the rationale for selection and rejection of alternatives and the information the lead agency relied on when making the selection. Per CEQA Guidelines Section 15126.6(c), the EIR also should identify any alternatives considered but rejected as infeasible by the lead agency during the scoping process and briefly explain the reasons for the exclusion.

Alternatives may be eliminated from detailed consideration in the EIR if they fail to meet most of the project objectives, are infeasible, or do not avoid any significant environmental effects.

Section 15126.6(e)(1) of the CEQA Guidelines also requires that the No Project Alternative must be addressed in this analysis. The purpose of evaluating the No Project Alternative is to allow decision-makers to compare the potential consequences of the proposed project with the consequences that would occur without implementation of the proposed project.

Finally, an EIR must identify the environmentally superior alternative. The No Project Alternative may be the environmentally superior alternative to the proposed project based on the minimization or avoidance of physical environmental impacts. CEQA Guidelines Section 15126.6(e)(2) requires that, if the environmentally superior alternative is the No Project Alternative, the EIR shall identify an environmentally superior alternative among the other alternatives.

6.2 MICUP Objectives

As explained above, based on the CEQA Guidelines, several factors need to be considered in determining the range of alternatives to be analyzed in this Draft EIR and the level of analytical detail that should be provided for each alternative. Those factors include the ability of the alternatives to meet the objectives of the proposed project. As stated in Chapter 3 Project Description of this Draft EIR, the objectives of the proposed project are as follows:

- Develop a supplemental Mokelumne River surface water supply to meet existing demands;
- Use surface water and groundwater conjunctively to respond to drought and climate change;
- Increase groundwater levels in the Eastern San Joaquin Groundwater Subbasin;
- Achieve integrated water supply and environmental benefits in the lower Mokelumne watershed.

6.3 Environmental Impacts of the Proposed Project

In addition to considering project objectives, based on CEQA Guidelines, the range of alternatives to be analyzed in this Draft EIR considers the nature of the significant impacts of the proposed project and the ability of alternatives to avoid or lessen the significant impacts associated with the proposed project.

Chapter 4 of this Draft EIR identifies the potential impacts associated with implementation of the proposed project for each of the environmental topics discussed in Sections 4.1 through 4.13. The results of the analysis indicate that the proposed project would result in the following significant and unavoidable impacts:

- **Agriculture:** conversion of important farmland to non-agricultural use
- **Cultural Resources:** construction-related disturbance to archaeological and historical resources
- **Noise:** construction-related noise associated with nighttime well drilling in excess of standards at sensitive receptors

Mitigation measures (MMs) were identified for these above-mentioned impacts; however, the identified mitigation may not reduce the impacts to less-than-significant levels. Thus, even though the proposed project attempts to mitigate its impacts to the greatest extent feasible as required by

CEQA, the mitigation may not be technically feasible, sufficient, or available to reduce impacts from significant and unavoidable to less-than-significant levels.

A summary of the significance of the impacts for each environmental topic analyzed in Chapter 4 is presented below in Table 6-1. The significant impacts of the proposed project and the mitigation measures to be incorporated to reduce the potential significant impacts to a less than significant level are provided in Table ES-1 in the Executive Summary of this Draft EIR.

Table 6-1 Summary of Proposed Project Impacts

Issue	Proposed Project Impact Classification
Aesthetics	LTS
Agriculture & Land Use Planning	SU
Air Quality	LTSM
Biological Resources	LTSM
Cultural and Tribal Cultural Resources	SU
Geology and Soils	LTSM
Greenhouse Gas Emissions and Energy	LTS
Hazards, Hazardous Materials, and Wildfire	LTSM
Hydrology and Water Quality – Surface Water	LTSM
Hydrology and Water Quality – Groundwater	LTSM
Noise	SU
Transportation	LTSM

Notes: LTS = Less than Significant; LTSM = Less than Significant with Mitigation; SU = Significant and Unavoidable

6.4 Alternatives Considered but Rejected

The following summarizes alternatives considered, but ultimately rejected from further consideration, because they would not meet most of the proposed project objectives, would not substantially reduce impacts compared to the proposed project, and/or were determined to be infeasible. Per CEQA Guidelines Section 15126.6(f)(1), factors that can be taken into consideration when determining feasibility include, but are not limited to, site suitability, economic viability, availability of infrastructure, general plan consistency, jurisdictional boundaries, or site access.

6.4.1 Alternatives Submitted during EIR Scoping

Participants in the EIR scoping process presented topics for consideration during the alternative project development process. The County considered two alternatives that were presented for consideration as described below. The County has rejected these alternatives as infeasible, and as required by CEQA, provides a brief explanation for their exclusion.

Unimpaired Flow Objective

In comment letter dated July 29, 2024 (see Appendix A), the SWRCB noted that the EIR should evaluate the proposed project in the context of the current efforts to update and implement the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan), including a possible new Delta inflow objective of 55 percent of unimpaired flow with an adaptive range of 45 to 65 percent of unimpaired flow. The County determined that this is not a

feasible alternative to MICUP. The County does not control flows into the lower Mokelumne River and cannot control the range of unimpaired flow. The County does not control releases from Camanche Reservoir into the lower Mokelumne River or the Mokelumne Aqueduct, where the diversions/rediversions are proposed for MICUP. As a result, this proposed alternative was deemed infeasible due to the County's lack of jurisdiction and control over unimpaired flow in the lower Mokelumne River.

Amador and Calaveras Water Transfer

In comment letter dated July 30, 2024 (see Appendix A), the Amador Water Agency, Calaveras County Water District, and Calaveras Public Utility District (collectively, "Amador and Calaveras Agencies") noted that the EIR should look at the Amador and Calaveras Agencies as potential partners in an integrated system on the river and potential participants to transfer surface water to MICUP. The County determined that water transfers using existing water rights from the upper Mokelumne River watershed is not a feasible alternative for MICUP. Existing water rights transfers do not meet the project objective to develop a new Mokelumne River supplemental surface water supply. Without a new water supply within the Mokelumne River watershed, the other project objectives to improve groundwater levels in the Subbasin and enhance conjunctive use of surface water and groundwater together could also not be achieved.

6.4.2 Original Application A023895 and Reservoir Storage

As explained in Chapter 2, Project Background, the original Application 29835 (A029835) was accepted by the SWRCB on October 4, 1990, and publicly noticed on September 27, 1996. A029835 proposed the following:

- Diversions from Mokelumne River and from Duck Creek tributary to Calaveras River.
- Various points of diversion and/or rediversion on the Mokelumne River, Calaveras River, and Duck Creek.
- A proposed Middle Bar Dam and Reservoir located on the Mokelumne River above Pardee Reservoir (Alternative A), and a proposed Duck Creek Dam and Reservoir located on Duck Creek (Alternative B).
- A diversion season of December 1 to June 30 for the Mokelumne River and December 1 to April 30 for Duck Creek.
- Direct diversion of 620 cfs up to 110,000 acre-feet and diversion to storage of up to 434,000 acre-feet annually. A total amount of 544,000 acre-feet to be taken by direct diversion and storage during any one year. Conveyance capacity to Duck Creek Reservoir to be 620 cfs for Alternative A and 1,000 cfs for Alternative B.
- Use of water for municipal, industrial, irrigation and incidental hydroelectric power generation.

The MRWPA did not move forward with the project described in the original A029835 due to geotechnical and geophysical constraints that rendered infeasible the use of Duck Creek Reservoir as a storage component. As evidenced by the Amended Application submitted in 2014, MRWPA proposed to remove Middle Bar Dam and Reservoir and replace the 150,000-acre-foot Duck Creek Dam and Reservoir with underground storage. In the Petition to Amend (see Appendix A) submitted to SWRCB in 2026, Middle Bar and Duck Creek reservoirs continue to be excluded, and instead the MICUP project was developed by the County and Partner Agencies replacing surface

storage with direct recharge components and underground storage in the Subbasin. Therefore, the original A029835 is rejected as a feasible alternative.

6.5 Alternatives to the Proposed Project

Pursuant to CEQA Guidelines Section 15126.6, this EIR presents a range of reasonable alternatives to the proposed project for analysis and evaluation. These alternatives are considered to cover the range of alternatives that would feasibly attain most of the basic project objectives of MICUP while lessening or avoiding one or more of its significant impacts, which are summarized above in Section 6.3. CEQA Guidelines Section 15126.6(a) states that an EIR need not evaluate every conceivable alternative. Information has been provided for each alternative that would allow alternative analysis as well as meaningful comparisons with the proposed project.

The two alternatives to the proposed project analyzed in this chapter are as follows:

- **Alternative 1:** No Project Alternative
- **Alternative 2:** Modified MICUP Project

The following sections provide a general description of each identified alternative, its ability to meet the project objectives, and a discussion of its physical environmental impacts compared to the proposed project. As provided in Section 15126.6(d) of the CEQA Guidelines, the significant effects of these alternatives are identified in less detail than the analysis of the project in Chapter 4 of this Draft EIR.

6.5.1 Alternative 1: No Project Alternative

The *CEQA Guidelines* (Section 15126.6[e]) require that the alternatives discussion include an analysis of a ”No Project” Alternative. Pursuant to CEQA, the No Project Alternative refers to the analysis of existing conditions and what would reasonably be expected to occur in the foreseeable future if the proposed project (i.e., MICUP) was not approved. This is based on current plans and projects and consistent with available infrastructure information.

For purposes of this EIR, the No Project Alternative (Alternative 1) assumes MICUP would not be implemented. However, the No Project Alternative also assumes the ESJ GSP Category A projects adopted in 2023 and amended in 2024[1] would be implemented over the next five years.[2] Category A projects, listed in Table 6-2, have existing water rights or agreements and include but are not limited to direct recharge projects and in-lieu recharge projects similar in nature to MICUP, including construction and operation of new recharge basins, pipelines, and pumps. Some Category A projects involve similar facilities to MICUP for purposes of recharging water under existing water rights, such as for NSJWCD, SEWD, and City of Stockton.

Ability to Meet Project Objectives

The ESJ GSP estimates that an additional 95,000 AF of supply per year is necessary to reduce groundwater pumping and/or recharge groundwater supplies.[3] Under climate change conditions

[1] Eastern San Joaquin Groundwater Authority, 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan: Agency Information, Plan Area, and Communication..

[2] The ESJ GSP Category A projects are also included in this EIR as cumulative projects; see Table 4-1 in Chapter 4.0.

[3] Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin 2024 Amended Groundwater Sustainability Plan: Executive Summary.

this number increases to 166,000 AF per year to achieve a modeled net-zero change in storage.[4] As stated in the GSP, "if projects do not progress, or if monitoring efforts demonstrate that the projects are not effective in achieving stated recharge and/or offset targets, the Subbasin's Demand Management Program, a new management action in this GSP, will be implemented." Also, "[a] Demand Management Program would include pumping restrictions if projects are not implemented as expected."[5]

Under Alternative 1, implementation of Category A projects may result in up to 154,900 AFY of maximum recharge benefit, which is projected to fall short of stated water storage and replenishment goals of 166,000 AFY of average annual additional recharge or demand reduction. Without the MICUP project and under Alternative 1, the Eastern San Joaquin Groundwater Authority would have less water available for groundwater replenishment (up to 158,000 AFY less of additional maximum supply) as compared to under MICUP and may not meet the goals of the ESJ GSP.

Alternative 1 also would not meet all the objectives of MICUP. Alternative 1 assumes that A029835 is not approved. Therefore, Alternative 1 would not develop a new supplemental Mokelumne River surface water supply to meet existing demands, and as such, may result in the need to implement a Demand Management Program. Alternative 1 would use existing surface supplies from existing water rights and entitlements to improve groundwater levels in the Subbasin and achieve integrated water supply and environmental benefits in the lower Mokelumne watershed to respond to drought and climate change. However, due to the inability of Alternative 1, alone, to achieve all of the 166,000 AFY average annual additional recharge goal, additional demand reduction would likely still be necessary. Preliminary GSP estimates and groundwater modeling show groundwater pumping would need to be reduced by approximately 108 thousand acre-feet (TAF) annually across the entire Subbasin to achieve a modeled net-zero change in groundwater storage. MICUP would develop new water supply for agriculture and communities in the Subbasin, filling a portion of the 108 TAF gap identified in the GSP.[6]

[4] Ibid.

[5] Ibid.

[6] ERA Economics, 2025. Mokelumne River Integrated Water Storage and Conjunctive Use Program (MICUP) Eastern San Joaquin Subbasin Economic Analysis. Prepared for San Joaquin County Department of Public Works.

Table 6-2 Eastern San Joaquin Groundwater Sustainability Plan Category A Projects

Project Name	Project Proponent	Project Type	Maximum Recharge Benefit (AFY)
Lake Grupe In-lieu Recharge	SEWD	In-lieu Recharge	4,900
SEWD Surface Water Implementation Expansion	SEWD	In-lieu Recharge	19,000
White Slough Water Pollution Control Facility Expansion	City of Lodi	Recycling/In-lieu Recharge/ Direct Recharge	1,000
CSJWCD Capital Improvement Program	CSJWCD	In-lieu Recharge	24,000
NSJWCD South System Modernization	NSJWCD	In-lieu Recharge	10,000
Long-term Water Transfer to SEWD and NSJWCD	SSJ GSA	Transfers	20,000
South System Groundwater Banking with East Bay Municipal Utilities District (EBMUD)	NSJWCD	In-lieu Recharge	4,000
NSJWCD North System Modernization/ Lakso Recharge	NSJWCD	In-lieu Recharge	4,000
Tecklenburg Recharge Project	NSJWCD	Direct Recharge	2,000
City of Stockton Phase 1: Groundwater Recharge Project	City of Stockton	Direct Recharge	20,000
West Groundwater Recharge Basin	SEWD	Direct Recharge	16,000
NSJWCD Private Pump Partnership	NSJWCD	In-Lieu Recharge/ Direct Recharge	3,000
Oakdale Irrigation District In-lieu and Direct Recharge Project	Oakdale Irrigation District	In-Lieu Recharge/ Direct Recharge	25,000
City of Stockton Advanced Metering Infrastructure	City of Stockton	Conservation	2,000
Total			**154,900**

Source: Eastern San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication..

Impact Analysis

Aesthetics

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. The operation of Category A projects only under Alternative 1 may introduce contrasting elements within the site line of scenic vistas. However, siting for projects under Alternative 1 would be located within rural areas that are remote from many public vantage points, low-lying, and similar to existing water management facilities within an agricultural landscape, such as to not significantly alter visual character or scenic vistas. In addition, Alternative 1 would not introduce new sources of nighttime lighting during construction, and new lighting during operation would be shielded and directed downward and, thus, minimize light spillover and duration. Therefore, Alternative 1 impacts related to aesthetics would be less than significant.

The proposed project's impacts related to aesthetics would be less than significant (see Section 4.1, *Aesthetics*). Alternative 1 would have a lesser level of aesthetics impacts compared to the proposed project due to a reduction in the number of projects being constructed and operated, but not to the extent of decreasing the impact significance level.

Agriculture & Land Use Planning

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. The operation of Category A projects would occur consistently with applicable land use plans, policies, and regulations, and Alternative 1 impacts related to land use planning would be less than significant. However, construction of Category A projects could be located within Important Farmland areas that would be converted to non-agricultural uses temporarily due to pipeline construction and permanently due to recharge basin construction. Also under Alternative 1, with less water available for groundwater replenishment, a Demand Management Program likely would be implemented within the Subbasin that would include pumping restrictions. As a result, less water available for irrigation could in turn result in agricultural land fallowing. Therefore, Alternative 1 impacts related to agriculture would be significant and unavoidable.

The proposed project's impacts related to agriculture would be significant and unavoidable (see Section 4.2, *Agriculture and Land Use Planning*). Alternative 1 would have the same level of land use planning impacts and a lesser level of agriculture impacts compared to MICUP due to a reduction in the number of recharge basin projects being constructed and consequently a reduction in the acreage of agricultural land conversion. However, under Alternative 1, pumping restrictions associated with a Demand Management Program could result in an increase in agricultural conversion due to land fallowing. For these reasons, on balance, Alternative 1 would have a similar impact related to agriculture as the proposed MICUP project.

Air Quality

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Since operation of recharge basins do not require energy use and operation of in-lieu recharge via pipelines that distribute water to nearby lands require minimal energy use, Alternative 1 operational criteria pollutant emissions impacts would be less than significant. While various Category A projects construction activities under Alternative 1 could generate overlapping criteria air pollutants in excess of SJVAPCD thresholds and toxic air contaminant emissions within 1,000 feet of sensitive receptors, such construction air quality impacts would be mitigable to less than significant with implementation of standard Tier 4 equipment use and project component-specific HRA mitigation measures and would not contribute to an exceedance of the NAAQS or CAAQS. Therefore, Alternative 1 impacts related to air quality would be less than significant with mitigation.

The proposed project's impacts related to air quality would be less than significant with mitigation (see Section 4.3, *Air Quality*). Alternative 1 would have a lesser level of air quality impacts compared to MICUP due to a reduction in the number of projects being constructed and operated, but not to the extent of decreasing the impact significance level.

Biological Resources

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Direct construction impacts would be mitigable to less than significant levels with incorporation of standard pre-construction surveys and other special status species and habitat avoidance mitigation. In addition, there would be no new

diversions or reduction in flows or changes in water quality in the lower Mokelumne River or the Delta that could impact special-status fish or their habitat. Since there would be additional groundwater recharge, there could be reductions in seepage and increase in lower Mokelumne River flows in drier years that would benefit special-status fish, similar to MICUP. Therefore, Alternative 1 impacts related to biological resources would be less than significant with mitigation.

The proposed project's impacts related to biological resources would be less than significant with mitigation (see Section 4.4, *Biological Resources*). Alternative 1 would have a lesser level of biological resources construction impacts compared to MICUP due to a reduction in the number of projects being constructed and operated but not to the extent of decreasing the impact significance level.

Cultural and Tribal Cultural Resources

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. AB 52 consultation conducted did not identify tribal cultural resources in these areas, and Alternative 1 impacts related to tribal cultural resources would be less than significant. In addition, Alternative 1 would not result in changes to pump station facilities that could be considered historically significant. However, archaeological resources are known to exist within these areas, and construction of Category A projects under Alternative 1 would involve ground disturbance due to pipeline construction that could affect such resources. Therefore, Alternative 1 impacts related to cultural resources would be significant and unavoidable.

The proposed project's impacts related to cultural resources would be significant and unavoidable (see Section 4.5, *Cultural and Tribal Cultural Resources*). Alternative 1 would have the same level of tribal cultural resources impacts, and a lesser level of archaeological and historic resources impacts compared to MICUP due to a reduction in the number of projects being constructed and operated, but not to the extent of decreasing the impact significance level or eliminating the need for mitigation.

Geology and Soils

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Construction of Category A projects under Alternative 1 would involve ground disturbance and potential related erosion/loss of topsoil and impacts to paleontological resources due to pipeline and recharge basin construction activities. Such construction geology and soils impacts would be mitigable to less than significant with implementation of standard erosion control plan and paleontological mitigation and monitoring plan. Therefore, Alternative 1 impacts related to geology and soils would be less than significant with mitigation.

The proposed project's impacts related to geology and soils would be less than significant with mitigation (see Section 4.6, *Geology and Soils*). Alternative 1 would have a lesser level of geology and soils impacts compared to MICUP due to a reduction in the number of projects being constructed and operated but not to the extent of decreasing the impact significance.

Greenhouse Gas Emissions and Energy

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Since operation of recharge basins do not require energy use and operation of in-lieu recharge via pipelines that distribute water to nearby lands require minimal energy use, Alternative 1 operational GHG emissions impacts would be less than significant. While various Category A projects construction activities under Alternative 1 could use energy and generate GHG emissions, such construction GHG emissions and energy impacts would be less than significant with efficient use of energy as well as consistency with CALGreen, California Energy Code Title 24, and regulations intended to reduce GHG emissions and would not contribute to a significant impact on the environment. Therefore, Alternative 1 impacts related to GHG emissions and energy would be less than significant.

The proposed project's impacts related to air quality would be less than significant (see Section 4.7, *GHG Emissions and Energy*). Alternative 1 would have a lesser level of GHG emissions and energy impacts compared to MICUP due to a reduction in the number of projects being constructed and operated but not to the extent of decreasing the impact significance.

Hazards, Hazardous Materials, and Wildfire

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Since these areas are not designated as High Fire Hazard Zones and construction equipment would use spark arrestors, Alternative 1 impacts related to wildfire would be less than significant. Given that Cortese and listed hazardous material sites are known to exist within these areas, construction of Category A projects under Alternative 1 could involve ground disturbance due to pipeline and new recharge basin construction that could uncover contaminated soil or contaminated groundwater; however, such potential hazards and hazardous materials exposure impacts would be mitigable to less than significant with incorporation of standard Phase I and II mitigation measures. Therefore, Alternative 1 impacts related to hazards, hazardous materials, and wildfire would be less than significant with mitigation.

The proposed project's impacts related to hazards, hazardous materials, and wildfire would be less than significant with mitigation (see Section 4.8, *Hazards, Hazardous Materials, and Wildfire*). Alternative 1 would have the same level of wildfire impacts and a lesser level of hazards and hazardous materials impacts compared to MICUP due to a reduction in the number of projects being constructed and operated but not to the extent of decreasing the impact significance.

Hydrology and Water Quality – Surface Water

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Direct construction impacts to surface water quality would be mitigable to less than significant levels with incorporation of standard water pollution control plan and NPDES discharge limits mitigation. In addition, there would be no reduction in surface flows or changes in water quality in the lower Mokelumne River or the Delta because no new diversions associated with new water rights would be implemented with Alternative 1. Since there would be additional groundwater recharge, there may be reductions in seepage and increases in lower Mokelumne River flows in drier years. Therefore, Alternative 1

impacts related to surface water hydrology and water quality would be less than significant with mitigation.

The proposed project's impacts related to hydrology and water quality (surface water) would be less than significant with mitigation (see Section 4.9, *Hydrology and Water Quality – Surface Water*). Alternative 1 would have a lesser level of surface water hydrology and water quality impacts due to a reduction in the number of projects being constructed and operated compared to MICUP but not to the extent of decreasing the impact significance level

Hydrology and Water Quality – Groundwater

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Direct construction impacts to groundwater quality would be mitigable to less than significant levels with incorporation of standard waste discharge requirements. In addition, there would be additional groundwater recharge associated with ESJ GSP Category A projects under Alternative 1. Therefore, Alternative 1 impacts related to groundwater recharge, groundwater elevations, and groundwater quality would be less than significant with mitigation.

The proposed project's impacts related to hydrology and water quality (surface water) would be less than significant with mitigation (see Section 4.10, *Hydrology and Water Quality – Groundwater*). Alternative 1 would have a lesser level of groundwater quality impacts due to a reduction in the number of projects being constructed and operated, and a similar beneficial effect to groundwater storage and elevations due to additional groundwater recharge from ESJ GSP Category A projects.

Noise

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Alternative 1 impacts related to construction vibration at sensitive receptors and structures would be less than significant with incorporation of standard vibration control plan mitigation. Construction of Category A projects under Alternative 1 would not introduce new nighttime noise; there are no wells proposed for Category A projects that would require 24/7 drilling. Category A projects under Alternative 1 would introduce new sources of daytime construction and operational noise as well as nighttime operational noise at noise-sensitive receptors; however, such noise impacts would be mitigable to less than significant with incorporation of standard construction noise mitigation. Therefore, Alternative 1 impacts related to noise would be less than significant with mitigation.

The proposed project's impacts related to noise would be significant and unavoidable (see Section 4.11, *Noise*). Alternative 1 would have a lesser level of noise impacts compared to the proposed project due to a reduction in the number of projects being constructed and operated, which also does not include well drilling.

Transportation

Under Alternative 1, implementation of ESJ GSP Category A projects would result in construction and operation of project components related to direct recharge, in-lieu recharge, conservation, recycling, and water right transfers within the Subbasin. Since project operation would be primarily limited to minimal maintenance activities and related roadway vehicle trips, Alternative 1

operational transportation impacts would be less than significant. While construction under Alternative 1 could increase construction worker trips, create potential conflicts with roadway users when pipeline installation and construction staging occurs within public ROWs and/or causes temporary queueing or lane closures, and temporarily change emergency evacuation routes such that the use of an evacuation route could be hindered during construction activities, such transportation impacts would be mitigable to less than significant with implementation of standard construction traffic mitigation. Therefore, Alternative 1 impacts related to transportation would be less than significant with mitigation.

The proposed project's impacts related to transportation would be less than significant with mitigation (see Section 4.12, *Transportation*). Alternative 1 would have a lesser level of transportation impacts compared to MICUP due to a reduction in the number of projects being constructed and operated but not to the extent of decreasing the impact significance level.

Conclusion

In summary, Alternative 1 would avoid the significant and unavoidable impacts of MICUP related to historic resources and noise but would not avoid the significant and unavoidable impacts of MICUP related to agriculture and archaeological resources. However, Alternative 1 would result in lesser impacts for all environmental topics compared to MICUP primarily due to a reduction in the number of projects being constructed and operated.

Alternative 1 also would not meet all the objectives of MICUP. Alternative 1 would not develop a new supplemental Mokelumne River surface water supply to meet existing demands, and as such, may result in the need to implement a Demand Management Program to meet reduced groundwater supplies.

6.5.2 Alternative 2: Modified MICUP Project

CEQA requires consideration of alternatives that would feasibly attain most of the basic project objectives while lessening or avoiding one or more of its significant impacts. Alternative 2 is a modified MICUP project that excludes the 20 ASR wells off the Mokelumne Aqueduct as means of avoiding the significant and unavoidable impacts associated with construction noise. Eliminating the ASR wells under Alternative 2 would avoid potential impacts related to nighttime drilling of wells in close proximity to sensitive receptors. The diversion capacity and recharge capacity associated with the ASR wells is 20 cfs and 13,400 AFY, respectively. This reduction in recharge capacity due to elimination of the ASR wells does not affect the feasibility of MICUP; as such Alternative 2 is considered to be a feasible alternative.

Ability to Meet Project Objectives

Alternative 2 would meet the objectives for MICUP. Alternative 2 assumes that A029835 is approved, which would develop a supplemental Mokelumne River surface water supply to meet existing demands. All proposed MICUP components would be implemented except for the 20 ASR wells; the remaining MIUCP components have the ability to beneficially use up to 158,000 AFY as included in A029835. Consequently, all other MICUP objectives can be met, increasing groundwater levels in the Subbasin and achieving integrated water supply and environmental benefits in the lower Mokelumne watershed, using surface water and groundwater conjunctively to respond to drought and climate change.

Impact Analysis

Aesthetics

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Alternative 2 would not introduce new sources of nighttime lighting during ASR well construction. All other impacts would be the same as MICUP. Therefore, Alternative 2 impacts related to aesthetics would be less than significant.

The proposed project's impacts related to aesthetics would be less than significant (see Section 4.1, *Aesthetics*). Alternative 2 would have a lesser level of aesthetics impacts compared to the proposed project, but not to the extent of decreasing the impact significance level.

Agriculture & Land Use Planning

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Alternative 2 would provide new surface water for groundwater recharge to meet the goals of the ESJ GSP, and agricultural lands would benefit from new water supply for agricultural irrigation. However, impacts to agricultural land conversation under Alternative 2 would be the same as MICUP due to construction of recharge basins. Therefore, Alternative 2 impacts related to agriculture would be significant and unavoidable.

The proposed project's impacts related to agriculture would be significant and unavoidable (see Section 4.2, Agriculture and Land Use Planning). Alternative 2 would have the same level of land use planning impacts and agriculture impacts compared to the proposed MICUP project.

Air Quality

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Construction emissions from Alternative 2 would be slightly reduced without the ASR wells components; however ASR wells do not contribute significant criteria air pollutants (see Table 4.3-10). Therefore overall, construction of remaining MICUP components together would still require mitigation for NOx emissions. Construction air quality impacts would be mitigable to less than significant with implementation of Mitigation Measures AQ-1 and AQ-2 requiring Tier 4 equipment use and project component-specific HRA and would not contribute to an exceedance of the NAAQS or CAAQS. Therefore, Alternative 2 impacts related to air quality would be less than significant with mitigation.

The proposed project's impacts related to air quality would be less than significant with mitigation (see Section 4.3, *Air Quality*). Alternative 2 would have a similar level of air quality impacts compared to the proposed MICUP project.

Biological Resources

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Direct construction impacts would be mitigable to less than significant levels with incorporation of pre-construction survey and other special status species and habitat avoidance mitigation. In addition, diversion/redivision of water would slightly reduce overall amounts of water available within the Mokelumne River, but any effects to special-status fish and their habitat would be minimized because diversions would only occur in wetter years when more water is available. Flow in the lower Mokelumne River

channel would maintain minimum flow requirements protective of CCV steelhead and Chinook salmon and downstream impacts to fish in the Delta from salinity changes would be minimal and potentially avoided with implementation of Term 91; increases in flow during drier periods due to reduced seepage because of groundwater recharge would benefit fishes. Therefore, Alternative 2 impacts related to biological resources would be less than significant with mitigation.

The proposed project's impacts related to biological resources would be less than significant with mitigation (see Section 4.4, *Biological Resources*). Alternative 2 would have a similar impact related to biological resources as the proposed MICUP project.

Cultural and Tribal Cultural Resources

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Excluding ASR wells would not reduce significant and unavoidable construction impacts associated with potential historic resources because Alternative 2 would implement project components that could result in changes to pump station facilities that could be considered historically significant. Excluding ASR wells would not reduce significant and unavoidable construction impacts associated with potential archaeological resources because Alternative 2 would implement project components that involve ground disturbance and could affect such resources. Therefore, Alternative 2 impacts related to cultural resources would be significant and unavoidable.

The proposed project's impacts related to cultural resources would be significant and unavoidable (see Section 4.5, *Cultural and Tribal Cultural Resources*). Alternative 2 would have the same level of historic, archaeological and tribal cultural resources impacts. Alternative 2 would have a similar impact related to cultural resources as the proposed MICUP project.

Geology and Soils

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Construction of Alternative 2 would involve ground disturbance and potential related erosion/loss of topsoil and impacts to paleontological resources due to pipeline and recharge basin construction activities. Such construction impacts to geology and soils would be mitigable to less than significant with implementation of erosion control plan and paleontological mitigation and monitoring plan mitigation (Mitigation Measures GEO-1 and GEO-2). Therefore, Alternative 2 impacts related to geology and soils would be less than significant with mitigation.

The proposed project's impacts related to geology and soils would be less than significant with mitigation (see Section 4.6, *Geology and Soils*). Alternative 2 would have a similar impact related to geology and soils as the proposed MICUP project.

Greenhouse Gas Emissions and Energy

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. While various construction activities under Alternative 2 could use energy and generate GHG emissions, such construction GHG emissions and energy impacts would be less than significant with efficient use of energy as well as consistency with CALGreen, California Energy Code Title 24, and regulations intended to reduce GHG emissions and would not contribute to a significant impact on the environment. Therefore, Alternative 2 impacts related to GHG emissions and energy would be less than significant.

The proposed project's impacts related to GHG emissions and energy would be less than significant (see Section 4.7, *GHG Emissions and Energy*). Alternative 2 would have a similar level of GHG emissions and energy impacts compared to MICUP.

Hazards, Hazardous Materials, and Wildfire

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Since the project area is not designated as High Fire Hazard Zones and construction equipment would use spark arrestors, Alternative 2 impacts related to wildfire would be less than significant. Given that Cortese and listed hazardous material sites are known to exist within these areas, construction of Alternative 2 could involve ground disturbance due to pipeline and new recharge basin construction that could uncover contaminated soil or contaminated groundwater; however, such potential hazards and hazardous materials exposure impacts would be mitigable to less than significant with incorporation of Mitigation Measure HAZ-1. Therefore, Alternative 2 impacts related to hazards, hazardous materials, and wildfire would be less than significant with mitigation.

The proposed project's impacts related to hazards, hazardous materials, and wildfire would be less than significant with mitigation (see Section 4.8, *Hazards, Hazardous Materials, and Wildfire*). Alternative 2 would have the same level of wildfire impacts and hazards and hazardous materials impacts compared to the proposed MICUP project.

Hydrology and Water Quality – Surface Water

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Direct construction impacts to water quality due to erosion and runoff from construction sites to receiving waters would be mitigable to less than significant levels with incorporation of water pollution control plan and NPDES discharge limits and other regulatory requirements. In addition, diversion/redivision of water would reduce flows in the lower Mokelumne River in wetter years and groundwater recharge in the ESJSB would reduce seepage and increase flows in the lower Mokelumne River in drier months and years. Reduction in flow in the lower Mokelumne River channel would maintain minimum flow requirements, would not increase erosion or adversely affect water temperatures, and downstream impacts to water quality in the Delta from salinity and chloride changes would be minimized or avoided with implementation of Term 91; increases in flow during drier periods due to reduced seepage because of groundwater recharge would benefit water quality. Therefore, Alternative 2 impacts related to surface water hydrology and water quality would be less than significant with mitigation.

The proposed project's impacts related to hydrology and water quality (surface water) also would be less than significant with mitigation (see Section 4.9, *Hydrology and Water Quality – Surface Water*). Alternative 2 would have a similar impact related to surface water hydrology and water quality as the proposed MICUP project.

Hydrology and Water Quality – Groundwater

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Direct construction impacts to water quality due to erosion and runoff from construction sites to receiving aquifers would be mitigable to less than significant levels with incorporation of waste discharge requirements, water pollution control plans, and other regulatory requirements. In addition, groundwater recharge

would result in increased groundwater storage and elevations and seepage reductions in the lower Mokelumne River. Therefore, Alternative 2 impacts related to groundwater would be less than significant with mitigation.

The proposed project's impacts related to groundwater would be less than significant with mitigation (see Section 4.10, *Hydrology and Water Quality – Groundwater*). Alternative 2 would have a similar impact related to groundwater as the proposed MICUP project, although the increase in groundwater levels would be incrementally less than MICUP.

Noise

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Alternative 2 would avoid significant nighttime construction noise due to the exclusion of the ASR wells which otherwise require 24/7 drilling. Alternative 2 would introduce new sources of daytime construction and operational noise as well as nighttime operational noise at noise-sensitive receptors; such noise impacts would be mitigable to less than significant with incorporation of Mitigation Measures NOI-1 and NOI-2. Alternative 2 impacts related to construction vibration at sensitive receptors and structures would be less than significant with incorporation of Mitigation Measure NOI-3. Therefore, Alternative 2 impacts related to noise would be less than significant with mitigation.

The proposed project's impacts related to noise would be significant and unavoidable (see Section 4.11, *Noise*. Alternative 2 would have a lesser impact related to noise than the proposed MICUP project.

Transportation

Alternative 2 excludes construction and operation of ASR wells from MICUP. Alternative 2 would include construction and operation of all other MICUP components. Alternative 2 operational transportation impacts would be less than significant since operation of remaining MICUP components would be primarily limited to minimal maintenance activities and related roadway vehicle trips. Alternative 2 could increase construction worker trips, create potential conflicts with roadway users when pipeline installation and construction staging occurs within public ROWs and/or causes temporary queueing or lane closures, and temporarily change emergency evacuation routes such that the use of an evacuation route could be hindered during construction activities. Such transportation impacts would be mitigable to less than significant with implementation of a construction traffic management plan per Mitigation Measure TRA-1. Therefore, Alternative 2 impacts related to transportation would be less than significant with mitigation.

The proposed project's impacts related to transportation would be less than significant with mitigation (see Section 4.12, *Transportation*). Alternative 2 would have a similar impact related to transportation as the proposed MICUP project.

Conclusion

In summary, Alternative 2 would avoid the significant and unavoidable impacts of MICUP related to construction noise. For Alternative 2, impacts would be similar to MICUP for all other environmental topics except for aesthetics. Alternative 2 would have a lesser level of aesthetics impacts due to eliminating nighttime lighting during nighttime drilling of ASR wells, but not to the extent of decreasing the impact significance levels (less than significant).

Alternative 2 would meet the objectives for MICUP. Alternative 2 assumes that A029835 is approved, which would develop a supplemental Mokelumne River surface water supply to meet existing demands. All proposed MICUP components would be implemented except for the 20 ASR wells; the remaining MIUCP components have the ability to beneficially use up to 158,000 AFY as included in A029835. Consequently, all other MICUP objectives can be met, increasing groundwater levels in the Subbasin (although the increase in groundwater levels would be incrementally less than MICUP) and achieving integrated water supply and environmental benefits in the lower Mokelumne watershed, using surface water and groundwater together to respond to drought and climate change.

6.6 Environmentally Superior Alternative

CEQA Guidelines Section 15126(e)(2) requires identification of an environmentally superior alternative. If the No Project Alternative is environmentally superior, CEQA requires selection of the "environmentally superior alternative other than the No Project Alternative" from among the proposed project and the alternatives evaluated.

To identify the environmentally superior alternative in accordance with the CEQA Guidelines, Table 6-3 presents a comparison of the impacts related to the alternatives and indicates whether each alternative's environmental impact is greater than, lesser than, or similar to that of the proposed MICUP project for each of the environmental topics that were analyzed above.

Table 6-3 Summary of Alternatives Analysis

Issue	MICUP Impact Classification	Alternative 1 Impact Classification	Alternative 2 Impact Classification
Aesthetics	LTS	LTS (Lesser)	LTS (Lesser)
Agriculture & Land Use Planning	SU	SU (Similar)	SU (Similar)
Air Quality	LTSM	LTSM (Lesser)	LTSM (Similar)
Biological Resources	LTSM	LTSM (Lesser)	LTSM (Similar)
Cultural and Tribal Cultural Resources	SU	SU (Lesser)	SU (Similar)
Geology and Soils	LTSM	LTSM (Lesser)	LTSM (Similar)
Greenhouse Gas Emissions and Energy	LTS	LTS (Lesser)	LTS (Similar)
Hazards, Hazardous Materials, and Wildfire	LTSM	LTSM (Lesser)	LTSM (Similar)
Hydrology and Water Quality – Surface Water	LTSM	LTSM (Lesser)	LTSM (Similar)
Hydrology and Water Quality – Groundwater	LTSM	LTSM (Lesser)	LTSM (Similar)
Noise	SU	LTSM (Lesser)	LTSM (Lesser)
Transportation	LTSM	LTSM (Lesser)	LTSM (Similar)

Notes: LTS = Less than Significant; LTSM = Less than Significant with Mitigation; SU = Significant and Unavoidable

Based on the alternatives analysis provided in this EIR chapter, Alternative 2 is the environmentally superior alternative, as it would either be similar to or lessen the severity of impacts associated with MICUP. Alternative 2 would avoid the significant and unavoidable impacts of MICUP related to construction noise. For Alternative 2, impacts would be similar to MICUP for all other environmental topics except for aesthetics. Alternative 2 would have a lesser level of aesthetics impacts due to eliminating nighttime lighting during nighttime drilling of ASR wells. Alternative 2 would meet the objectives of the MICUP project with regard to developing a new supplemental lower Mokelumne

surface water supply and stated GSP surface and groundwater supply goals. Alternative 2 would increase groundwater levels in the Eastern San Joaquin Groundwater Subbasin but may achieve a relatively lesser benefit than MICUP due to the reduction in groundwater recharge without the ASR wells.

7 Federal Crosscutting

7.1 Environmental Justice

This section describes the existing physically affected environment and regulatory framework related to population, income, and ethnicity, as well as discussions about environmental justice and risks to children's health and safety.

7.1.1 Regulatory Framework

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"

Under Executive Order 12898, federal agencies are directed to make achieving environmental justice a part of their mission by identifying and addressing, as appropriate, disproportionately high adverse human health or environmental effects of its activities on minority and low-income populations.[1] Per Executive Order 12898, each federal agency must make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health, environmental, economic and social effects of its programs, policies, and activities on minority and low-income populations, particularly when such analysis is required by NEPA. The Executive Order emphasizes the importance of NEPA's public participation process, directing that each federal agency shall provide opportunities for community input in the NEPA process. Agencies are further directed to identify potential effects and mitigation measures in consultation with affected communities. This Executive Order 12898 was rescinded by President Trump on January 21, 2025. However, because it was in effect at the time the environmental analysis began, an Environmental Justice Analysis is included in Section 7.1.3 below for the proposed project per the guidelines set above to comply with federal cross cutting regulations required to receive federal funding.

7.1.2 Environmental Setting

This section presents demographic information of the census tracts within the Mokelumne River Integrated Conjunctive Use Project (MICUP) recharge areas. The information relating to income and ethnicity for the region is derived from the 2023 U.S. Census Bureau, which is the most recent comprehensive source of data.

Potentially Affected Populations

The study area for environmental justice effects includes areas that may experience adverse human health or environmental effects resulting from construction and operation of the proposed project. The proposed project would be located in various areas throughout San Joaquin County. As such, the study area for this analysis of environmental justice is the Place of Use, which includes all census tracts that overlap with areas of construction and the proposed aquifer storage and recovery (ASR) well recharge areas, proposed flood managed aquifer recharge (Flood-MAR) areas, and proposed direct surface recharge areas. Table 7-1 and Table 7-2 list the census tracts by recharge area potentially affected by the proposed project. The tracts are shown in Figure 7-1.

[1] U.S. Environmental Protection Agency. 1994. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf (accessed December 2024).

Table 7-1 Demographic Information for Census Tracts within the Place of Use by Recharge Area

Census Tract	Black or African American Alone, Not Hispanic or Latino (Percent)	Asian Alone, Not Hispanic or Latino (Percent)	Native Hawaiian and Other Pacific Islander Alone, Not Hispanic or Latino (Percent)	Hispanic or Latino (of Any Race) (Percent)	Total Minority* (Percent)
NSJWCD/SEWD ASR Well Recharge Areas					
35.01	1.2	14.24	0.18	24.99	40.61
35.02	1.69	7.42	0.06	42.32	**51.49**
36.02	0.92	2.84	0.06	54.73	**58.55**
41.07	1.69	9.93	0.19	36.6	48.41
47.04	0.34	3.05	0.28	34.83	38.50
NSJWCD/SEWD/City of Stockton Recharge Areas					
32.09	9.38	15.41	1.16	33.65	**59.6**
32.19	8.56	39.32	0.8	24.04	**75.72**
33.11	13.75	17.58	1.18	47.27	**79.78**
34.03	8.65	46.11	0.97	32.27	**88**
34.04	8.43	37	1.54	34.28	**81.25**
34.05	8.99	43.55	1.16	33.99	**87.69**
35.01	1.2	14.24	0.18	24.99	40.61
35.02	1.69	7.42	0.06	42.32	**51.49**
35.03	8.25	53.17	1.27	25.7	**88.39**
35.04	8.48	49.22	1.77	29.1	**88.57**
36.01	1.14	6.14	0.34	42.65	**50.27**
36.02	0.92	2.84	0.06	54.73	**58.55**
40.01	1.97	4.67	0.4	51.77	**58.81**
41.04	0.82	7.71	0.24	19.38	28.15
41.05	1.41	5.05	0.32	29.92	36.7
41.06	0.3	5.99	0	34.74	41.03
41.07	1.69	9.93	0.19	36.6	48.41
41.08	7.67	50.35	0.78	22.37	**81.17**
42.02	0.35	5.51	0.12	12.65	18.63
42.05	0.32	3.22	0.17	31.16	34.87
42.06	0.62	4.74	0.06	29.2	34.7
43.02	1.03	7.09	0.1	34.69	42.91
43.05	1.85	12.02	0.32	22.92	37.11
43.07	1.61	8.51	0.3	38.53	48.95
43.09	1.44	4.47	0.29	22.61	28.81
43.1	0.78	7.53	0	16.71	25.02
44.04	0.57	14.4	0.1	67.51	**82.58**
45.01	1.32	8.51	0.21	41.33	**51.37**

Census Tract	Black or African American Alone, Not Hispanic or Latino (Percent)	Asian Alone, Not Hispanic or Latino (Percent)	Native Hawaiian and Other Pacific Islander Alone, Not Hispanic or Latino (Percent)	Hispanic or Latino (of Any Race) (Percent)	Total Minority* (Percent)
46	0.56	3.08	0.36	36.46	40.46
47.01	0.6	1.07	0.39	35.6	37.66
47.03	0.83	1.84	0.35	28.02	31.04
47.04	0.34	3.05	0.28	34.83	38.5
48	0.29	1.31	0.09	38.05	39.74
SEWD Mosher Creek Upper Recharge Areas					
47.04	0.34	3.05	0.28	34.83	38.5
SEWD Mosher Creek at Tully Dam Recharge Basin					
47.04	0.34	3.05	0.28	34.83	38.5
48	0.29	1.31	0.09	38.05	39.74
SEWD West Linden Recharge Area					
36.02	0.92	2.84	0.06	54.73	**58.55**
48	0.29	1.32	0.09	38.05	39.75

* **Bolded** numbers values are those where the total minority population is above 50 percent.

Source: U.S. Census Bureau ACS 2023 5-Year Estimates Table S0501

Table 7-2 Income and Poverty for Census Tracts within the Place of Use by Recharge Area

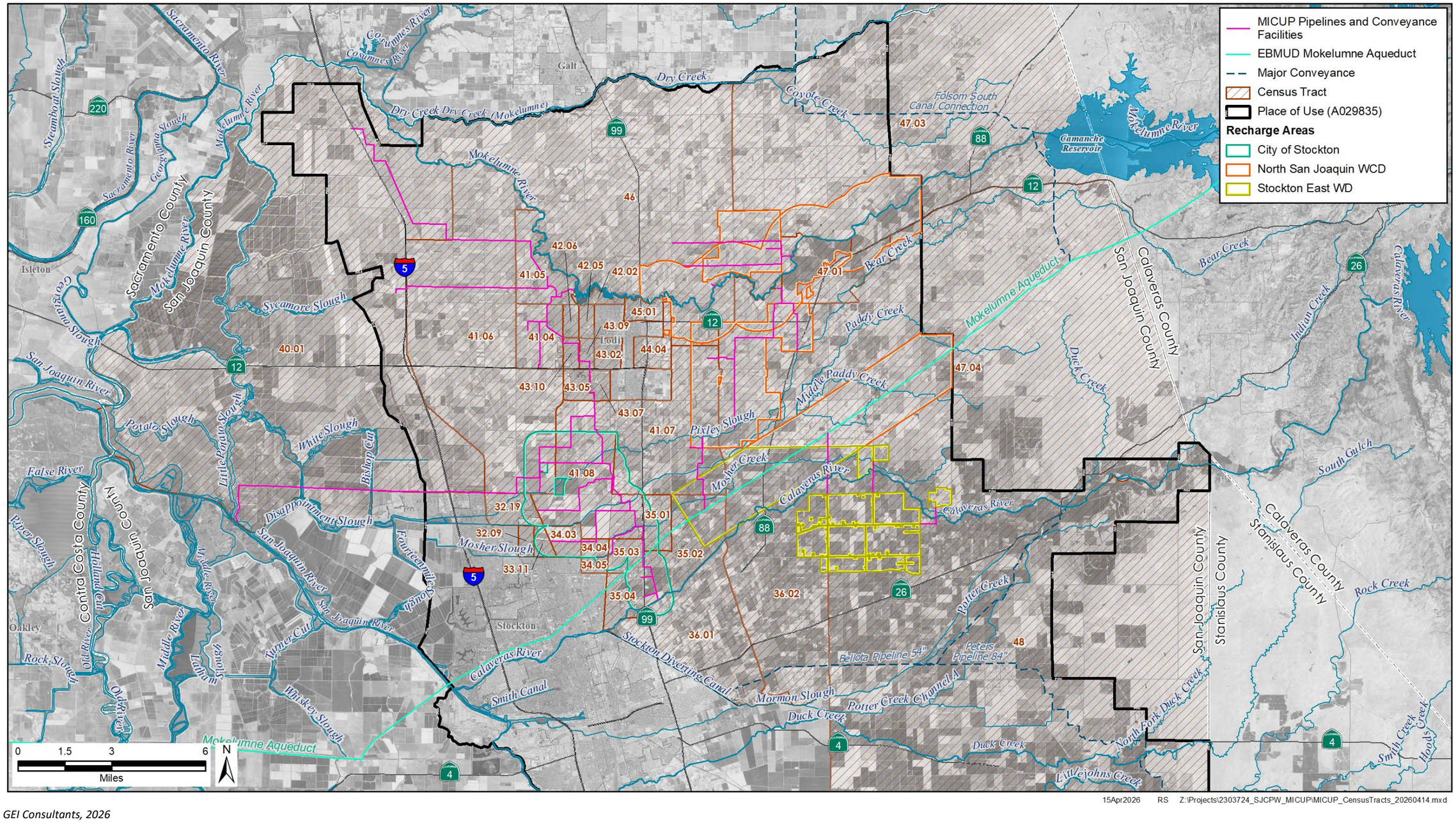
Census Tract	Median Household Income, 5-year estimate (Dollars)	Individuals with Income Below the Poverty Threshold (Percent)*
NSJWCD/SEWD ASR Well Recharge Areas		
35.01	**71,875**	2.4
35.02	100,357	0
36.02	86,058	**13.6**
41.07	80,188	0
47.04	108,482	1
NSJWCD/SEWD/City of Stockton Recharge Areas		
32.09	111,563	2.3
32.19	130,521	1.1
33.11	86,047	8.5
34.03	81,571	5.6
34.04	**56,667**	8.4
34.05	**73,793**	5.2
35.01	**71,875**	2.3
35.02	100,357	0
35.03	99,671	2.7
35.04	103,222	0
36.01	89,375	0

Census Tract	Median Household Income, 5-year estimate (Dollars)	Individuals with Income Below the Poverty Threshold (Percent)*
36.02	86,058	**13.6**
40.01	**55,469**	0.7
41.04	116,027	0
41.05	105,107	1.9
41.06	100,905	0.8
41.07	80,188	0
41.08	127,125	3.7
42.02	133,405	0
42.05	**65,625**	6.8
42.06	**62,381**	0
43.02	**68,600**	0.6
43.05	131,726	0
43.07	77,697	4.9
43.09	98,750	2
43.1	106,860	1.6
44.04	**58,654**	7.8
45.01	**64,421**	0
46	98,875	0.4
47.01	88,125	3.8
47.03	123,807	0.7
47.04	108,482	1.2
48	100,032	2
SEWD Mosher Creek Upper Recharge Areas		
47.04	108,482	1.2
SEWD Mosher Creek at Tully Dam Recharge Area		
47.04	108,482	1.2
48	100,032	2
SEWD West Linden Recharge Area		
36.02	86,058	**13.6**
48	100,032	2.0

* **Bolded** values are those above the 12.6 percent threshold or below $76,417.

Source: U.S. Census Bureau ACS 2023 5-Year Estimates Table S1702

Figure 7-1 Census Tracts by Recharge Area



GEI Consultants, 2026

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Minority Populations

According to the federal Council on Environmental Quality (CEQ) guidelines for environmental justice analyses, minority populations should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is "meaningfully greater" than the majority population percentage in the general population or other appropriate unit of geographic analysis.[2] CEQ guidance does not define the term "meaningfully greater;" however, the Federal Interagency Working Group on Environmental Justice NEPA Committee's *Promising Practices for EJ Methodologies* suggests that the 50 percent approach and the "meaningfully greater" approach should be used together, and that "[t]he Meaningfully Greater analysis requires use of a reasonable, subjective threshold (e.g., ten or twenty percent greater than the reference community)."[3] This analysis embraces the NEPA Committee's advice on this approach.

Information regarding racial and ethnic diversity within the Place of Use was derived from the 2018-2023 ACS 5-Year Estimates by the U.S. Census Bureau. Of the census tracts impacted by the proposed groundwater pumping stations, approximately 43 percent, or 30 of the 69 affected census tracts have been identified as minority populations, as shown in Table 7-1.[4] Minority populations are dispersed throughout the Place of Use; however, there is a heavy concentration in the NSJWCD, SEWD, and City of Stockton Recharge Areas, where 14 out of 32 census tracts are minority populations. The ASR Well Recharge Area consists of 2 minority populations which accounts for a third of all tracts in this recharge area, and the West Linden Recharge Area contains one.

Because the MICUP service area has a minority population over 50 percent (approximately 62 percent), the "meaningfully greater" approach is not used here to identify minority populations.

Low-Income Populations

The CEQ environmental justice guidance states that "…low-income populations in an affected area should be identified with the annual statistical poverty thresholds from the Bureau of the Census' Current Population Reports, Series P-60 on Income and Poverty".[2] USEPA guidance recommends the use of Census data on poverty income as one indicator, as well as other available data. Unlike the CEQ guidance on minority populations, none of the environmental justice guidance documents contains a quantitative definition of what proportion of low-income individuals defines a low-income population. The annual statistical poverty thresholds are based on family income. A threshold of 50 percent of individuals in families with incomes below the poverty threshold (similar to the 50 percent threshold used to identify a minority population) would be an overly restrictive threshold for identifying a low-income population due to the nature of the poverty thresholds, which are not adjusted for regional costs of living, and are below levels commonly considered low-income in many areas of California.

[2] Council on Environmental Quality (CEQ). 1997. Environmental Justice: Guidance Under the National Environmental Policy Act. https://www.epa.gov/sites/default/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf (accessed December 2024).
[3] Federal Interagency Working Group on Environmental Justice (FIWGEJ). 2016. Promising Practices for EJ Methodologies in NEPA Reviews. https://www.epa.gov/sites/default/files/2016-08/documents/nepa_promising_practices_document_2016.pdf (accessed December 2024).
[4] U.S. Census Bureau. 2023. ACS 2023 5-Year Estimates, Table S0501: Selected Characteristics of the Native and Foreign-Born Populations. https://data.census.gov/table/ACSST5Y2023.S0501?q=San%20Joaquin%20County,%20California%20Populations%20and%20People (accessed December 2024).

For the purpose of this environmental justice analysis, the method of identifying low-income populations within the Place of Use must account for regional costs of living. Therefore, this analysis uses a comparative approach and identifies a low-income population if the proportion of people with family incomes below the poverty threshold is greater than that within the general population; in other words, if the percentage of the census tract identified within the recharge areas is greater than 12.6 percent, which is the poverty rate in San Joaquin County.[5] One Census Tract (36.02) within the ASR Well Recharge Area, NSJWCD, SEWD, and City of Stockton Recharge Areas, and West Linden Recharge Area has a percentage of households below the poverty threshold of 13.6 percent. Additionally, California's Integrated Regional Water Management guidelines provide criteria for identifying disadvantaged communities (DACs) during water resource planning efforts. Under the California Water Code, a DAC is defined as one with an annual household income that is less than 80 percent of the Statewide median household income (California Water Code, Section 79505.5[a]). The Statewide median household income during 2023 when the census tract data was gathered was $95,521. Therefore, the threshold of 80 percent of the Statewide median is $76,417. As shown in Table 7-2, 10 census tracts are below the 80 percent threshold, with nine located in the NSJWCD, SEWD, and City of Stockton Recharge Areas. Of the nine census tracts located in the NSJWCD, SEWD, and City of Stockton Recharge Areas, two are within NSJWCD jurisdiction, one is within SEWD jurisdiction, six are within the City of Stockton jurisdiction.

7.1.3 Impacts and Mitigation Measures

Specific Thresholds of Significance

For the purposes of this EIR and consistency with NEPA and CEQA-Plus Guidelines, applicable local plans, and agency and professional standards, the proposed project would be considered to have a significant effect on environmental justice if it would:

- Affect the health or environment of minority or low-income populations disproportionately.

Impact Discussion

Construction

- **Air Quality.** MICUP construction impacts related to air quality management plans consistency would be less than significant with mitigation incorporated. Each individual proposed project region is under the SJVAPCD significance threshold, and each region is separated geographically to such an extent that overlapping emissions contributions, were they to occur, would not contribute to an exceedance of the NAAQS or CAAQS. Therefore, impacts related to daily emissions for the proposed project would be less than significant. NSJWCD construction impacts related to TAC emissions exposure would be less than significant with implementation of Mitigation Measure AQ-2. Construction impacts related to objectionable odors would be considered less than significant.
- **Hazards, Hazardous Materials, and Wildfire.** MICUP construction activities could result in the release of potentially hazardous materials, which may occur within 0.25 mile of a school. However, compliance with local, regional, State, and federal regulations related to hazardous materials would minimize the risk of releases and exposure to these materials. Impacts would be less than significant. In the event that a project component would be constructed on or near

[5] U.S. Census Bureau. 2023. S1702: Poverty Status in the Past 12 Months of Families. S1702: Poverty Status in the Past ... - Census Bureau Table (accessed December 2024).

a contaminated site, construction of the project components would represent a potentially significant hazard to the public or the environment during construction activities. Impacts related to safety hazards and excessive noise for people residing or working the plan areas are limited to operational impacts. No respective construction impacts would occur. Project construction could temporarily result in changes to emergency evacuation routes such that the use of an evacuation route would be hindered during construction activities. Implementation of Mitigation Measure TRA-1 would reduce potentially significant impacts to a less than significant level. Construction vehicle and equipment activities would not substantially increase existing fire risk. Therefore, construction impacts would be less than significant.

- **Noise.** Construction of MICUP project components would temporarily increase noise levels, potentially affecting nearby noise-sensitive land uses. construction noise impacts would be reduced through project-specific Construction Noise Management Plans as part of Mitigation Measure NOI-1. Construction of project components facilitated by the proposed project would temporarily generate groundborne vibration, potentially affecting nearby structures located within certain distances. To reduce vibration impacts during construction, Mitigation Measure NOI-3 is provided. Project components facilitated by MICUP would be located outside of the noise contours for all nearby airports and would not expose workers to excessive aircraft-related noise. Airport noise impacts would be less than significant.
- **Transportation.** With respect to conflicts with circulation system policies, plan, or programs related to roadways, NSJWCD, SEWD, and City of Stockton construction impacts associated with pipeline construction or improvements would be less than significant with implementation of Mitigation Measure TRA-1. While construction activities may marginally generate VMT related to construction worker commutes, haul trips, truck deliveries, and detour route, construction would not substantially impact regional VMT. Construction impacts related to VMT would be less than significant. Construction of the proposed project could create incompatible uses that introduce hazards to roadways. This impact would be less than significant with the implementation of Mitigation Measure TRA-1. Construction of the proposed project could impact emergency services and response times, and could impede access to emergency evacuation routes. This impact would be less than significant with the implementation of Mitigation Measure TRA-1.
- **Water Quality.** Project components facilitated by MICUP would be located outside of the noise contours for all nearby airports and would not expose workers to excessive aircraft-related noise. Airport noise impacts would be less than significant. MICUP project components and facilities could result in erosion or siltation during construction. However, implementation of a SWPPP, water pollution control plan, and additional BMPs for in-water work would reduce impacts. Construction Impacts would be less-than-significant with mitigation. MICUP project components and facilities would not release pollutants due to inundation. Impacts would be less than significant. MICUP project components and facilities could violate water quality standards, waste discharge requirements or degrade groundwater quality during construction if the mobilization of sediment, contamination, or inadvertent spills or leaks occur. However, implementation of a SWPPP, water pollution control plan, Phase I environmental Site Assessments, and additional BMPs for in-water work would reduce impacts. Construction Impacts would be less-than-significant with mitigation. MICUP project components and facilities would not decrease groundwater supplies or interfere with groundwater recharge such that the proposed project would impede sustainable groundwater management of the Eastern San Joaquin Subbasin. Impacts would be less than significant. Construction of MICUP project components and facilities would not interfere with groundwater recharge such that the proposed project would impede sustainable groundwater management of the Eastern San

Joaquin Subbasin. MICUP project components could conflict with water quality objectives identified in the Basin Plan. However, implementation of mitigation measures including implementation of a SWPPP, water pollution control plan, Phase I environmental Site Assessments, and additional BMPs for in-water work would reduce impacts during construction; and implementation of Flood-MAR design parameters, initial site assessments, and hazardous soil remediation, as well compliance with General WDRs for ASR wells would reduce impacts during construction. Impacts would be less-than-significant with mitigation.

- **Water Supply.** Construction of the proposed pump station improvements, new underground pipelines, and new recharge facilities would involve ground-disturbing activities that may require a temporary water supply for dust suppression, pressure testing, and cleaning facilities. Construction-related BMPs implemented under project-specific SWPPPs would include measures to practice water conservation and avoid excess runoff of applied water. However, NSJWCD, SEWD, COSMUD, Cal Water Stockton District, and City of Stockton water supplies would be available. Therefore, construction impacts on water supply would be less than significant.

Therefore, MICUP environmental justice construction impacts would be less than significant with mitigation.

Operation

As discussed above, 30 census tracts that traverse the various recharge basins would be considered minority populations. In addition, the study area analyzed for environmental justice impacts is the Place of use that contains 16 census tracts that would be considered low-income.

While the proposed project would be located in census tracts that are low-income or contain minority populations, the environmental impacts associated with construction and operation/ maintenance activities would not have significant effects on the environment or the public. Based on the analysis of impacts provided in Chapter 4 of this EIR, the proposed project would not have significant operational effects related to air quality, noise, transportation, water quality, water supply, or due to hazards or hazardous materials. A summary of these analyses is provided below.

- **Air Quality.** MICUP operational impacts related to air quality management plans consistency would be less than significant. Overall, operation and maintenance of MICUP facilities would not require additional staff and would not increase vehicle trips. Any potential increase in emissions associated with the proposed project would be minimal. Impacts related to operational emissions are less than significant. NSJWCD operational impacts related to TAC emissions exposure would be less than significant. The proposed project would not generate objectionable odors affecting a substantial number of people, and impacts would be less than significant.
- **Hazards, Hazardous Materials, and Wildfire.** Project operational impacts related to a hazard to the public or the environment through routine transport, use or disposal of hazardous materials or reasonably foreseeable upset and/or accidental release of hazardous materials, including within 0.25 mile of a school, would be less than significant. No operational use or maintenance impact would occur with regard to hazardous materials site risk at any district. The MICUP project components would not be located within an airport land use plan nor within two miles of a public or private airstrip and so would not contribute to a safety hazard or result in excessive noise to people residing or working in the Place of Use. Impacts would be less than significant. The San Joaquin County Multi-Jurisdictional Hazard Mitigation Plan includes evacuation strategies to reduce the risk associated with wildfires in the County and cities within

San Joaquin County. As such, impacts would be less than significant. Overall, the project would also increase water supply for use in agricultural land use irrigation across the NSJWCD, SEWD, and City of Stockton. Operational impacts related to wildfire risk would be less than significant.

- **Noise.** Development of MICUP project components would also introduce new noise sources and potentially affect nearby noise-sensitive land uses depending on the final locations of project components. To reduce noise impacts during operation, Mitigation Measure NOI-2 is provided. This impact would be less than significant with mitigation. Operation of project components facilitated by the proposed project would not result in substantial groundborne vibration levels. This impact would be less than significant with mitigation. Project components facilitated by MICUP would be located outside of the noise contours for all nearby airports and would not expose workers to excessive aircraft-related noise. Airport noise impacts would be less than significant.
- **Transportation.** With respect to conflicts with circulation system programs related to roadway, pedestrian, bicycle, and transit facilities, no operational impacts would occur. Monitoring, maintenance, and inspection activities are anticipated to occur once per quarter, and current employees would be used for such activities. Therefore, MICUP operations can be presumed to result in a less-than-significant VMT impact based on OPR's Screening Threshold for Small Projects that generate fewer than 110 trips per day. Operational activities would not substantially increase hazards because of a geometric design feature or incompatible uses. Operational activities would not effect emergency vehicle access.
- **Water Quality.** Operation and maintenance activities associated with MICUP project components and facilities would not degrade surface water quality or conflict with a Water Quality Control Plan. Operation impacts would be less than significant. Operation of MICUP project components and facilities would not result in erosion or siltation, increase the rate of surface runoff, exceed capacities of stormwater drainage systems, or impede or redirect flood flows. Operational impacts would be less than significant. MICUP project components and facilities would not release pollutants due to inundation. Impacts would be less than significant. Operation of NSJWCD, SEWD, City of Stockton, and ASR Wells in the Project area could violate water quality standards, waste discharge requirements or degrade groundwater quality. However, implementation of Flood-MAR design parameters, initial site assessments, and hazardous soil remediation, as well compliance with General WDRs for ASR wells would reduce impacts. Operational impacts would be less-than-significant with mitigation. MICUP project components and facilities would not decrease groundwater supplies or interfere with groundwater recharge such that the proposed project would impede sustainable groundwater management of the Eastern San Joaquin Subbasin. Impacts would be less than significant Operation of MICUP project components and facilities would not interfere with groundwater recharge such that the proposed project would impede sustainable groundwater management of the Eastern San Joaquin Subbasin. MICUP project components could conflict with water quality objectives identified in the Basin Plan. However, implementation of Flood-MAR design parameters, initial site assessments, and hazardous soil remediation, as well compliance with General WDRs for ASR wells would reduce impacts during operation. Impacts would be less-than-significant with mitigation.
- **Water Supply.** MICUP project components within the NSJWCD and City of Stockton areas would provide the operational capacity to divert water supplies that would improve existing conditions for groundwater recharge, resulting in improved water supply availability and reliability across the Eastern San Joaquin Groundwater Subbasin during normal, dry, and multiple dry years. In addition, maintenance activities associated with the operation of the new recharge facilities

within the NSJWCD, SEWD, and City of Stockton areas would not introduce a new water demand. Therefore, operational impacts on water supply would be less than significant.

In addition to physical operational impacts, operational coordination of the proposed project is not anticipated to create equity issues related to water availability or use. While there are low-income and minority populations present within the project area, water resources procured through this project would be used for the benefit of the entire region. Water would not be diverted from any community, including disadvantaged communities, as water for the MICUP is water that flows from the Sierra Mountains that would otherwise flow out to the Pacific Ocean and is being captured for use in the region. Therefore, MICUP environmental justice operational impacts would be less than significant with mitigation.

7.2 Climate Change

The National Environmental Policy Act requires that any agency taking an action that has a federal nexus (i.e., federal permitting connection and/or funding) assess a proposed action's environmental effects in the context of and in conjunction with the anticipated effects of climate change.

7.2.1 Regulatory Framework

NEPA Guidance on Consideration of Effects of Climate Change

CEQA proposes that agencies should determine which climate change impacts warrant consideration, because of their impact on the analysis of the environmental effects of a proposed action. Agencies should consider the specific effects of the proposed action (including the proposed action's effect on the vulnerability of affected ecosystems), the nexus of those effects with projected climate change effects on the same aspects of our environment, and the implications for the environment to adapt to the projected effects of climate change. When assessing the effects of climate change on a proposed action, an agency typically starts with an identification of the reasonably foreseeable future condition of the affected environment for the "no action" alternative based on available climate change measurements, statistics, observations, and other evidence. Climate change effects should be considered in the analysis of projects that are designed for long-term utility and located in areas that are considered vulnerable to specific effects of climate change within the project's timeframe.

Sustainable Groundwater Management Act

In 2014, the State adopted the Sustainable Groundwater Management Act (SGMA) to help manage its groundwater. According to the act, local Groundwater Sustainability Agencies (GSAs) must be formed for all high- and medium-priority basins in the State. These GSAs must develop and implement GSPs for managing and using groundwater without causing undesirable results, including significant groundwater-level declines, groundwater-storage reductions, seawater intrusion, water-quality degradation, land subsidence, and surface-water depletions.[6] These are also referred to as sustainability indicators. The California Department of Water Resources (DWR) and State Water Resources Control Board (SWRCB) are the two lead State agencies that implement the SGMA.

[6] California Department of Water Resources. 2025. Sustainable Groundwater Management Act. Available: https://water.ca.gov/programs/groundwater-management/sgma-groundwater-management. Accessed February 6, 2025.

SGMA requires that all designated medium and high-priority groundwater basins be managed in a sustainable manner within 20 years of GSP adoption. SGMA also requires that GSAs demonstrate sustainability through the avoidance of undesirable results. The presence of significant and unreasonable effects for any of the indicators, if left uncorrected, could result in State intervention in the management of groundwater in the Subbasin. In compliance with SGMA, GSPs should be evaluated regarding their progress towards meeting the approved sustainability goals at least every five years.[7]

Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan

The Eastern San Joaquin Groundwater Subbasin (ESJSB; Bulletin 118 Basin Number 5-0022.01) is one of 21 basins and subbasins identified by DWR as being in a state of critical overdraft.[8] For compliance with SGMA, the ESJSB was required to prepare a GSP to achieve sustainability for long-term management of the ESJSB without causing undesirable results.

The Eastern San Joaquin Groundwater Authority, formed in 2017 in response the SGMA, is comprised of 16 GSAs in the ESJSB, including the three MICUP Partner Agencies of NSJWCD, SEWD, and City of Stockton. To address the requirements of SGMA, the original GSP was developed by the GSAs and submitted by the January 31, 2020 deadline. The 2020 GSP was subsequently revised to address two deficiencies identified by DWR and potential corrective actions to address each potential deficiency. In July 2022, the GSAs submitted the 2022 Revised ESJSB GSP to DWR. DWR's July 2023 letter of determination concluded that the GSAs have taken sufficient actions to correct the deficiencies identified by DWR and approved the 2022 Revised GSP. The 2023 determination letter also outlined eight recommended corrective actions. The Final 2024 GSP Amendment was prepared to adequately address the recommended corrective actions and submitted in January 2025 for DWR review.[9]

Pursuant to SGMA, the ESJSB GSP sets the following sustainability goal:

> "Maintain economically-viable groundwater resources for the beneficial use of the people of the Eastern San Joaquin Subbasin by operating the Subbasin within its sustainable yield or by modification of existing management to address future conditions. This goal will be achieved through the implementation of a mix of supply and demand type projects consistent with the GSP implementation."

The ESJSB GSP established minimum thresholds and measurable objectives for a series of representative monitoring wells to determine compliance with SGMA with respect to each of the six sustainability indicators. Minimum thresholds are numeric values for each sustainability indicator and are used to define when undesirable results occur. Measurable objectives are quantifiable goals that reflect the desired Subbasin condition for achieving sustainability. Representative networks were used to determine compliance with the minimum thresholds and demonstrate progress toward achieving sustainability in the ESJSB.

[7] *Ibid*

[8] California Department of Water Resources. 2006. Bulletin 118: San Joaquin Valley Groundwater Basin Eastern San Joaquin Subbasin. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Bulletin-118/Files/2003-Basin-Descriptions/5_022_01_EasternSanJoaquinSubbasin.pdf. Accessed February 6, 2025.

[9] East San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available : https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NggK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

7.2.2 Environmental Setting

The following discussion is based on the best available climate science and includes consideration of future climate projections when discussing the environmental setting.

Climate Change Conditions Anticipated for San Joaquin County

The San Joaquin Valley Region Report is part of California's Fourth Climate Change Assessment. The report is part of a series of twelve assessments to support climate action by providing an overview of climate-related risks and adaptation strategies tailored to specific regions and themes. The San Joaquin Valley region has the highest concentration of rural disadvantaged communities and the most stressed ecosystems of California, while also hosting the largest extension of irrigated agricultural land. Climate change may impact the San Joaquin Valley disproportionally more than other regions of California from water resources and infrastructure to ecosystems and agriculture.[10]

The San Joaquin Valley is a major agricultural hub producing a wide variety of crops, including grapes, almonds, walnuts and tomatoes. Climate change is likely to worsen conditions for agriculture, making it difficult to sustain some traditionally grown crops. Direct effects like water shortages, fewer chill hours, and more extreme heat waves, along with indirect effects such as increased crop pests and water scarcity, are expected to reduce the suitability of various crops. These impacts may also influence commodity markets, labor dynamics, and regulatory policies.[11] Drought related climate vulnerability greatly impacts disadvantaged communities and agriculture in the San Joaquin Valley. As droughts become more frequent and severe in the San Joaquin Valley, the need for groundwater for farming will rise, while the supply of groundwater will diminish. This will exacerbate the challenges faced by disadvantaged communities that depend on wells for their household water needs. These challenges will lead to water quality issues, increasing the risk of contaminants and impacting water infrastructure, systems, demand, and treatment.

Ecosystems of the San Joaquin Valley are among the most degraded and impacted by human development in California. Climate change threatens ecosystem functions and services and its compounding effects along with human impacts make the San Joaquin Valley one of the most climate-vulnerable regions in California.[12] Drought related impacts not only significantly affect agriculture but also make ecosystems equally vulnerable. The extensive transformation of wetlands and grasslands into agricultural and urban areas, along with ongoing changes to aquatic ecosystems through activities like damming and dredging, has led to fragmented and degraded habitats. These areas are increasingly invaded by non-native species, adding new stressors to natural processes. Climate change further exacerbates these issues, hindering these ecosystems from performing vital functions and services essential to human well-being.

Future Condition of Surface Waters with Climate Change

Intensifying climate change is likely to degrade surface water quality and reduce its availability. The San Joaquin Valley already suffers from serious water quality issues that inequitably impact rural disadvantaged communities. Climate change will likely exacerbate existing water quality issues through indirect effects such as reduced water quality in source waters after wildfires, algae bloom due to higher temperatures, and increased concentration of contaminants as water is reduced in

[10] State of California. 2022. San Joaquin Valley Region Report for California's Fourth Climate Change Assessment. Available: https://www.energy.ca.gov/sites/default/files/2022-01/CA4_CCA_SJ_Region_Eng_ada.pdf. Accessed February 7, 2025.
[11] Ibid.
[12] Ibid.

surface and groundwater reservoirs, among other effects.[13] The ESJSB GSP includes an assessment of projected surface water supply and demand conditions with the impacts of climate change. The projected water budget with climate change assesses the conditions of the Subbasin under future conditions of water supply and agricultural and urban demand, with the additional impact of climate change on the available water supply and agricultural demand.

Average annual surface water inflows to the ESJSB's stream system total an average of just under 6.0 million acre-feet (MAF)/year in the projected conditions with climate change scenario. Under projected conditions with climate change, stream inflows of 4.9 MAF/year are augmented by stream gains from groundwater of 115,000 AF/year and runoff of precipitation to the stream system (753,000 AF/year) and return flow of applied water to the stream system (112,000 AF/year). Of these inflows, it is anticipated that 340,000 AF/year will be distributed to local growers to meet agricultural demand as surface water diversions and the remaining amount will leave the system in the form of San Joaquin River and Mokelumne River outflows (5.1 MAF/year), stream seepage (420,000 AF/year), and riparian intake from streams (40,000 AF/year).

The land surface water budget for the projected conditions with climate change scenario has annual average inflows and outflows of 2,520,000 AF/year. Inflows consist of precipitation (1,087,000 AF/year), surface water supply (525,000 AF/year), groundwater supply (879,000 AF/year), and riparian intake from streams (29,000 AF/year). The balance of this is the summation of average annual evapotranspiration (1,384,000 AF/year), runoff of precipitation to the stream system (753,000 AF/year), return flow of applied water to the stream system (112,000 AF/year), deep percolation (268,000 AF/year), and other flows due to land expansion and temporary storage in the root-zone and unsaturated (vadose) zones (5,000 AF/year).

Future Condition of Groundwater Basin with Climate Change

Increased surface water scarcity due to the effects of climate change is anticipated to result in greater reliance on groundwater and a resulting depletion in groundwater supply and groundwater quality within the San Joaquin Valley region.[14] The ESJSB GSP includes an assessment of projected groundwater supply and demand conditions with the impacts of climate change. The projected water budget with climate change assesses the conditions of the Subbasin under future conditions of water supply and agricultural and urban demand, with the additional impact of climate change on the available water supply and agricultural demand.

Climate change is anticipated to result in a total groundwater pumping of 879,000 AF/year, which represents an increase relative to conditions without climate change. Under projected conditions with climate change, the groundwater system of the ESJSB experiences an average of 1,044,000 AF/year of inflows each year, of which 268,000 AF/year is deep percolation. There is also stream seepage (330,000 AF/year), as well as other recharge which includes recharge from canals, reservoirs, and MAR projects (168,00 AF/year), and subsurface inflows (222,000 AF/year) from the Sierra Nevada Mountains and the neighboring subbasins of Cosumnes, Modesto, South American, Solano, East Contra Costa, and Tracy. The projected water budget has greater outflows than inflows, resulting in an average annual decline in groundwater storage of 56,000 AF/year. The overdraft modeled under climate change conditions is simulated to increase above projected conditions without climate change. The modeling indicates that pumping reductions or offsets of 166,000 AF/year would achieve a modeled zero change in storage in the subbasin and result in a general increase in groundwater levels, compared to a projected conditions baseline that does not include

[13] Ibid.
[14] Ibid.

the 166,000 AF/year of pumping reduction or offset.[15] While the model shows zero change in storage with the proposed pumping reduction, this outcome does not necessarily meet SGMA sustainability criteria. SGMA requires avoiding undesirable results across multiple indicators, not just stabilizing storage.[16]

7.2.3 Impacts and Mitigation Measures

Under NEPA, federal agencies are required to consider the potential impacts of climate change when analyzing the environmental effects of proposed actions, including assessing how a proposed project might contribute to climate change and how climate change could affect the project itself, by evaluating factors like greenhouse gas emissions and the potential vulnerability of the project site to climate change-related events. Since the discussion of how the proposed project could contribute to climate change is discussed in Section 4.7, *Greenhouse Gas Emissions and Energy*, the following discussion is limited to how climate change could affect the project itself.

Specific Thresholds of Significance

For the purposes of this EIR and consistency with NEPA and CEQA-Plus Guidelines, applicable local plans, and agency and professional standards, the proposed project would be considered to have a significant effect related to climate change if:

- Climate change would magnify the damaging strength of certain effects of a proposed action;
- Climate change would affect the integrity of a development or structure by exposing it to a greater risk of floods, storm surges, or higher temperatures; or
- Climate change would increase the vulnerability of a resource, ecosystem, or human community, causing a proposed action to result in consequences that are more damaging than prior experience with environmental impacts analysis might indicate.

Impact Discussion

Construction

Climate change impacts are limited to impacts that would occur during project operation. Therefore, no federal climate change construction impacts would occur.

Operation

Drought and less precipitation associated with ongoing and anticipated climate change could result in less available MICUP water for capture off the river and, thus, less water storage in the groundwater basin. This in turn could result in depleted groundwater sources for agricultural irrigation as well as subsidence of the land area above the ESJSB. According to the California Department of Water Resources Draft Land Subsidence Best Management Practices document, groundwater extraction can cause irreversible compaction, resulting in land subsidence,

[15] East San Joaquin Groundwater Authority. 2024. Eastern San Joaquin Groundwater Subbasin, 2024 Groundwater Sustainability Plan Amendment: Agency Information, Plan Area, and Communication. Available: https://www.esjgroundwater.org/Portals/0/assets/docs/GSP/ESJ%202024%20GSP%20Compiled_November%202024%20Compressed.pdf?ver=NgqK0zbMAVv6BQnU6KNf9g%3d%3f. Accessed January 23, 2025.

[16] California Department of Water Resources. 2025. Sustainable Groundwater Management Act Brochure. Available: https://resources.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Sustainable-Groundwater-Management/Files/SGMA-Brochure_Online-Version_FINAL_updated.pdf. Accessed August 15, 2025.

infrastructure damage, and reduced aquifer capacity.[17] Alternatively, and during different years, increased storm events and river flows associated with ongoing and anticipated climate change could result in more available MICUP water for capture and storage in the ESJSB. Furthermore, there could be year by year or grouping of years swings from drought-prominent years to storm-prominent years. These multiple and varied future scenarios are exemplification of climate change.

MICUP is intended to capture and store excess water beyond the amounts of water that can currently be diverted and used or stored under established senior water rights. MICUP diversions would not interfere with releases of water for fishery purposes. The capturing and storing of such excess water would both capitalize on storm-prominent years as well as provide a mechanism for water storage that does not entail construction and operation of a new aboveground water reservoir. This approach leverages storm years for water storage, mitigating the amplified negative effects of climate change related to water supply. The installation of new surface water reservoirs themselves could have adverse impacts to the ecosystem areas that they would convert for such use. Thus, the proposed project would lessen the damaging effects of climate change.

Increasing water scarcity and overreliance on groundwater resources, especially during drought periods, are driving changes in the way California is managing water use and demands. The SGMA has implications on agricultural land use and irrigation pumping. Following agricultural land can lead to increased soil erosion and dust issues if agricultural practices are not modernized, which may lead to health impacts on already negatively affected rural communities. Collaborative approaches including policymakers, academia, disadvantaged community members, farmers, industry, and environmental organizations may effectively transition land to alternative uses that increase water security while improving socioeconomic conditions for communities and agriculture.[18]

In the face of climate change, the integrity of developments and structures is increasingly at risk. As droughts continue to affect the San Joaquin Valley with increasing frequency and intensity, the demand for groundwater will rise while its availability decreases. This will worsen the multidimensional issues faced by disadvantaged communities relying on wells for domestic water use. Additionally, temperature increases will promote earlier water release from reservoirs, reducing water availability for summer and drought periods, and leading to larger freshwater amounts being delivered to the Delta during peak flows. The San Joaquin Valley also anticipates more frequent and severe droughts and floods, further increasing the demand for groundwater for agriculture while decreasing its availability. However, the proposed project would support the regional water systems to help improve climate resiliency and adaptation via a more sustainable groundwater basin. Increased and more resilient water supply would help make the region more resilient to climate impacts, such as droughts and extreme weather events.

The ESJSB GSP includes several strategies to mitigate the impacts of climate change including enhanced groundwater recharge and promoting water conservation and efficiency. They will promote monitoring and data collection which would enhance the monitoring of groundwater levels and quality to better understand and manage the resource as well as stakeholder collaboration and engagement from local communities and farmers to develop and implement sustainable water

[17] California Department of Water Resources. 2025. Draft Land Subsidence Best Management Practices of the Sustainable Management of Groundwater. Available: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Subsidence/Files/Subsidence_BMP_Public_Draft.pdf?utm_medium=email&utm_source=govdelivery. Accessed August 15, 2025.

[18] State of California. 2022. San Joaquin Valley Region Report for California's Fourth Climate Change Assessment. Available: https://www.energy.ca.gov/sites/default/files/2022-01/CA4_CCA_SJ_Region_Eng_ada.pdf. Accessed February 7, 2025.

management practice.[19] While some of the water supply obtained under the MICUP project would be utilized for irrigation purposes, the project would help implement the ESJSB GSP strategies that aim to provide longer-term groundwater sustainability, protect water quality, and support the region's agricultural and domestic water needs. Without the implementation of MICUP, climate change would markedly increase the vulnerability of resources, ecosystems, and communities in San Joaquin County. Modeling also indicates that supplementing the subbasin with surface water either through recharge or irrigation in lieu of pumping increases groundwater levels and reduces groundwater gradients. These changes decrease net seepage from surface streams and reduce inflows from adjacent basins, further contributing to regional groundwater stability.

Therefore, MICUP federal climate change operational impacts related to potentially magnifying climate effects, affecting the integrity of infrastructure due to flood or drought exposure, or increasing the vulnerability of a resource, ecosystem, or human community would be less than significant.

7.3 Federal Air Quality

The Federal Clean Air Act (FCAA) requires any federal agency taking an action, including funding an action, must make a determination that its action would not conflict with a State Implementation Plan (SIP). As part of the implementation of the FCAA, the United States Environmental Protection Agency (US EPA) has developed rules for transportation projects and non-transportation projects. The rule applicable to the proposed action is referred to as the "General Conformity Rule."

7.3.1 Regulatory Framework

Federal Clean Air Act

Section 176(c) of the FCAA, as amended (42 United States Code [U.S.C.] 7401 et seq.) prohibits federal agencies from engaging in, supporting, providing financial assistance to, or issuing permits for activities, which do not conform to an applicable State Implementation Plan (SIP). As codified in Title 40 Code of Federal Regulations (CFR) Part 51 Subpart W and 40 CFR Part 93 Subpart B: General Conformity, the FCAA requires federal agencies to ensure that actions taken by those agencies conform to the applicable SIP. The FCAA applies only to direct and/or indirect criteria pollutant emissions caused by the actions that occur in areas designated as nonattainment or maintenance areas with respect to National Ambient Air Quality Standards (NAAQS). These regulations require an applicability analysis to determine whether the federal action must be supported by a conformity determination. Under the General Conformity Rule, the FCAA applicability analysis is established for federal actions performed in locations with a history of non-compliance, as described below:

a. An area that is in nonattainment (i.e., has recorded violations of the NAAQS) for each criteria pollutant (such as ozone, carbon monoxide, and particulate matter) for which the area is designated nonattainment
b. An area designated as nonattainment that was later re-designated by the Administrator of the US EPA as an attainment area and that is therefore required to develop a maintenance plan under 42 U.S.C. Section 7505a with respect to the specific pollutant(s) for which the area was previously designated nonattainment

[19] East San Joaquin Groundwater Authority. 2022. Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan Available https://www.sjgov.org/docs/default-source/public-works-documents/water-resources/final-esj-revised-gsp_june2022_clean.pdf?sfvrsn=675b059b_5. Accessed February 7, 2025.

A General Conformity determination is required when emissions from a project are expected to equal or exceed the de minimis emissions thresholds established in 40 CFR §93.153. There is a set of thresholds for areas designated as Federal Nonattainment and a set of thresholds for areas designated as Federal Maintenance.

The General Conformity regulations contain information, for example, on its applicability to federal projects, reporting requirements, conformity evaluation and determination, and timing of mitigation measures. This policy focuses on three specific General Conformity requirements:[20]

1. Pollutants to be mitigated: When a pollutant exceeds its General Conformity threshold, General Conformity requires mitigation of that pollutant only. Per §93.158(a), "…for each pollutant that exceeds the rates in §93.153(b)…"
2. Number of years for mitigation: The General Conformity regulations do not specifically limit the mitigation of a pollutant to only the year it exceeds its General Conformity threshold. Therefore, when a pollutant exceeds its General Conformity threshold for one year, General Conformity requires mitigation of that pollutant for all project years.
3. Level of mitigation: When a pollutant exceeds its General Conformity threshold, General Conformity requires full mitigation down to zero per §93.158(a)(2) "…so that there is no net increase in emissions of that pollutant;…"

7.3.2 Environmental Setting

Regional Climate and Meteorology

The proposed project area encompasses a large portion of the San Joaquin Valley Air Basin (SJVAB). The SJVAB encompasses the southern half of the California Central Valley and is comprised of eight counties: San Joaquin, Stanislaus, Fresno, Merced, Madera, Kings, Tulare, and western Kern County. The SJVAB is approximately 250 miles long and 35 miles in width (on average) and is bordered by the Sierra Nevada Mountains in the east (8,000 to 14,500 feet in elevation), the Coast Ranges in the west (averaging 3,000 feet in elevation), and the Tehachapi Mountains in the south (6,000 to 8,000 feet in elevation).

The overall climate in the SJVAB is warm and semi-arid. The San Joaquin Valley is in a Mediterranean climate zone. Mediterranean climate zones occur on the west coast of continents at 30 to 40 degrees latitude and are influenced by a subtropical high-pressure area most of the year. Mediterranean climates are characterized by sparse rainfall, which occurs mainly in the winter. There is only one wet season during the year and 90 percent of the precipitation falls during October through April. Snow in the San Joaquin Valley is infrequent and thunderstorms seldom occur. Summers are hot and dry. Summertime maximum temperatures often exceed 100 degrees Fahrenheit (°F) in the San Joaquin Valley. The SJVAB's topography has a dominating effect on wind patterns. Winds tend to blow somewhat parallel to the valley and mountain range orientation. In spring and early summer, thermal low-pressure systems develop over the interior basins east of the Sierra Nevada mountain range, and the Pacific High (a high-pressure system that develops over the central Pacific Ocean near the Hawaiian Islands) moves northward. These meteorological developments and the topography produce the high incidence of relatively strong northwesterly winds in the spring and early summer.

[20] San Joaquin Valley Air Pollution Control District (SJVAPCD). 2023. APR – 2035 General Conformity under the National Environmental Policy Act. https://ww2.valleyair.org/media/wzwmtowa/apr-2035.pdf (accessed February 2025)

The subtropical high-pressure cell is strongest during spring, summer, and fall and produces subsiding air, which can result in temperature inversions in the San Joaquin Valley. A temperature inversion can act like a lid, inhibiting vertical mixing of the air mass at the surface. Any emissions of pollutants can be trapped below the inversion. Most of the surrounding mountains are above the normal height of summer inversions (1,500 to 3,000 feet). Winter-time high-pressure events can often last many weeks with surface temperatures lowering to 30°F. During these events, fog can be present, and inversions are extremely strong. These wintertime inversions can inhibit vertical mixing of pollutants to a few hundred feet.[21]

Existing Local (Project Area) Air Quality

The San Joaquin Valley Air Pollution Control District (SJVAPCD) operates three air quality monitoring stations in the SJVAB within San Joaquin County. The purpose of the monitoring stations is to measure ambient concentrations of pollutants and determine whether ambient air quality meets the California and federal standards.

The nearest air quality monitoring station to the project area is the Stockton-University Park monitoring station, located at 702 North Aurora Street in Stockton. This station is approximately 3.0 miles away from the existing City of Stockton WTP Recharge Basin, the closest project component, and approximately 14 miles away from the existing NSJWCD North System, the farthest project component from the monitoring station. This monitoring station measures ozone, PM_{10}, $PM_{2.5}$ and NO_2. Because monitoring is not generally conducted for pollutants for which the SJVAB is in attainment, there is no recent monitoring data available for CO or SO_2.

Table 7-3 indicates the number of days that each of the federal and State standards has been exceeded at monitoring stations near the NSJWCD Project Components vicinity in each of the last three years for which data is available. The federal and State 8-hour ozone standards were exceeded in 2022. The federal and State 1-hour ozone standards were exceeded in 2022 as well. Additionally, the PM_{10} State standards were exceeded all three years. The $PM_{2.5}$ federal standards were exceeded all three years. No other federal or State standards were exceeded.

[21] San Joaquin Valley Air Pollution Control District (SJVAPCD). 2015a. *Guide for Assessing and Mitigating Air Quality Impacts*, March 19, 2015. https://www.valleyair.org/transportation/GAMAQI.pdf (accessed February 2025).

Table 7-3 Ambient Air Quality Monitoring Data for the Proposed Project

Pollutant	2021	2022	2023
Ozone (ppm), Worst 1-Hour[1]	0.040	0.141	0.086
Number of days of State exceedances (>0.09 ppm)	0	1	0
Ozone (ppm), 8-Hour Average[1]	0.036	0.113	0.068
Number of days of State exceedances (>0.07 ppm)	0	1	0
Number of days of Federal exceedances (>0.07 ppm)	0	1	0
Nitrogen Dioxide, Worst 1-Hour	0.034	0.044	0.045
Number of days above CAAQS (>0.180 ppm)	0	0	0
Number of days above CAAQS (>0.180 ppm)	0	0	0
Particulate Matter <10 microns, μg/m^3, Worst 24 Hours[1]	72.2	81.3	81.5
Number of days above State standard (>50 μg/m^3)	3	24	23
Number of days above Federal standard (>150 μg/m^3)	0	0	0
Particulate Matter <2.5 microns, μg/m^3, Worst 24 Hours[1]	39.5	51.9	40.6
Number of days above Federal standard (>35 μg/m^3)	1	6	6

ppm = parts per million; μg/m^3 = micrograms per cubic meter

[1] Measurements taken from the Stockton-University Park Station

Source: CARB 2025a iADAM: Air Quality Data Statistics Top 4 Summary. https://www.arb.ca.gov/adam/topfour/topfour1.php (accessed February 2025).

7.3.3 Impacts and Mitigation Measures

Specific Thresholds of Significance

For the purposes of this EIR and consistency with NEPA and CEQA-Plus Guidelines, applicable local plans, and agency and professional standards, the proposed project would be considered to have a significant effect related to air quality if it would involve calculation of the total emissions of criteria or precursor pollutants during the years of construction and operation of the proposed action. A conformity determination must be made if the annual emissions exceed the rates specified in 40 CFR Part 93.153(b), referred to as *de minimis* rates. If the applicable emissions exceed the *de minimis* rates outlined in the General Conformity Rule, then the federal agency would prepare a formal General Conformity Determination for public comment.

Based on the federal attainment status for San Joaquin County, Table 7-4 lists the *de minimis* rates that apply to the proposed project. These levels apply to annual emissions generated during construction and operation of the proposed project under federal agency control.

Table 7-4 General Conformity De Minimis Emission Rates for San Joaquin County

Pollutant	Federal Attainment Status Designation	De Minimis Emission Rate (tons/year)[1]
Ozone (VOC and NO_X)	Nonattainment - Extreme	10
NO_2	Unclassified/Attainment[2]	N/A
CO	Nonattainment - Moderate[2]	100
PM_{10}	Nonattainment - Serious[2]	70
$PM_{2.5}$	Nonattainment - Serious[2]	70
SO_2	Unclassified/Attainment[2]	70
Lead	Unclassified/Attainment[2]	N/A

N/A: not applicable (the SFBAAB is not a designated nonattainment or maintenance area for these pollutants); VOC: volatile organic compounds; NO_x: nitrogen oxides; NO_2: nitrogen dioxide; CO: carbon monoxide; PM_{10}: particulate matter 10 microns or less in diameter; $PM_{2.5}$: particulate matter 2.5 microns or less in diameter; SO_2: sulfur dioxide

[1] US EPA. 2024. "De Minimis Tables." Last modified: June 10, 2024. https://www.epa.gov/general-conformity/de-minimis-tables (accessed February 2025).

[2] US EPA. 2024. "California Nonattainment/Maintenance Status for Each County by Year for All Criteria Pollutants" Last modified: May 31, 2024. https://www3.epa.gov/airquality/greenbook/anayo_ca.html (accessed February 2025).

Impact Discussion

The proposed project may receive funding from federal sources; therefore, emissions associated with the proposed project are subject to FCAA requirements under the General Conformity Rule.

Construction

Air pollutant emissions generated by construction and operation of the project were estimated using the methodologies and factors implemented in the California Emissions Estimator Model (CalEEMod), Version 2022. The format of the project information was not ideal for use in the CalEEMod model; rather, the methodologies, data inputs and emission factors were incorporated into an Excel workbook. More information related to calculation methodologies is provided in Section 4.3, *Air Quality*. Emissions were calculated in terms of tons per year (TPY) to compare to the *de minimis* thresholds as discussed above and are shown in Table 7-5 and Table 7-6.

Table 7-5 All Project Components Unmitigated Emissions

	Tons/year					
	ROG	NOx	CO	SO2	PM10	PM2.5
NSJWCD	**1**	**6**	**5**	**< 1**	**1**	**<1**
SEWD	1	9	8	< 1	1	< 1
City of Stockton	1	4	4	< 1	1	< 1
All Project Components	**3**	**19**	**17**	**< 1**	**3**	**1**
Federal De Minimis Thresholds	10	10	100	70	70	70
Exceed Threshold?	No	YES	No	No	No	No

[1]Includes compliance with Rule 8021 dust control measures, which accounts for watering.

Bold values indicate where thresholds are exceeded.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{1.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

Table 7-6 All Project Components Mitigated Emissions

	Tons/year					
	ROG	NOx	CO	SO2	PM10	PM2.5
NSJWCD	**1**	**3**	**6**	**< 1**	**< 1**	**< 1**
SEWD	1	5	10	< 1	1	< 1
City of Stockton	< 1	2	5	< 1	< 1	< 1
All Project Components	**2**	**9.7**	**21**	**< 1**	**1**	**1**
Federal De Minimis Thresholds	10	10	100	70	70	70
Exceed Threshold?	No	No	No	No	No	No

[1]Includes compliance with Rule 8021 dust control measures, which accounts for watering.

Bold values indicate where thresholds are exceeded.

NO_X= Nitrous Oxides; ROG = Reactive Organic Gases; PM_{10} = Particulate matter with a diameter of 10 microns or less; $PM_{1.5}$ = Particulate Matter with a diameter of 2.5 microns or less.

Construction of the proposed project would not exceed the de minimis levels.

Operation

Long-term operational criteria pollutant associated with implementation of the proposed project were discussed qualitatively (please refer to Section 4.3, *Air Quality* for more information). The proposed project is anticipated to have minimal sources of operational criteria pollutant emissions, primarily associated with a few passenger vehicle trips for periodic maintenance. It is anticipated that the proposed project would require quarterly trips for monitoring, maintenance and inspection. This would result in minimal operational emissions of criteria pollutant. Operation of the proposed project would not exceed the de minimis levels.

Overall

Overall, general conformity requirements do not apply. The proposed project would conform to the SIP and is exempt from a General Conformity Determination under FCAA Section 176. Therefore, the lead agency would be in compliance with the FCAA.

7.4 Federal Noise

7.4.1 Regulatory Framework

Federal Transit Administration Construction Noise and Vibration Standards

There are no federal noise and vibration standards or regulations adopted by any agency that are applicable in evaluating noise and vibration impacts from land use development projects such as the proposed project. However, the Federal Transit Administration (FTA) has adopted criteria for use in evaluating noise and vibration impacts from construction activities. [22] Construction noise limits are presented in Table 7-7.

[22] Federal Transit Administration (FTA). 2018. Transit Noise and Vibration Impact Assessment Manual. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/research-innovation/118131/transit-noise-and-vibration-impact-assessment-manual-fta-report-no-0123_0.pdf (accessed February 2025).

Table 7-7 FTA Construction Noise Criteria

Land Use	L_{eq}, equip (8-hour), dBA	
	Day (7:00 a.m. to 10:00 p.m.)	Night (10:00 p.m. to 7:00 a.m.)
Residential	80	70
Commercial	85	85
Industrial	90	90

dBA = A-weighted decibels; L_{eq} = equivalent continuous sound level

Construction vibration thresholds at which minor architectural (i.e., non-structural) damage may occur to buildings of various construction types are presented in Table 7-8.

Table 7-8 FTA Construction Vibration Criteria for Building Damage

Building Category	PPV (in/sec)
I. Reinforced concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Nonengineered timber and masonry buildings	0.2
IV. Buildings extremely susceptible to vibration damage	0.12

PPV = peak particle velocity; in/sec = inches per second

In addition to the building damage vibration criteria shown in Table 7-8, the FTA has also adopted vibration standards for assessing the potential for human annoyance for various land use categories. Human annoyance vibration criteria are based on the vibration sensitivity of each land use and the number of vibration events that may occur per day.[22] These human annoyance vibration criteria are presented in Table 7-9.

Table 7-9 FTA Vibration Criteria for Human Annoyance

Land Use Category	Vibration Impact Levels (VdB)		
	Frequent[1] Events	Occasional[2] Events	Infrequent[3] Events
Category 1: Buildings where vibration would interfere with interior operations.[4]	65	65	65
Category 2: Residences and buildings where people normally sleep.	72	75	80
Category 3: Institutional land uses with primarily daytime use.	75	78	83

VdB= vibration velocity decibel

[1] "Frequent Events" is defined as more than 70 vibration events of the same source per day.

[2] "Occasional Events" is defined as between 30 and 70 vibration events of the same source per day.

[3] "Infrequent Events" is defined as fewer than 30 vibration events of the same kind per day.

[4] This criterion is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes.

The FTA defines Category 1 land uses as buildings where vibration would interfere with operations within the building, including vibration-sensitive research and manufacturing facilities, hospitals with vibration-sensitive equipment, and university research operations. Vibration-sensitive equipment may include, but is not limited to, electron microscopes, high-resolution lithographic equipment, and normal optical microscopes. Category 2 land uses include all residential land uses and any buildings where people sleep, such as hotels and hospitals. Category 3 land uses include

institutional land uses such as schools, churches, other institutions, and quiet offices that do not have vibration-sensitive equipment but that still potentially involve activities that could be disturbed by vibration.

Occupational Safety and Health Act of 1970

Under the Occupational Safety and Health Act of 1970 (29 United States Code [USC] Sections1919 et seq.), the Occupational Safety and Health Administration (OSHA) has adopted regulations designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise level exposure as a function of the amount of time during which the worker is exposed. The regulations further specify a hearing conservation program that involves monitoring noise to which workers are exposed, ensuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.[23]

Noise Control Act of 1972

Under the authority of the Noise Control Act of 1972, the United States Environmental Protection Agency (U.S. EPA) established noise emission criteria and testing methods published in Parts 201 through 205 of Title 40 of the Code of Federal Regulations (CFR) that apply to some transportation equipment (e.g., interstate rail carriers, medium trucks, and heavy trucks) and construction equipment. In 1974, U.S. EPA issued guidance levels for the protection of public health and welfare in residential areas. Outdoor and indoor 24-hour average noise levels of 55 and 45 dBA L_{dn}, respectively, are identified as the levels at which activity interference and annoyance are prevented for activities such as conversation, sleeping, working, and recreation.[24] These guidance levels are not standards or regulations and were developed without consideration of technical or economic feasibility. There are no federal noise standards that directly regulate environmental noise related to the construction or operation of the proposed project. Moreover, the federal noise standards are not reflective of urban environments that range by land use, density, proximity to commercial or industrial centers, etc. As such, for purposes of determining acceptable sound levels to determine and evaluate intrusive noise sources and increases, this document utilizes the San Joaquin County Noise Regulations, discussed in the following section.

7.4.2 Environmental Setting

The proposed project would be located primarily in unincorporated areas of San Joaquin County. Existing sources of noise within San Joaquin County include roadway traffic, aircraft operations, commercial and industrial uses, agricultural operations, active recreation areas, and mining operations. Noise-sensitive land uses within the County include those which may be adversely affected by excessive noise levels. The County's General Plan Public Health and Safety Element defines noise-sensitive land uses as those where people live, sleep, recreate, worship, and study, as these uses are typically disrupted by intrusive levels of noise.

[23] United States Department of Labor. 1970. Occupational Safety and Health Act. https://www.osha.gov/laws-regs/oshact/completeoshact (accessed February 2025).
[24] United States Environmental Protection Agency (U.S. EPA). 1974. EPA Identifies Noise Levels Affecting Health and Welfare.

7.4.3 Impacts and Mitigation Measures

Specific Thresholds of Significance

For the purposes of this EIR and consistency with NEPA and CEQA-Plus Guidelines, applicable local plans, and agency and professional standards, the proposed project would be considered to have a significant effect related to noise if it would:

- Generate construction noise levels exceeding thresholds established by the FTA at nearby noise-sensitive land uses.
- Generate construction vibration levels exceeding thresholds established by the FTA at nearby noise-sensitive land uses.
- Generate operational noise levels exceeding thresholds established by the applicable federal lead agency.

Impact Discussion

Construction

NOISE

Construction of the proposed project would generate temporary levels of noise in the project vicinity and increase noise levels at nearby sensitive land uses. Based on the construction equipment list provided for the project components, construction noise levels were estimated and provided at various distances (refer to Section 4.11, *Noise*). Construction noise impacts would vary depending on final locations of project components and associated construction work areas. Depending on the distances between proposed construction activity and existing noise-sensitive receptors, noise levels generated during construction may exceed FTA noise thresholds. Once final locations for project components have been determined, construction noise impacts would be evaluated on a project-level basis and compared to applicable federal noise thresholds. Mitigation Measure NOI-1 was provided to reduce construction noise impacts to the extent feasible (including use of mufflers, locating stationary equipment as far from sensitive receptors as possible, installation of temporary noise barriers, and other noise-reducing construction best management practices), which would aid in reducing daytime construction noise impacts upon nearby receptors to below applicable FTA thresholds. Construction noise impacts would be less than significant with mitigation

VIBRATION

Construction of the proposed project would include use of vibration-generating equipment, which may produce noise levels exceeding applicable thresholds depending on how close this equipment may be used relative to nearby sensitive receptors and other vibration-sensitive structures. An estimate of expected vibration levels has been presented at various distances based on the construction equipment list provided by each partner agency in Section 4.11, *Noise*; however, since the locations of many project components have not yet been finalized, vibration impacts may vary depending on where final construction work areas would be located. Once these work areas have been determined, expected vibration impacts would be evaluated on a project-level basis. If necessary, Mitigation Measure NOI-3 was provided, which includes use of alternative equipment that produces lower levels of vibration and conducting vibration monitoring to reduce vibration

impacts generated during construction to below applicable FTA vibration thresholds. Construction-related vibration impacts would be less than significant with mitigation.

Operation

NOISE

Operation of the proposed project would introduce additional stationary sources of noise associated with project components that would include ASR wells. Depending on the final locations of these project components, operational noise levels may exceed applicable noise thresholds at nearby sensitive receptors. Mitigation Measure NOI-2 (refer to Section 4.11.4, *Impacts and Mitigation Measures*) would include project-specific noise analyses for these project components once their locations have been finalized to quantify their noise impacts upon nearby sensitive receptors and compare impacts to applicable thresholds. If necessary, mitigation measures such as selecting quieter equipment, installing equipment within sound-attenuating enclosures, and/or constructing barriers around equipment may be necessary. Operational noise impacts would be less than significant with mitigation.

VIBRATION

The proposed project would not include any substantial operational sources of vibration associated with operation. Therefore, no operational vibration impacts would occur.

7.5 Federal Cultural Resources

This section describes the federal regulatory framework related to cultural resources that would be applicable to any MICUP component with a federal nexus (i.e. requiring a federal permit or using federal funding). The existing environmental setting of the Place of Use related to built environment historic properties, archaeological historic properties and traditional cultural properties is also briefly presented, followed by a discussion of potential impacts.

7.5.1 Regulatory Framework

The National Historic Preservation Act

Projects that have a federal nexus must comply with the provisions of the National Historic Preservation Act of 1966 (NHPA), as amended (16 United States Code [USC] 470f). The NHPA of 1966 established a federal program for the preservation of historic properties, including built environment, archaeological, and traditional cultural properties. Towards this end, the NHPA establishes both institutions and defined processes to direct federal agencies and support state and local governments in their historic preservation programs and activities. These institutions and processes include the Advisory Council on Historic Preservation (ACHP), State Historic Preservation Officers (SHPO), Tribal Historic Preservation Officers (THPO), the National Register of Historic Places (NRHP), and the Section 106 review process, further described below.

Section 106 of the National Historic Preservation Act

Section 106 of the NHPA (Section 106) (16 USC 470f) requires federal agencies to account for the effects of their undertakings on historic properties, and to afford the ACHP a reasonable opportunity to comment on such undertakings. Historic properties are defined as buildings,

structures, districts, sites, or objects which are included in or eligible for inclusion in the NRHP. A description of the NRHP is included below. Section 106 is implemented through 36 Code of Federal Regulations (CFR) Part 800, which outlines the process for historic preservation review, including participants, identification efforts, and the assessment and resolution of adverse effects. Per 36 CFR 800.16(y), a federal undertaking is defined as any project requiring or receiving a federal permit, license, approval, or funding. Federal agencies must take steps to determine if the undertaking would result in adverse effects to historic properties and take measures to avoid or resolve those effects as feasible.

According to 36 CFR 800.4, to comply with Section 106, the following steps shall be undertaken in support of an undertaking.

DETERMINE SCOPE OF IDENTIFICATION EFFORTS

In consultation with the SHPO/ THPO, the agency official shall:

- Determine and document the area of potential effects, as defined in 36 CFR 800.16(d);
- Review existing information on historic properties within the area of potential effects, including any data concerning possible historic properties not yet identified;
- Seek information, as appropriate, from consulting parties, and other individuals and organizations likely to have knowledge of, or concerns with, historic properties in the area, and identify issues relating to the undertaking's potential effects on historic properties; and
- Gather information from any Indian tribe or Native Hawaiian organization identified pursuant to 36 CFR 800.3(f) to assist in identifying properties, including those located off tribal lands, which may be of religious and cultural significance to them and may be eligible for the NRHP, recognizing that an Indian tribe or Native Hawaiian organization may be reluctant to divulge specific information regarding the location, nature, and activities associated with such sites. The agency official should address concerns raised about confidentiality pursuant to 36 CFR 800.11(c).

IDENTIFY HISTORIC PROPERTIES

Based on the information gathered in the efforts described above and in consultation with the SHPO/THPO and any Indian tribe or Native Hawaiian organization that might attach religious and cultural significance to properties within the area of potential effects, the agency official shall take the steps necessary to identify historic properties within the area of potential effects.

- Level of effort. The agency official shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. The agency official shall take into account past planning, research and studies, the magnitude and nature of the undertaking and the degree of Federal involvement, the nature and extent of potential effects on historic properties, and the likely nature and location of historic properties within the area of potential effects.

EVALUATE HISTORIC SIGNIFICANCE

- Apply NRHP criteria
- Determine whether a property is eligible for listing in the NRHP

ASSESS ADVERSE EFFECTS

- Apply criteria of adverse effect (36 CFR 800.5)

RESOLVE ADVERSE EFFECTS

- Continue consultation
- Prepare memorandum of agreement to document resolution of adverse effects

The National Register of Historic Places

Authorized by Section 101 of the NHPA, the NRHP is the nation's official list of cultural resources worthy of preservation. The National Park Service (NPS) is responsible for administering the NRHP program. The NRHP recognizes the quality of significance in American, state, and local history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects. Properties eligible for listing in the NRHP are considered historic properties pursuant to Section 106. Per 36 CFR Part 60.4, a property is eligible for listing in the NRHP if it meets one or more of the following criteria:

Criterion A: Is associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: Is associated with the lives of persons significant in our past

Criterion C: Embodies the distinctive characteristics of a type, period, or method of installation, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction

Criterion D: Has yielded, or may be likely to yield, information important in prehistory or history

In addition to meeting at least one of the above designation criteria, resources must also retain integrity. The NPS recognizes seven aspects or qualities that, considered together, define historic integrity. To retain integrity, a property must possess several, if not all, of these seven qualities, defined in the following manner:

Location: The place where the historic property was constructed or the place where the historic event occurred

Design: The combination of elements that create the form, plan, space, structure, and style of a property

Setting: The physical environment of a historic property

Materials: The physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property

Workmanship: The physical evidence of the crafts of a particular culture or people during any given period in history or prehistory

Feeling: A property's expression of the aesthetic or historic sense of a particular period of time

Association: The direct link between an important historic event or person and a historic property

Certain properties are generally considered ineligible for listing in the NRHP, including cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions, relocated structures, or commemorative properties, unless they meet special requirements. Additionally, a property must be at least 50 years of age to be eligible for listing in the NRHP. The NPS states that 50 years is the general estimate of the time needed to develop the necessary historical perspective to evaluate significance.[25] Properties which are less than 50 years must be determined to have "exceptional importance" to be considered eligible for NRHP listing.

7.5.2 Environmental Setting

Potential Built Environment Historic Properties

Potential built environment historic properties are located throughout the Place of Use due to the presence of historic-period development. These properties may include, but are not limited to, buildings, structures, trails, roads, railroads, small and large-scale mining features, logging features, occupation areas (short and long term), and water conveyance features or other infrastructure that possess significance and are therefore eligible for listing in the NRHP.

Potential Archaeological Historic Properties

Based on a review of published sources, potential archaeological historic properties are known to exist throughout the Place of Use. These may include, but are not limited to, occupation areas (both short and long term, from the prehistoric and post-contact periods), burial areas, ceremonial areas, resource collection and processing sites, lithic scatters, quarries, rock art sites, trails, refuse dumps, features such as privies or wells, and isolated examples of artifacts that possess significance and are therefore eligible for listing in the NRHP.

Potential Traditional Cultural Properties

Potential traditional cultural properties may exist throughout the Place of Use due to the presence of living communities with historical and cultural ties to the area. Traditional cultural properties may include, but are not limited to, locations associated with the traditional beliefs of a Native American group related to its origin, cultural history, of nature that possess significance and are therefore eligible for listing in the NRHP.

7.5.3 Impacts and Mitigation Measures

Specific Thresholds of Significance

For the purposes of this EIR and consistency with 36 CFR Part 800, a proposed project component would be considered to have an adverse effect to historic properties if it would:

- Alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance or be cumulative.

[25] National Park Service. 1997. *National Register Bulletin 15 - How to Apply the National Register Criteria for Evaluation.* Accessed online at https://www.nps.gov/subjects/nationalregister/upload/NRB-15_web508.pdf. January 2025.

Impact Discussion

Construction

The Place of Use includes potential built environment historic properties, archaeological historic properties, and traditional cultural properties throughout. If a MICUP project component is later determined to have a federal nexus such as requirement for a federal regulatory permit (e.g., Clean Water Act Section 404 permit) or a federal funding aspect, compliance with Section 106 by the project component implementing agency would be required. However, given that project construction could result in materially altered or demolished unknown historic or archaeological resources within the Place of Use, MICUP federal cultural resources construction impacts would be significant and unavoidable even with compliance with NHPA Section 106 requirements.

Operation

Cultural resources impacts are limited to direct impacts that would occur during construction activities. Therefore, no MICUP federal cultural resources operational impacts would occur.

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8 Contributors and Preparers

8.1 EIR Contributors

San Joaquin County Department of Public Works – Lead Agency

Najee Zarif, Public Works Director
Alex Chetley, Public Works Deputy Director of Development
Ashley Couch, Water Resources Manager
Robert Granberg, Program Manager
Venki Narasimhalu, Water Resources Engineer

San Joaquin County Attorney Office

Kirin Virk, Deputy County Counsel
Barbara A. Brenner, Legal Counsel, White Brenner LLP
Gage Marchini, Legal Counsel, White Brenner, LLP

North San Joaquin Water Conservation District

Steve Schwabauer, General Manager
Jennifer Spaletta, Legal Counsel, Stoel Rives LLP
Daniel deGraaf, District Engineer, deGraaf Engineering

Stockton East Water District

Justin Hopkins, General Manager
Darrel Evensen, District Engineer
Jeanne Zolezzi, Legal Counsel, Herum Crabtree Suntag

City of Stockton

Travis Small, Deputy Director of Water Resources

East Bay Municipal Utility District

Bradley Ledesma, Manager of Water Resources Planning
Grace Su, Senior Civil Engineer
Ana Ulloa, Senior Civil Engineer

8.2 EIR Preparers

This EIR was prepared by San Joaquin County, with the assistance of Rincon Consultants, Inc. and GEI Consultants. Consultant staff involved in the preparation of the EIR are listed below.

Rincon Consultants, Inc. (EIR Preparer)

Jennifer Jacobus, Project Director
Kelsey Bennett, Senior Project Manager
Leslie Slayday, Assistant Project Manager
Amanda Antonelli, Environmental Planner
Megan Knight, Environmental Planner
Taylor Freeman, Environmental Planner
Kayleigh Limbach, Environmental Planner
Aubrey Mescher, Senior Environmental Planner
Emily Marino, Senior Environmental Planner
Leo Mena, Senior Environmental Planner
Michael Stewart, Air Quality and GHG/Energy Specialist
Jessie Jaeger, Air Quality and GHG/Energy Specialist
Heather Dubois, Air Quality and GHG/Energy Specialist
Kyle Pritchard, Noise Specialist
Bill Vosti, Senior Noise, Air Quality, and GHG/Energy Specialist
Josh Carman, Senior Noise, Air Quality, and GHG/Energy Specialist
Rachel Perzel, Architectural Historian
JulieAnn Murphy, Architectural Historian
Hannah Haas, Cultural Resources Specialist
Candace Ehringer, Senior Cultural Resources Specialist
Antonia Davetas, Environmental Justice Specialist
Marisa Rodriguez, Environmental Justice Analyst
Michael Huang, Environmental Analyst
Maya Ziff, Environmental Analyst
Katherine Fikan, Environmental Analyst
Norm Ponferrada, Fisheries and Aquatics Peer Review
Colby Boggs, Biological Resources Peer Review
Nicole West, Hydrology/Water Quality Peer Review
Andrew McGrath, Paleontological Resources Peer Review
Kelsey Bennett, Photographer
Nikole Vannest, GIS/Graphics Specialist
Debra Jane Seltzer, Publishing Specialist

GEI Consultants, Inc. (EIR Preparer)

Ryan Jolley, Principal Environmental Planner
Michael Cornelius, Principal Geologist and Hydrological Specialist
Katelyn Matroni, Senior Environmental Planner
Jennifer King, Senior Environmental Planner
Sevim Onsoy, Senior Water Resources Planner
Kelly Fitzgerald-Holland, Senior Biologist
Julie DeBarros, Senior Biologist
Allison Bosworth, Senior Fisheries Biologist
Hannah Dunn, Biologist
Amanda Ibara, Environmental Planner
Amy McBride, Water Resources Planner
Kyle Brudvik, Paleontologist
Ryan Snyder, GIS Analyst
Patrick Cuthbert, Fisheries Biologist, FishBIO
Michael Hellmair, Principal Fisheries Biologist, FishBIO

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Appendix A

EIR Scoping Report

Rincon Consultants, Inc.
4825 J Street, Suite 200
Sacramento, California 95819
916-706-1374

RINCON CONSULTANTS, INC. SINCE 1994

September 18, 2024
Project No: 22-13187

Ashley Couch, PE, CFM
San Joaquin County Public Works
1810 E. Hazelton Avenue
Stockton, California 95205
Via email: acouch@sjgov.org

Subject: Mokelumne Integrated Conjunctive Use Program CEQA Public Scoping Summary

Introduction

San Joaquin County, as the lead agency under the California Environmental Quality Act (CEQA), is proposing to adopt the Mokelumne Integrated Conjunctive Use Program ("MICUP" or "program") within the Place of Use for Water Right Application 29835 (A029835). The Place of Use is defined as the geographic area where the water diverted under A029835 would be beneficially used, including the lower Mokelumne River and areas immediately adjacent to and within the jurisdictional boundaries of San Joaquin County. The proposed program would seek to address overdependence on groundwater within the Eastern San Joaquin Groundwater Subbasin (ESJGSB). MICUP is a coordinated effort to put unappropriated Mokelumne River water to beneficial use in the ESJGSB through approval of Mokelumne River Water & Power Authority (MRWPA) Application A029835 and implementation of related projects. The County is leading an effort to identify a preferred program for Partner Agencies to invest in development of the Mokelumne River water right such that the State Water Resources Control Board (SWRCB) would issue a water right permit, allowing the region to secure a long-term, supplemental surface water supply.

Notice of Preparation

A Notice of Preparation (NOP) was prepared pursuant to Section 15082 of the CEQA Guidelines, to notify interested parties that San Joaquin County will be preparing an Environmental Impact Report (EIR) to evaluate potential environmental impacts of the proposed program (see Attachment 1). The NOP was mailed on July 2, 2024 to Responsible and Trustee agencies, including local, state, and federal agencies; local tribes; and interested parties including groups or individuals who had previously expressed interest in MICUP. The NOP was also posted by the County Clerk in San Joaquin County and published in a local newspaper of general circulation, the Stockton Record. A Notice of Completion (NOC) was prepared by San Joaquin County and posted on the State Clearinghouse website with the NOP. The proposed program was given a State Clearinghouse number of SCH#2024070107, and the program information was posted in the CEQAnet Database. The NOP was made available for public review online on the San Joaquin County Public Works website at the following link: https://www.sjgov.org/department/pwk/home/news-and-updates .

Scoping Period

The 30-day public scoping period began with the distribution of the NOP on July 2, 2024 and remained open through July 31, 2024 at 4:00 p.m. During the scoping period, one hybrid (in-person and virtual) scoping meeting was held on July 16, 2024, at the Stockton Water Treatment Plant in Lodi, California

and via Zoom. Public notification about the scoping meeting was included in the NOP. As described above, the NOP was published in the Stockton Record classifieds section, posted by the San Joaquin County Clerk, posted on CEQAnet, and mailed directly to Responsible and Trustee agencies, relevant state, Federal, regional and local agencies, and other interested parties.

At the scoping meeting, San Joaquin County, GEI Consultants, Inc. and Rincon Consultants, Inc. gave a presentation on the proposed program and the CEQA process. Including County staff and consultants, approximately 12 meeting participants attended the in-person scoping meeting and seven participants attended the scoping meeting via Zoom. The Zoom Chat function was available for participants to ask questions or comment. There were no written comments received in the Zoom Chat during the meeting. The Zoom unmute function was also available for participants to provide verbal comments. Participant comments and questions pertained to the inclusion of current protests to related water applications, existing projects, and the CEQA process (See Attachment 2).

Comments

During the scoping period, San Joaquin County received a total of eight comment letters on the proposed program via e-mail. Table 1 includes a list of the agencies that submitted comments during the 30-day program scoping period. CEQA does not require the County to formally respond to these comments, but rather to consider these comments during preparation of the EIR. The comment letters are included in Attachment 2.

Table 1 List of Comments

Commenter	Date Received (2024)
Native American Heritage Commission	July 19
State Water Resources Control Board	July 29
Amador Water Agency, Calaveras County Water District, Calaveras Public Utility District	July 30
California Department of Transportation	July 30
California Sportfishing Protection Alliance and The Center for Biological Diversity	July 30
Woodbridge Irrigation District	July 30
California Department of Fish and Wildlife	July 31
Central Valley Flood Protection Board	July 31

Attachments

This Scoping Summary contains documents pertinent to the scoping process. The following items are included in Attachment 1:

- Notice of Preparation
- Notice of Completion
- Proof of Publication
- Proof of Posting

The following items are included in Attachment 2:

- Comment Letters Received by the County
- Scoping Meeting Comments

Attachment 1

Notice of Preparation

Notice of Completion

Proof of Publication

Proof of Posting

SAN JOAQUIN COUNTY
Greatness grows here.

Public Works
Working for YOU

Department of Public Works

Fritz Buchman, Director

Alex Chetley, *Deputy Director - Development*
Kristi Rhea, *Deputy Director - Administration*
David Tolliver, *Deputy Director - Operations*
Najee Zarif, *Deputy Director - Engineering*

NOTICE OF PREPARATION of an ENVIRONMENTAL IMPACT REPORT and SCOPING MEETING

Mokelumne River Integrated Conjunctive Use Program

DATE: July 2, 2024

TO: Responsible and Trustee Agencies and Interested Parties

FROM: San Joaquin County Public Works Department
1810 E. Hazelton Avenue
Stockton, California 95205

SUBJECT: **Notice of Preparation of an Environmental Impact Report and Scoping Meeting**
PROJECT: **Mokelumne River Integrated Conjunctive Use Program**

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties about initiation of the California Environmental Quality Act (CEQA) process for the Mokelumne River Integrated Conjunctive Use Program (MICUP or proposed program). The County of San Joaquin (County) proposes to implement the MICUP together with the following Partner Agencies: North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), City of Stockton, Woodbridge Irrigation District (WID), East Bay Municipal Utilities District (EBMUD), and California Water Service. Partner Agencies are defined as users of surface water developed through MICUP, or participants in the delivery of surface water for beneficial use. The County will serve as the Lead Agency for preparation of an Environmental Impact Report (EIR). In addition to CEQA, the EIR will be prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA). The EIR will identify, evaluate, and disclose possible environmental impacts and develop strategies to avoid, reduce, or mitigate potentially significant impacts that would arise from the implementation of MICUP.

This NOP provides: 1) a summary of the proposed program, 2) the County's preliminary identification of the potential environmental issues to be analyzed in the EIR, and 3) information on how to comment on the scope of the EIR. This NOP, and other information related to MICUP, is available online at: https://www.sjgov.org/department/pwk/home/news-and-updates.

Program Background: In 1980, the California Department of Water Resources (DWR) determined that the Eastern San Joaquin Groundwater Subbasin (ESJGSB or Subbasin) was in a state of critical overdraft. The Subbasin continues to be in an overdraft condition due to the over reliance on groundwater supply to meet demand. To address this overdependence on groundwater, local agencies in San Joaquin County have long sought to appropriate water from the Mokelumne River to meet current and future demand and address the critical overdraft condition. MICUP is a coordinated effort to put unappropriated Mokelumne River water to beneficial use in the ESJGSB through approval of Mokelumne River Water & Power Authority (MRWPA) Water Right Application 29835 and implementation of related projects. Through the MRWPA, the County is leading an effort to identify a preferred program for Partner Agencies to invest in development of the Mokelumne River water

right such that the State Water Resources Control Board (SWRCB) would issue a water right permit, allowing the region to secure a long-term, supplemental surface water supply. As the Lead Agency under CEQA, the County has determined that MICUP may have a significant impact on the environment, and the preparation of an EIR is necessary to evaluate potential impacts. There will be opportunities for public participation throughout the environmental review process. At this time, the County requests input from Responsible and Trustee agencies, and other interested parties including organizations, businesses, and members of the public, on the scope of the EIR pursuant to CEQA Guidelines Section 15082.

NOP Public Review Period: July 2 to July 31, 2024

During this public review period, interested agencies, organizations, businesses, and individuals are invited to provide comments about the scope of the environmental topics to be included in the MICUP EIR.

NOP Written Comments: Written comments must be received by **4:00 PM on July 31, 2024.** Please include "NOP Comment: MICUP EIR" in the subject line and submit comments via mail or email to:

Ashley Couch, PE, CFM
Water Resources Manager
San Joaquin County
1810 East Hazelton Ave./PO Box 1810
Stockton, CA 95201
acouch@sjgov.org

EIR Public Scoping Meeting: The County will hold an EIR public scoping meeting to describe the proposed program and receive verbal comments on the scope of the environmental issues to be addressed in the EIR. No decisions concerning the proposed program will be made at this meeting.

The EIR public scoping meeting will occur in-person at the following time and location:

Time:	July 16, 2024, at 6:00 PM
Location:	Stockton Water Treatment Plant Training Room 11373 N. Lower Sacramento Road, Lodi, CA 95242

To participate in this meeting remotely via Zoom, go to: https://us06web.zoom.us/j/82674646997 or call (669) 444-9171 (Meeting ID: 826 7464 6997, Passcode: 056904).

Program Location: The proposed program would be implemented within the Place of Use for Water Right Application 29835 (A029835) as shown in Figure 1. The Place of Use is defined as the geographic area where the water diverted under A029835 would be beneficially used, including the lower Mokelumne River and areas immediately adjacent to and within the jurisdictional boundaries of San Joaquin County. Figure 1 shows the regional location, and Figure 2 shows the estimated boundaries of the proposed program and potential components.

Program Objectives: As previously stated in the Program Background, local agencies in San Joaquin County have long sought to appropriate water from the Mokelumne River to meet current and future demand in the County and to address critical overdraft of the underlying groundwater basin. Numerous studies have been completed as part of various planning efforts in the County to secure water rights for surface water supplies from the Mokelumne River. Previous studies identified potential recharge projects, many of which are described in the recently completed 2020 ESJGSB Groundwater Sustainability Plan (GSP). The ESJGSB GSP concludes that an additional 78,000 acre-feet of supply per year is necessary to offset groundwater use or recharge groundwater supplies to achieve sustainability in the Subbasin.

The proposed MICUP objectives include:

1) develop a supplemental Mokelumne River surface water supply;
2) use surface water and groundwater together to respond to drought and climate change;
3) improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin; and
4) achieve integrated water supply and environmental benefits in the lower Mokelumne watershed.

Proposed Program: MICUP would entail diverting unappropriated Mokelumne River water either to serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge water into underground storage for later extraction to meet such demands. Under Water Right Application 29835 (A029835), MICUP would divert up to 110,000 acre-feet per year (AFY) and up to 620 cubic feet per second (cfs) between December 1 and June 30 during wet years, using a combination of existing and proposed infrastructure as shown in Figure 2. In addition, up to 48,000 AFY could be stored in Camanche and/or Pardee Reservoir, subject to available capacity as determined by EBMUD.

Groundwater Recharge Methodologies: There are several methods that may be used to recharge MICUP water. The methods being considered are based on available facilities, land use and crop type, and near surface soil conditions and hydrogeologic conditions.

- Direct Surface Recharge: Direct surface recharge facilities are designed to suit both geologic and hydrologic conditions. Direct surface recharge facilities can be operated as passive recharge facilities, such as recharge basins or unlined canals, or active recharge facilities. Active recharge involves methods to facilitate greater recharge rates by penetrating low permeable or impermeable material in the shallow subsurface, such as dry wells.
- Aquifer Storage and Recovery (ASR) Wells: ASR wells are groundwater wells that recharge water directly into the underground aquifer. These wells can be dedicated recharge wells or dual-purpose wells capable of extracting stored water. Recharge wells can be drilled to the depth of the target aquifer(s). ASR wells take up a small footprint and are not restricted by overlying land use.
- In-Lieu: In-lieu recharge is utilizing surface water, when available, “in-lieu” of groundwater pumping. The offset of groundwater pumping keeps water in the aquifer that would normally be pumped as a form of “recharge.” In-lieu recharge requires that surface water be available during periods when groundwater would otherwise be used.
- Flood Managed Aquifer Recharge (FloodMAR): FloodMAR is the process of delivering surface water to flood agricultural fields for intentional recharge of the underlying groundwater system. FloodMAR does not require modifications to existing land or agricultural practices and may utilize existing water infrastructure. However, recharge may be restricted based on agricultural practices and recharge rate of shallow soil layers.

Potential MICUP Projects: The following summarizes the projects that have been identified by Partner Agencies for recharge of water under MICUP.

- North San Joaquin Water Conservation District: NSJWCD would divert MICUP water using existing diversions on the Mokelumne River. Some diversions may be improved to increase diversion capacity and/or improve operational efficiency. Water diverted from the Mokelumne River would be conveyed through existing conveyance pipelines that are currently being improved or are planned to be improved. New pipelines would also expand the geographic extent of the recharge activities within NSJWCD. Several

recharge methods would be used to recharge MICUP water as described above, within NSJWCD boundaries.

NSJWCD also may take delivery of MICUP water from EBMUD's Mokelumne Aqueduct. Recharge opportunities would be coordinated with EBMUD as the owner and operator of the Mokelumne Aqueduct. These recharge opportunities would require a new turnout from the Mokelumne Aqueduct as well as new facilities to convey MICUP water for recharge.

- Stockton East Water District: SEWD would divert MICUP water from existing and new Mokelumne Aqueduct turnouts, to convey to recharge facilities within the district. These recharge activities would be coordinated with EBMUD as the owner and operator of the Mokelumne Aqueduct. Recharge activities may include in-lieu recharge, recharge basins, ASR wells, and dry wells.
- City of Stockton: The City of Stockton would divert MICUP water from the Mokelumne River using existing diversion facilities owned and operated by WID. Water diverted from the Mokelumne River would be conveyed through existing canals and/or pipelines to the City of Stockton for direct groundwater recharge at the proposed Delta Water Treatment Plant (DWTP) Groundwater Recharge Basin project and/or to other basins currently being used to recharge water in North Stockton. The DWTP is currently supplied by a diversion in the Sacramento-San Joaquin Delta. MICUP water may also be diverted at this location for recharge at the DWTP, subject to existing rules and restrictions.
- Woodbridge Irrigation District: WID would divert MICUP water from the Mokelumne River using the existing diversions, including the WID Diversion Dam. Water diverted from the Mokelumne River would be conveyed through existing pipelines and lined or unlined canals to existing and future recharge facilities and detention basins within and adjacent to the WID boundaries. Several recharge methods would be used, including in-lieu recharge, FloodMAR, and direct surface recharge. FloodMAR operations may include recharge on currently farmed fields.

EIR Environmental Impact Areas: The EIR will provide an evaluation of potential environmental impacts of constructing and operating the MICUP. The EIR also will evaluate the cumulative impacts of MICUP when considered in conjunction with other related past, present, and reasonably-foreseeable future plans and projects. It is anticipated that MICUP could result in potentially significant environmental impacts to the following topic areas that will be further evaluated in the EIR:

- Aesthetics
- Agriculture & Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Energy
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Noise
- Transportation
- Tribal Cultural Resources
- Utilities and Service Systems
- Wildfire

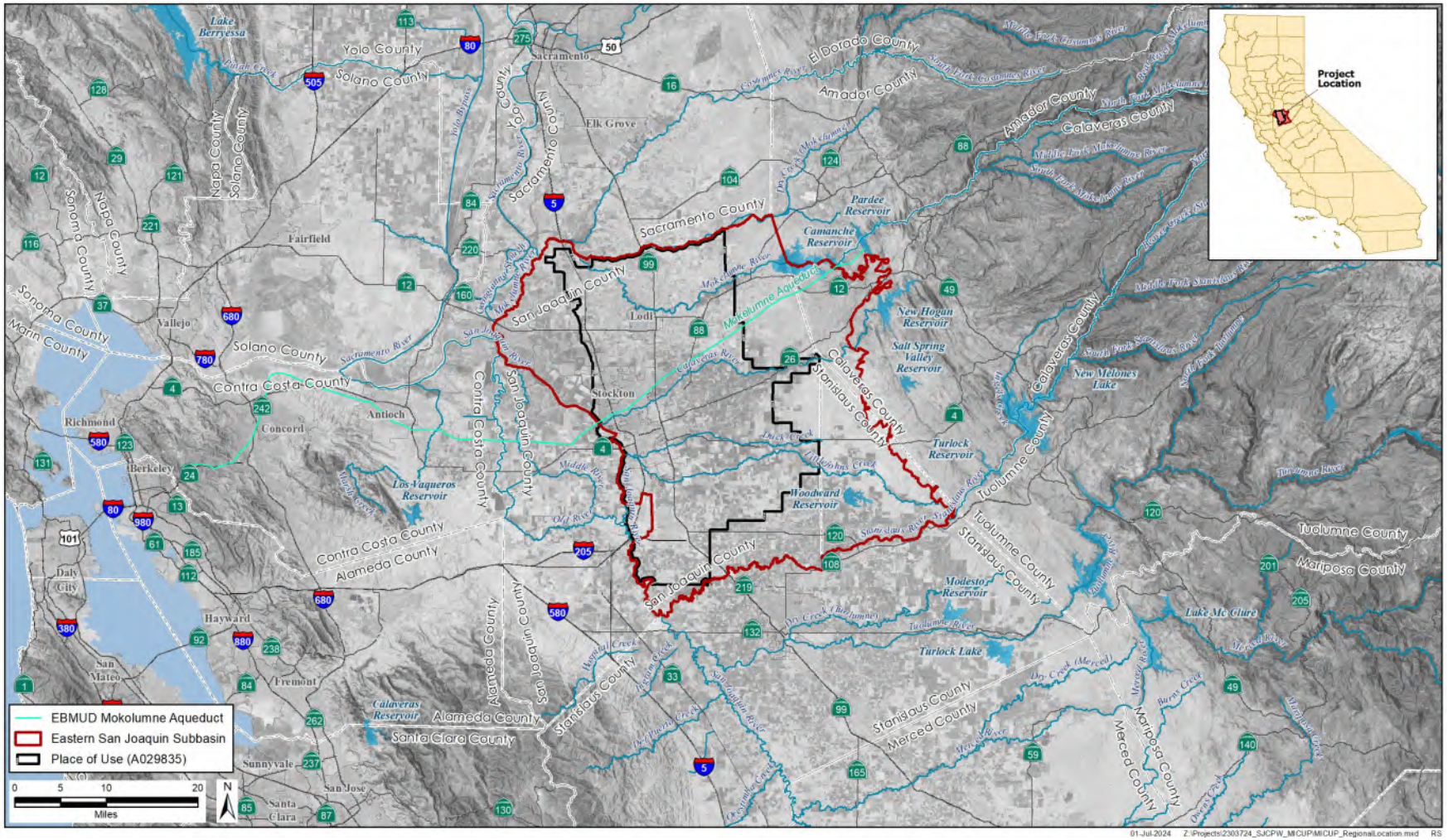
The EIR will analyze the topics identified above, and potentially others, in detail and it will propose mitigation measures to reduce or avoid impacts determined to be significant.

EIR Alternatives: The EIR will also evaluate a reasonable range of alternatives that could reduce or avoid potential environmental effects identified in the EIR, including a required "No Project" Alternative.

Future Notices: All interested parties and organizations wishing to be notified when the Draft EIR is available for review should email Ashley Couch, Water Resources Manager, at acouch@sjgov.org and provide a current email address. When the Draft EIR is available for review, the County will provide a public notice with information about how to access it and provide comments.

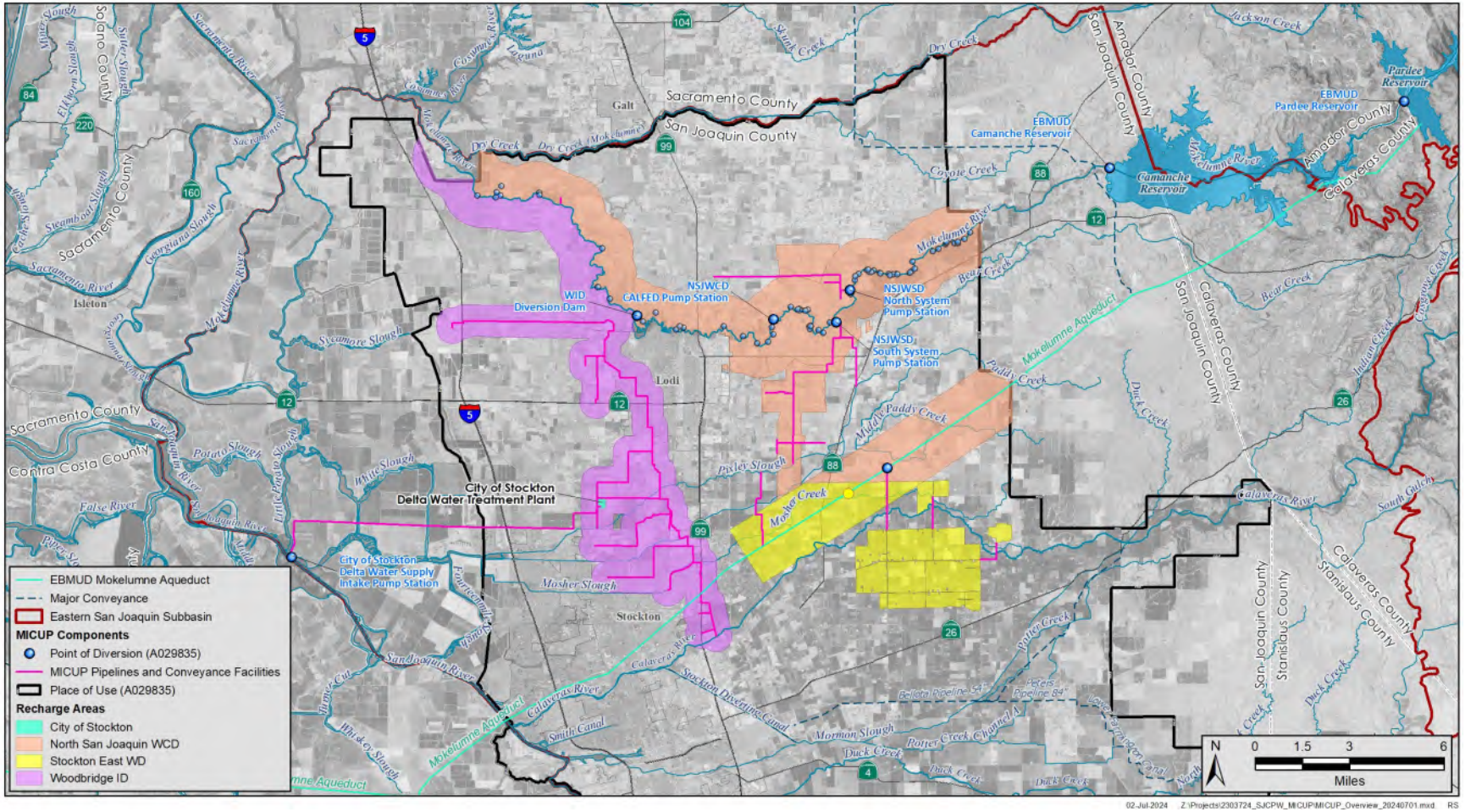
Questions: If you have questions regarding this EIR NOP or the EIR public scoping meeting, please contact the Lead Agency contact, Ashley Couch, Water Resources Manager, at acouch@sjgov.org.

Figure 1 Regional Location



Source: GEI, 2024

Figure 2 Proposed MICUP Components



Source: GEI, 2024

Notice of Completion & Environmental Document Transmittal

Mail to: State Clearinghouse, P.O. Box 3044, Sacramento, CA 95812-3044 (916) 445-0613
For Hand Delivery/Street Address: 1400 Tenth Street, Sacramento, CA 95814

SCH #

Project Title: Mokelumne River Integrated Conjunctive Use Program

Lead Agency: San Joaquin County
Contact Person: Ashley Couch, PE, CFM
Mailing Address: 1810 East Hazelton Avenue/P.O. Box 1810
Phone: 209-468-3089
City: Stockton Zip: 95201
County: San Joaquin County

Project Location: County: San Joaquin City/Nearest Community: Stockton
Cross Streets: Zip Code:
Longitude/Latitude (degrees, minutes and seconds): ____° ____′ ____″ N / ____° ____′ ____″ W Total Acres:
Assessor's Parcel No.: Section: Twp.: Range: Base:
Within 2 Miles: State Hwy #: Hwy 99, Hwy 12, Hwy 88, Hwy 26 Waterways: Mokelumne River, Mokelumne Aqueduct
Airports: Stockton Metropolitan Airport Railways: Schools: Several

Document Type:

CEQA: ☒ NOP ☐ Draft EIR NEPA: ☐ NOI Other: ☐ Joint Document
☐ Early Cons ☐ Supplement/Subsequent EIR ☐ EA ☐ Final Document
☐ Neg Dec (Prior SCH No.) ☐ Draft EIS ☐ Other:
☐ Mit Neg Dec Other: ☐ FONSI

Local Action Type:

☐ General Plan Update ☐ Specific Plan ☐ Rezone ☐ Annexation
☐ General Plan Amendment ☐ Master Plan ☐ Prezone ☐ Redevelopment
☐ General Plan Element ☐ Planned Unit Development ☐ Use Permit ☐ Coastal Permit
☐ Community Plan ☐ Site Plan ☐ Land Division (Subdivision, etc.) ☒ Other: Conjunctive Use Plan

Development Type:

☐ Residential: Units Acres
☐ Office: Sq.ft. Acres Employees
☐ Commercial: Sq.ft. Acres Employees
☐ Industrial: Sq.ft. Acres Employees
☐ Educational:
☐ Recreational:
☒ Water Facilities: Type Diversion MGD up to 110,000 AFY
☐ Transportation: Type
☐ Mining: Mineral
☐ Power: Type MW
☐ Waste Treatment: Type MGD
☐ Hazardous Waste: Type
☐ Other:

Project Issues Discussed in Document:

☒ Aesthetic/Visual ☐ Fiscal ☐ Recreation/Parks ☒ Vegetation
☒ Agricultural Land ☒ Flood Plain/Flooding ☐ Schools/Universities ☒ Water Quality
☒ Air Quality ☒ Forest Land/Fire Hazard ☒ Septic Systems ☒ Water Supply/Groundwater
☒ Archeological/Historical ☒ Geologic/Seismic ☒ Sewer Capacity ☒ Wetland/Riparian
☒ Biological Resources ☐ Minerals ☒ Soil Erosion/Compaction/Grading ☒ Growth Inducement
☐ Coastal Zone ☒ Noise ☒ Solid Waste ☒ Land Use
☒ Drainage/Absorption ☐ Population/Housing Balance ☒ Toxic/Hazardous ☒ Cumulative Effects
☐ Economic/Jobs ☐ Public Services/Facilities ☒ Traffic/Circulation ☐ Other:

Present Land Use/Zoning/General Plan Designation:

Various

Project Description: *(please use a separate page if necessary)*

The Mokelumne River Integrated Conjunctive Use Program (MICUP) would entail diverting unappropriated Mokelumne River water either to serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge water into underground storage for later extraction to meet such demands. Under Water Right Application 29835, MICUP would divert up to 110,000 acre-feet per year (AFY) and up to 620 cubic feet per second (cfs) between December 1 and June 30 during wet years, using a combination of existing and proposed infrastructure. In addition, up to 48,000 AFY could be stored in Camanche Reservoir and/or Pardee Reservoir, subject to available capacity. The County of San Joaquin proposes to implement the MICUP together with the following Partner Agencies: North San Joaquin Water Conservation District, Stockton East Water District, City of Stockton, Woodbridge Irrigation District, East Bay Municipal Utilities District, and California Water Service.

Note: The State Clearinghouse will assign identification numbers for all new projects. If a SCH number already exists for a project (e.g. Notice of Preparation or previous draft document) please fill in.

Reviewing Agencies Checklist

Lead Agencies may recommend State Clearinghouse distribution by marking agencies below with and "**X**".
If you have already sent your document to the agency please denote that with an "**S**".

X	Air Resources Board	X	Office of Historic Preservation
X	Boating & Waterways, Department of		Office of Public School Construction
	California Emergency Management Agency	X	Parks & Recreation, Department of
	California Highway Patrol		Pesticide Regulation, Department of
X	Caltrans District # 10	X	Public Utilities Commission
	Caltrans Division of Aeronautics	X	Regional WQCB # 5
X	Caltrans Planning		Resources Agency
X	Central Valley Flood Protection Board		Resources Recycling and Recovery, Department of
	Coachella Valley Mtns. Conservancy		S.F. Bay Conservation & Development Comm.
	Coastal Commission		San Gabriel & Lower L.A. Rivers & Mtns. Conservancy
	Colorado River Board	X	San Joaquin River Conservancy
X	Conservation, Department of		Santa Monica Mtns. Conservancy
	Corrections, Department of		State Lands Commission
X	Delta Protection Commission		SWRCB: Clean Water Grants
	Education, Department of	X	SWRCB: Water Quality
	Energy Commission	S	SWRCB: Water Rights
X	Fish & Game Region # 2 and 3		Tahoe Regional Planning Agency
	Food & Agriculture, Department of	X	Toxic Substances Control, Department of
X	Forestry and Fire Protection, Department of	X	Water Resources, Department of
	General Services, Department of		
	Health Services, Department of		Other:
	Housing & Community Development		Other:
X	Native American Heritage Commission		

Local Public Review Period (to be filled in by lead agency)

Starting Date July 2, 2024 Ending Date July 31, 2024

Lead Agency (Complete if applicable):

Consulting Firm: Rincon Consultants, Inc.
Address: 4825 J Street, #200
City/State/Zip: Sacramento, California 95819
Contact: Kelsey Bennett
Phone: 916-706-1374

Applicant: San Joaquin County, Ashley Couch, PE, CFM
Address: 1810 East Hazelton Avenue/ P.O. Box 1810
City/State/Zip: Stockton, California 95201
Phone: 209-953-7460

Signature of Lead Agency Representative: Kelsey Bennett Digitally signed by Kelsey Bennett DN: Dr="Rincon Consultants, Inc.", CN=Kelsey Bennett, E=kbennett@rinconconsultants.com Reason: I am the author of this document Location: Date: 2024.07.02 09:26:56-07'00' Foxit PDF Editor Version: 2024.1.0 **Date:** 7/2/2024

Authority cited: Section 21083, Public Resources Code. Reference: Section 21161, Public Resources Code.

SAN JOAQUIN
—COUNTY—

Working for YOU

Department of Public Works

Fritz Buchman, Director

Alex Chetley, *Deputy Director - Development*
Kristi Rhea, *Deputy Director - Administration*
David Tolliver, *Deputy Director - Operations*
Najee Zarif, *Deputy Director - Engineering*

NOTICE OF PREPARATION of an ENVIRONMENTAL IMPACT REPORT and SCOPING MEETING

Mokelumne River Integrated Conjunctive Use Program

Filed Doc #: 39-07022024-217
Tue Jul 02 14:51:01 PDT 2024
Page: 1 of 7 Fee: $0.00
Steve J. Bestolarides
San Joaquin County Clerk
By Deputy: kmchugh

DATE: July 2, 2024

TO: Responsible and Trustee Agencies and Interested Parties

FROM: San Joaquin County Public Works Department
1810 E. Hazelton Avenue
Stockton, California 95205

SUBJECT: **Notice of Preparation of an Environmental Impact Report and Scoping Meeting**
PROJECT: **Mokelumne River Integrated Conjunctive Use Program**

This Notice of Preparation (NOP) has been prepared to notify agencies and interested parties about initiation of the California Environmental Quality Act (CEQA) process for the Mokelumne River Integrated Conjunctive Use Program (MICUP or proposed program). The County of San Joaquin (County) proposes to implement the MICUP together with the following Partner Agencies: North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), City of Stockton, Woodbridge Irrigation District (WID), East Bay Municipal Utilities District (EBMUD), and California Water Service. Partner Agencies are defined as users of surface water developed through MICUP, or participants in the delivery of surface water for beneficial use. The County will serve as the Lead Agency for preparation of an Environmental Impact Report (EIR). In addition to CEQA, the EIR will be prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA). The EIR will identify, evaluate, and disclose possible environmental impacts and develop strategies to avoid, reduce, or mitigate potentially significant impacts that would arise from the implementation of MICUP.

This NOP provides: 1) a summary of the proposed program, 2) the County's preliminary identification of the potential environmental issues to be analyzed in the EIR, and 3) information on how to comment on the scope of the EIR. This NOP, and other information related to MICUP, is available online at: https://www.sjgov.org/department/pwk/home/news-and-updates.

Program Background: In 1980, the California Department of Water Resources (DWR) determined that the Eastern San Joaquin Groundwater Subbasin (ESJGSB or Subbasin) was in a state of critical overdraft. The Subbasin continues to be in an overdraft condition due to the over reliance on groundwater supply to meet demand. To address this overdependence on groundwater, local agencies in San Joaquin County have long sought to appropriate water from the Mokelumne River to meet current and future demand and address the critical overdraft condition. MICUP is a coordinated effort to put unappropriated Mokelumne River water to beneficial use in the ESJGSB through approval of Mokelumne River Water & Power Authority (MRWPA) Water Right Application 29835 and implementation of related projects. Through the MRWPA, the County is leading an effort to identify a preferred program for Partner Agencies to invest in development of the Mokelumne River water

[EXT] SCH Number 2024070107

Meng Heu <Meng.Heu@opr.ca.gov>
Tue 7/2/2024 2:28 PM
To:Leslie Slayday <lslayday@rinconconsultants.com>

CAUTION: This email originated from outside of Rincon Consultants. Be cautious before clicking on any links, or opening any attachments, until you are confident that the content is safe .

Your project is published and is available for review. Please note the State/Local review 'start' and 'end' period.

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****Updates to Published Projects:** Please note that we do not remove attachments from published projects unless there is confidential information that cannot be displayed online. To make changes to a published document, send requests and any attachments to state.clearinghouse@opr.ca.gov. We ask that you also provide a brief memo on lead agency letterhead explaining what changes/corrections have been made.

Thank you,

Meng Heu
Office of Planning and Research (OPR)
State Clearing House
***Note*: No reply, response, or information provided constitutes legal advice.

To view your submission, use the following link.
https://ceqasubmit.opr.ca.gov/Document/Index/302579/1

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AFFIDAVIT OF PUBLICATION

Rincon Consultants, Inc.
449 15th Street Suite 303
Oakland CA 94612

STATE OF WISCONSIN, COUNTY OF BROWN

The Record, a newspaper of general publication, printed and published daily in the City of Stockton, County of San Joaquin by the Superior Court of the County of San Joaquin, State of California, under the date of February 26, 1952, File No. 52857, San Joaquin County Records; that the notice of which the annexed is a printed copy (set in type not smaller than nonpareil), has been published each regular and entire issue of said newspaper and not in any supplement thereof in issues dated:

07/05/2024

Sworn to and subscribed before on 07/05/2024

Legal Clerk

Notary, State of WI, County of Brown

6/30/2025

My commission expires

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AMY KOKOTT
Notary Public
State of Wisconsin

Notice of Public Meeting - Mokelumne River Integrated Conjunctive Use Program

Notice is hereby given that a Notice of Preparation (NOP) has been prepared to notify agencies and interested parties about the initiation of the California Environmental Quality Act (CEQA) process for the Mokelumne River Integrated Conjunctive Use Program (MICUP). The NOP is available online at: https://www.sjgov.org/department/pwk/home/news-and-updates. The County of San Joaquin (County) proposes to implement the MICUP together with the following Partner Agencies: North San Joaquin Water Conservation District, Stockton East Water District, City of Stockton, Woodbridge Irrigation District, East Bay Municipal Utilities District (EBMUD), and California Water Service. The County will serve as the Lead Agency for preparation of an Environmental Impact Report (EIR). In addition to CEQA, the EIR will be prepared in accordance with the CEQA-Plus requirements of the U.S. Environmental Protection Agency, to fulfill the requirement of potential federal funding partners to comply with the National Environmental Policy Act (NEPA). The EIR will identify, evaluate, and disclose possible environmental impacts and develop strategies to avoid, reduce, or mitigate potentially significant impacts that would arise from the implementation of the MICUP.

MICUP would entail diverting unappropriated Mokelumne River water either to serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge water into underground storage for later extraction to meet such demands. Under Water Right Application 29835, MICUP would divert up to 110,000 acre-feet per year (AFY) and up to 620 cubic feet per second (cfs) between December 1 and June 30 during wet years, using a combination of existing and proposed infrastructure. In addition, up to 48,000 AFY could be stored in Camanche and/or Pardee Reservoir, subject to available capacity as determined by EBMUD.

Notice is also hereby given that the County will hold a public meeting on Tuesday, July 16, 2024 beginning at 6:00 PM. The public meeting will be held in-person at the Stockton Water Treatment Plant, 11373 N. Lower Sacramento Road, Lodi, CA 95242. To participate in this meeting remotely via Zoom, go to: https://us06web.zoom.us/j/82674646997 or call (669) 444-9171 (Meeting ID: 826 7464 6997, Passcode: 056904). At this time, the County requests input from Responsible and Trustee agencies, and other interested parties including organizations, businesses, and members of the public, on the scope of the EIR.

For additional information regarding MICUP or the public meeting, please contact Ashley Couch, PE, CFM, Water Resources Manager, at acouch@sjgov.org.

July 5 2024
LYRK0125121

Attachment 2

Comment Letters Received by the County

Scoping Meeting Comments

COMMENTS FOR THE NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT FOR THE MOKELUMNE RIVER INTEGRATED CONJUNCTIVE USE PROGRAM (MICUP)

DATE: July 30, 2024

TO: San Joaquin County Public Works Department
1810 E. Hazelton Avenue
Stockton, California 95205

FROM: Amador Water Agency
Calaveras County Water District
Calaveras Public Utility District

Subject: **Comments on the Notice of Preparation and Scoping of an Environmental Impact Report for the Mokelumne River Integrated Conjunctive Use Program.**

The agencies located in Amador and Calaveras Counties that have water rights to the Mokelumne River would like the scope of the Environmental Impact Report (EIR) to address the following questions and/or comments:

1. Both Amador and Calaveras County have Water Rights that are held in reserve as County of Origin Water. Some of these reservations have not yet been developed. How will MICUP and the County of San Joaquin's Application 29835 impact this reservation, such as order of priority?

2. The program objectives are to develop an additional 78,000 acre-feet of supply per year to offset the impacts of groundwater use or to recharge groundwater supplies to achieve sustainability in the subbasin.

    a. Permit Application 29835 only diverts water during 'Wet' years with up to 110,000 acre-feet available for recharge. In the scoping of the EIR, we encourage San Joaquin County to consider looking at alternatives for offsetting groundwater deficits and to achieve sustainability within the basin. Some of the alternatives could include leasing or transferring water from upstream agencies to offset the groundwater pumping in water year types where Permit Application 29835 is unable to deliver water.

3. In the MICUP objectives, the County of San Joaquin is trying to achieve an integrated water supply and environmental benefits in the lower Mokelumne watershed.

    a. The Amador Water Agency, Calaveras County Water District, and the Calaveras Public Utility District would like to be included as interested parties. We also believe that we could potentially become partners in a truly integrated system on the river, if MICUP went beyond the lower watershed. The EIR should look at the Amador and Calaveras agencies as potential participants to transfer surface water to MICUP.

Best Regards,

Larry McKenney	Michael Minkler	Travis Small
General Manager	General Manager	General Manager
Amador Water Agency	Calaveras County Water District	Calaveras Public Utility District

California Department of Transportation

OFFICE OF THE DISTRICT 10 DIRECTOR
P.O. BOX 2048 | STOCKTON, CA 95201
(209) 948-7943 | FAX (209) 948-7179 TTY 711
www.dot.ca.gov

July 30, 2024

10-SJ-Various-PM Varioiius
Mokelumne River
Integrated Conjunction Use Program
NOP for EIR

Ashley Couch
San Joaquin County
Community Development Department
1810 E. Hazelton Ave
Stockton, CA 95205

Dear Ms. Couch:

The California Department of Transportation appreciates the opportunity to review the Notice of Preparation of an Environmental Impact Report for the Mokelumne River Integrated Conjunction Use Program (MICUP). The project proposes to appropriate water from Mokelumne River to lessen overdependence on groundwater. The Department has the following comments:

Water availability, use, storage, and transport is a critical component to the viability for all of California. Existing and future climate conditions in the region of the proposed program directly contribute to the long-term sustainability of the water supply and should be carefully considered in the development of this program and alternatives considered to meet the objectives of this program.

1. Please submit the DEIR to Caltrans for review and comment when it becomes available. The DEIR should include the following items.

2. Readily available climate projections, evaluations, and mapping addressing future climate projections, and adaptation measures for changes in precipitation, temperature, and subsidence and how the proposed program may be affected by these changes should be used to inform program alternatives.

3. Alternatives that improve water use efficiency and increase potential for increased water storage should be considered in addition to existing diversion and groundwater recharge efforts.

4. If the project program EIR seeks to be compliant with National Environmental Policy Act (NEPA), document should provide additional information regarding climate adaptation (analysis of climate change effects from proposed action) as outlined in the Phase II NEPA regulations adopted by Council on Environmental Quality (CEQ) rulemaking.

5. An explanation of how changes in the groundwater table will be monitored and whether that information will be publicly available.

If you have any questions, please contact me at (209) 483-2582 or Nicholas Fung at (209) 986-1552.

Sincerely,

Nicholas Fung
FOR

Tom Dumas
Chief, Office of Metropolitan Planning

Docusign Envelope ID: AF3B1F1E-9D59-40E0-972D-DEB99A7CEAF1

State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
North Central Region
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670-4599
(916) 358-2900
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

July 31, 2024

Ashley Couch, PE, CFM
Water Resources Manager
San Joaquin County
1810 East Hazelton Avenue
PO Box 1810
Stockton, CA 95201
acouch@sjgov.org

Subject: Mokelumne River Integrated Conjunctive Use Program
Notice of Preparation of Environmental Impact Report
SCH No. 2024070107[1]

Dear Ashley Couch:

The California Department of Fish and Wildlife (CDFW) received and reviewed the Notice of Preparation of an Environmental Impact Report (EIR) from San Joaquin County (County) for the Mokelumne River Integrated Conjunctive Use Program (MICUP; Project) in San Joaquin County, pursuant to the California Environmental Quality Act (CEQA) statute and guidelines.[2]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish, wildlife, plants and their habitats. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may need to exercise its own regulatory authority under the Fish and Game Code (Fish & G. Code).

CDFW ROLE

CDFW is California's Trustee Agency for fish and wildlife resources and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a).). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id.*, § 1802.). Similarly, for purposes of CEQA, CDFW provides, as available, biological expertise during public agency environmental

1 https://ceqanet.opr.ca.gov/2024070107
2 CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

Docusign Envelope ID: AF3B1F1E-9D59-40E0-972D-DEB99A7CEAF1

review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

CDFW may also act as a Responsible Agency under CEQA. (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381.) CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority. (Fish & G. Code, § 1600 et seq.) Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), the project proponent may seek related take authorization as provided by the Fish and Game Code.

PROJECT DESCRIPTION SUMMARY

The Project involves diverting Mokelumne River water to either serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge water into underground storage within the Eastern San Joaquin groundwater subbasin for later extraction and use. The Project would be located within the designated place of use for Water Right Application 029835 (A029835), within and immediately adjacent to the jurisdictional boundaries of San Joaquin County. The County proposes to implement the MICUP with the following partner agencies: North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), City of Stockton, Woodbridge Irrigation District (WID), East Bay Municipal Utilities District (EBMUD), and California Water Service.

Under A029835, the MICUP would divert up to 110,000 acre-feet per year (AFY) at up to 620 cubic feet per second (cfs) between December 1 and June 30 during wet years. In addition, up to 48,000 AFY could be stored in Camanche and/or Pardee Reservoirs, subject to available capacity as determined by EBMUD.

The Project would use a combination of existing and proposed diversion, conveyance, and recharge infrastructure within the Partner Agencies' boundaries. Surface water would either be directly diverted from the Mokelumne River or rediverted from the Mokelumne Aqueduct. Groundwater recharge methodologies may include direct surface recharge, aquifer storage and recovery wells, in-lieu recharge, and flood managed aquifer recharge.

COMMENTS AND RECOMMENDATIONS

CDFW offers the comments and recommendations presented below to assist the County in adequately identifying and/or mitigating the Project's significant, or potentially significant, impacts on biological resources. The comments and recommendations are also offered to enable CDFW to adequately review and comment on the proposed Project with respect to impacts on biological resources. CDFW recommends that the forthcoming EIR address the following topics.

Docusign Envelope ID: AF3B1F1E-9D59-40E0-972D-DEB99A7CEAF1

Project Description

The Project description should include the whole action as defined in the CEQA Guidelines § 15378, including proposed new operations and infrastructure, and should specify appropriate detailed exhibits disclosing Project temporary impacted areas such as equipment staging areas, spoils areas, adjacent infrastructure development, vehicle staging areas, and access and haul roads if applicable.

As required by § 15126.6 of the CEQA Guidelines, the EIR should include an appropriate range of reasonable and feasible alternatives that would attain most of the basic Project objectives and avoid or minimize significant impacts to resources under CDFW's jurisdiction. CDFW specifically recommends the County consider water conservation alternatives.

Assessment of Biological Resources

Section 15125(c) of the CEQA Guidelines states that knowledge of the regional setting of a project is critical to the assessment of environmental impacts and that special emphasis should be placed on environmental resources that are rare or unique to the region. To enable CDFW staff to adequately review and comment on the Project, the EIR should include a complete assessment of the flora and fauna within and adjacent to the Project footprint, with emphasis on identifying rare, threatened, endangered, and other sensitive species and their associated habitats. CDFW recommends the EIR specifically include:

1. An assessment of all habitat types located within the Project footprint, and a map that identifies the location of each habitat type.

2. A biological inventory of the aquatic and riparian species that are present in the Mokelumne River and adjacent riparian habitat, and downstream of the Project area. For each species, include the specific life stages likely to be present during Project activities, including water diversion, and reference available information on the species' instream flow, habitat, and water temperature needs.

3. Maps of all planned and potential conveyance infrastructure and points of diversion for the Project with descriptions of the current or planned conveyance and diversion capacity, presence or absence of a fish screen, and type of screen.

4. Maps showing planned or likely recharge areas, with descriptions of the habitat types, current land uses, and plants and terrestrial species present in the recharge areas, or within adjacent areas that could be affected by the Project.

5. Maps and descriptions of groundwater dependent ecosystems (GDEs) within the Project footprint. The EIR should leverage the most up to date mapping and information contained in the Eastern San Joaquin groundwater subbasin Groundwater Sustainability Plan (GSP).

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6. CDFW recommends that the California Natural Diversity Database (CNDDB), as well as previous studies performed in the area, be consulted to assess the potential presence of sensitive species and habitats. A nine United States Geologic Survey 7.5-minute quadrangle search is recommended to determine what may occur in the region, larger if the Project area extends past one quad (see *Data Use Guidelines* on the Department webpage www.wildlife.ca.gov/Data/CNDDB/Maps-and-Data). Please review the webpage for information on how to access the database to obtain current information on any previously reported sensitive species and habitat, including Significant Natural Areas identified under Chapter 12 of the Fish and Game Code, in the vicinity of the Project. CDFW recommends that CNDDB Field Survey Forms be completed and submitted to CNDDB to document survey results. Online forms can be obtained and submitted at: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data.

   Please note that CDFW's CNDDB is not exhaustive in terms of the data it houses, nor is it an absence database. CDFW recommends that it be used as a starting point in gathering information about the *potential presence* of species within the general area of the Project site. Other sources for identification of species and habitats near or adjacent to the Project area should include, but may not be limited to, State and federal resource agency lists, California Wildlife Habitat Relationship System, California Native Plant Society Inventory, agency contacts, environmental documents for other projects in the vicinity, academics, and professional or scientific organizations.

Analysis of Direct, Indirect, and Cumulative Impacts to Biological Resources

The EIR should provide a thorough discussion of the Project's potential direct, indirect, and cumulative impacts on biological resources. To ensure that Project impacts on biological resources are fully analyzed, the following information should be included in the EIR:

1. For each water year type, descriptions of baseline water operations for Pardee and Camanche Reservoirs, and release schedules and current flow hydrographs for the Mokelumne River below Camanche and below Woodbridge Dam. The EIR should characterize a range of potential or anticipated changes to operations due to the Project and present modeled scenarios for instream flows below Camanche and Woodbridge Dam, for each water year type, after Project implementation. The EIR should include descriptions of likely rates and volumes of Project diversions, including ramping rates, for each point of diversion, including both direct diversions from the Mokelumne River and re-diversions from the Mokelumne Aqueduct.

2. Analysis of Project impacts to end-of-year reservoir storage and the volume and temperature of water available to release as pulse flows in the fall, to attract salmonids, and in the spring, to aid with juvenile out migration.

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3. Analysis of Project impacts to reservoir and instream temperatures.

4. Description of the Mokelumne River Joint Settlement Agreement (JSA) and any potential Project impacts to end of year reservoir storage, the determination of JSA water year type, the frequency of JSA water year types, and the ability to continue to meet JSA release and instream flow obligations with Project implementation.

5. Environmental benefits attributable to the Project. The NOP states that a proposed objective of the Project is to “achieve integrated water supply and environmental benefits in the lower Mokelumne watershed.” The EIR should explicitly describe what environmental benefits will be achieved, which species and habitats will benefit, and how those benefits will be quantified and measured during Project implementation.

6. Project cumulative effects analysis developed as described under CEQA Guidelines section 15130. The EIR should discuss the Project's cumulative impacts to natural resources and determine if that contribution would result in a significant impact. The EIR should include a list of present, past, and probable future projects producing related impacts to biological resources or shall include a summary of the projections contained in an adopted local, regional, or statewide plan, that consider conditions contributing to a cumulative effect. The cumulative analysis shall include impact analysis of vegetation and terrestrial and aquatic habitat reductions within the area and their potential cumulative effects. This analysis should consider other pending water rights from the Mokelumne and related GSP projects. Please include all potential direct and indirect Project-related impacts to riparian areas, wetlands, wildlife corridors or wildlife movement areas, aquatic habitats, sensitive species and/or special-status species, open space, and adjacent natural habitats in the cumulative effects analysis.

Mitigation Measures for Project Impacts to Biological Resources

The EIR should include appropriate and adequate avoidance, minimization, and/or mitigation measures for all direct, indirect, and cumulative impacts that are expected to occur as a result of the construction and long-term operation and maintenance of the Project. CDFW also recommends the environmental documentation provide scientifically supported discussion regarding adequate avoidance, minimization, and/or mitigation measures to address the Project's significant impacts upon fish and wildlife and their habitat. For individual projects, mitigation must be roughly proportional to the level of impacts, including cumulative impacts, in accordance with the provisions of CEQA (Guidelines § § 15126.4(a)(4)(B), 15064, 15065, and 16355). In order for mitigation measures to be effective, they must be specific, enforceable, and feasible actions that will improve environmental conditions.

CDFW considers adverse Project-related impacts to sensitive species and habitats to be significant to both local and regional ecosystems, and the EIR should include

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mitigation measures for adverse Project-related impacts to these resources. Mitigation measures should emphasize avoidance and reduction of Project impacts. For unavoidable impacts, onsite habitat restoration, enhancement, or permanent protection should be evaluated and discussed in detail. If onsite mitigation is not feasible or would not be biologically viable and therefore not adequately mitigate the loss of biological functions and values, offsite mitigation through habitat creation and/or acquisition and preservation in perpetuity should be addressed. Areas proposed as mitigation lands should be protected in perpetuity with a conservation easement, financial assurance and dedicated to a qualified entity for long-term management and monitoring. Under Government Code, section 65967, the Lead Agency must exercise due diligence in reviewing the qualifications of a governmental entity, special district, or nonprofit organization to effectively manage and steward land, water, or natural resources on mitigation lands it approves.

California Endangered Species Act

CDFW is responsible for ensuring appropriate conservation of fish and wildlife resources including threatened, endangered, and/or candidate plant and animal species, pursuant to CESA. CDFW recommends that a CESA Incidental Take Permit (ITP) be obtained if the Project has the potential to result in "take" (Fish & G. Code § 86 defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") of State-listed CESA species, either through construction or over the life of the Project.

State-listed species with the potential to occur in the area include, but are not limited to: giant gartersnake (*Thamnophis gigas*), Bank Swallow (*Riparia riparia*), Boggs Lake hedge-hyssop (*Gratiola heterosepala*), succulent owl's-clover (*Castilleja campestris var. succulenta*), Swainson's Hawk (*Buteo swainsoni*), Crotch's bumble bee (*Bombus crotchii*), California tiger salamander (*Ambystoma californiense*), and Tricolored Blackbird (*Agelaius tricolor*).

The EIR should disclose the potential of the Project to take State-listed species and how the impacts will be avoided, minimized, and mitigated. Please note that mitigation measures that are adequate to reduce impacts to a less-than significant level to meet CEQA requirements may not be enough for the issuance of an ITP. To facilitate the issuance of an ITP, if applicable, CDFW recommends the EIR include measures to minimize and fully mitigate the impacts to any State-listed species the Project has potential to take. CDFW encourages early consultation with staff to determine appropriate measures to facilitate future permitting processes and to engage with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service to coordinate specific measures if both State and federally listed species may be present within the Project vicinity.

Lake and Streambed Alteration Program

The EIR should identify all perennial, intermittent, and ephemeral rivers, streams, lakes, other hydrologically connected aquatic features, and any associated biological resources/habitats present within the entire Project footprint (including utilities, access

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and staging areas). The environmental document should analyze all potential temporary, permanent, direct, indirect and/or cumulative impacts to the above-mentioned features and associated biological resources/habitats that may occur because of the Project. If it is determined the Project will result in significant impacts to these resources the EIR shall propose appropriate avoidance, minimization and/or mitigation measures to reduce impacts to a less-than-significant level.
Section 1602 of the Fish and Game Code requires an entity to notify CDFW prior to commencing any activity that may do one or more of the following:

1. Substantially divert or obstruct the natural flow of any river, stream or lake;

2. Substantially change or use any material from the bed, channel or bank of any river, stream, or lake; or

3. Deposit debris, waste or other materials where it may pass into any river, stream or lake.

Please note that "any river, stream or lake" includes those that are episodic (i.e., those that are dry for periods of time) as well as those that are perennial (i.e., those that flow year-round). This includes ephemeral streams and watercourses with a subsurface flow. It may also apply to work undertaken within the flood plain of a body of water.

If upon review of an entity's notification, CDFW determines that the Project activities may substantially adversely affect an existing fish or wildlife resource, a Lake and Streambed Alteration (LSA) Agreement will be issued which will include reasonable measures necessary to protect the resource. CDFW's issuance of an LSA Agreement is a "project" subject to CEQA (see Pub. Resources Code 21065). To facilitate issuance of an LSA Agreement, if one is necessary, the EIR should fully identify the potential impacts to the lake, stream, or riparian resources, and provide adequate avoidance, mitigation, and monitoring and reporting commitments. Early consultation with CDFW is recommended, since modification of the Project may avoid or reduce impacts to fish and wildlife resources. Notifications for projects involving (1) sand, gravel or rock extraction, (2) timber harvesting operations, or (3) routine maintenance operations must be submitted using paper notification forms. All other LSA Notification types must be submitted online through CDFW's Environmental Permit Information Management System (EPIMS). For more information about EPIMS, please visit https://wildlife.ca.gov/Conservation/Environmental-Review/EPIMS. More information about LSA Notifications, paper forms and fees may be found at https://www.wildlife.ca.gov/Conservation/Environmental-Review/LSA.

Please note that other agencies may use specific methods and definitions to determine impacts to areas subject to their authorities. These methods and definitions often do not include all needed information for CDFW to determine the extent of fish and wildlife resources affected by activities subject to Notification under Fish and Game Code section 1602. Therefore, CDFW does not recommend relying solely on methods developed specifically for delineating areas subject to other agencies' jurisdiction (such as United States Army Corps of Engineers) when mapping lakes, streams, wetlands,

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floodplains, riparian areas, etc. in preparation for submitting a Notification of an LSA.

CDFW relies on the lead agency environmental document analysis when acting as a responsible agency issuing an LSA Agreement. CDFW recommends lead agencies coordinate with CDFW as early as possible, since potential modification of the proposed Project may avoid or reduce impacts to fish and wildlife resources and expedite the Project approval process.

The following information will be required for the processing of an LSA Notification and CDFW recommends incorporating this information into any forthcoming CEQA document(s) to avoid subsequent documentation and Project delays:

1. Mapping and quantification of lakes, streams, and associated fish and wildlife habitat (e.g., riparian habitat, freshwater wetlands, etc.) that will be temporarily and/or permanently impacted by the Project, including impacts from access and staging areas. Please include an estimate of impact to each habitat type.

2. Discussion of specific avoidance, minimization, and mitigation measures to reduce Project impacts to fish and wildlife resources to a less-than-significant level. Please refer to section 15370 of the CEQA Guidelines.

ENVIRONMENTAL DATA

CEQA requires that information developed in environmental impact reports and negative declarations be incorporated into a database, which may be used to make subsequent or supplemental environmental determinations (Pub. Resources Code, § 21003, subd. (e)). Accordingly, please report any special-status species and natural communities detected during Project surveys to CNDDB. The CNNDB field survey form can be found at the following link: https://www.wildlife.ca.gov/Data/CNDDB/Submitting-Data. The completed form can be submitted online or mailed electronically to CNDDB at the following email address: CNDDB@wildlife.ca.gov.

FILING FEES

The Project, as proposed, would have an effect on fish and wildlife, and assessment of filing fees is necessary. Fees are payable upon filing of the Notice of Determination by San Joaquin County and serve to help defray the cost of environmental review by CDFW. Payment of the fee is required in order for the underlying project approval to be operative, vested, and final. (Cal. Code Regs, tit. 14, § 753.5; Fish & G. Code § 711.4; Pub. Resources Code, § 21089.)

CONCLUSION

Pursuant to Public Resources Code sections 21092 and 21092.2, CDFW requests written notification of proposed actions and pending decisions regarding the Project. Written notifications shall be directed to: California Department of Fish and Wildlife North Central Region, 1701 Nimbus Road, Rancho Cordova, CA 95670 or emailed to R2CEQA@wildlife.ca.gov.

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CDFW appreciates the opportunity to comment on the Notice of Preparation of the EIR for the Mokelumne River Integrated Conjunctive Use Program and recommends that San Joaquin County address CDFW's comments and concerns in the forthcoming EIR. CDFW personnel are available for consultation regarding biological resources and strategies to minimize impacts.

If you have any questions regarding the comments provided in this letter, please contact Bridget Gibbons, Environmental Scientist at bridget.gibbons@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Morgan Kilgour
C3A86764C0AD4F6...

Morgan Kilgour
Regional Manager

ec: Briana Seapy, Senior Environmental Scientist (Supervisory)
Bridget Gibbons, Environmental Scientist
Alyssa Obester, Senior Environmental Scientist (Specialist)
Skyler Burson, Environmental Scientist
Department of Fish and Wildlife

Office of Planning and Research, State Clearinghouse, Sacramento

July 30, 2024

Ashley Couch
Water Resources Manager
San Joaquin County
1810 East Hazelton Ave
Stockton, CA 95201
acouch@sjgov.org
submitted via email

Re: Comments on July 2, 2024, Notice of Preparation of an Environmental Impact Report for the Mokelumne River Integrated Conjunctive Use Program.

Dear Mr. Couch:

California Sportfishing Protection Alliance (CSPA) and The Center for Biological Diversity (The Center) respectfully submit the following comments on scoping for the proposed Mokelumne River Integrated Conjunctive Use Program (MICUP or Project).

CSPA is a nonprofit, public interest environmental organization. CSPA has been an advocate for fish, habitat, and water quality for 40 years. A leader in efforts to improve fisheries and fishing opportunities. CSPA is also one of California's major water policy organizations, with decades of consistent and effective advocacy before the State Water Resources Control Board and regional water quality control boards.

The Center is a nonprofit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has over 1.7 million members and online activists throughout California and the United States. The Center has worked for many years to protect imperiled plants and wildlife, open space, air and water quality, and overall quality of life for people in the Mokelumne River watershed.

These comments are made in response to the description of the project provided in the July 2, 2024, Notice of Preparation (NOP) of an Environmental Impact Report (EIR) issued by San Joaquin County Public Works Department.

Introduction

The future of MICUP depends on Water Rights Application 29835 (Application 29835). Application 29835 was first filed in 1990 and amended in 2014. The amended application proposed to store appropriated water in underground storage rather than in Middle Bar Dam or Duck Creek Dam. The amended application also reduced the points of diversion from nine to three; Pardee Dam; Camanche Dam; and the Intersection of Mokelumne River and Interstate 5.

Application 29835 seeks to appropriate up to 110,000 acre-feet (AF) of Mokelumne River water per year. This water would be diverted at a rate of up to 620 cubic feet per second (cfs) between December 1 and June 30 during Wet years. Most of this water would be stored in aquifers that are currently overdrafted. Up to 48,000 AF of this water would also possibly be stored in Camanche and/or Pardee Reservoir. San Joaquin County and others would then utilize this water for agricultural irrigation, municipal use, industrial use, and to recharge aquifers for later use.

The proposed water that would be used to recharge San Joaquin County's over-drafted aquifers is surface water derived from an already over-appropriated river. Water Right Order 98-08 declared the Mokelumne River to be fully appropriated from March through November of every water year. The State Water Resources Control Board (State Water Board) offered a qualifier that "During the months of March through June, the Declaration does not apply to proposed conjunctive use projects which are not dependent upon unappropriated water being available from the Mokelumne River in most years, but which could utilize unappropriated water in years when it is available."[1] Application 29835 depends on this qualifier.

Groundwater recharge is a new frontier in California water policy. The promise is that recharging aquifers will lead to a more reliable and sustainable water future for California. However, demand for water will continue to outstrip supply unless the State Water Board and water users address the existing and ever-increasing unsustainable demand for water. While California urgently needs projects that rectify the state's overdrafted aquifers, it is prudent that those in charge of such projects keep in mind how the State's aquifers became overdrafted in the first place.

Diverting water from the over-appropriated Mokelumne River would not be without cost to the environment and public trust resources. CSPA and The Center urge San Joaquin County and the Coordinating Committee leading MICUP to prepare an EIR that analyzes alternatives that are protective of ecosystems in the Mokelumne River, San Joaquin River, and Sacramento-San Joaquin Delta.

Such an EIR must include a water availability analysis that does not presume all

[1] California State Water Resources Control Board 1998, *Order WR 98-08*, California State Water Resources Control Board, viewed 29 July 2024, https://www.waterboards.ca.gov/waterrights/board_decisions/adopted_orders/orders/1998/wro98-08.pdf, p. 32 (pdf).

unappropriated flows to be excess flows. Modeling for bypass flow requirements should use more stringent conditions than those of the proposed Voluntary Agreements. The EIR should also investigate an alternative that includes bypass flow requirements of 55%-75% of unimpaired flow downstream of Camanche Dam.

The EIR must consider the Project's direct and cumulative impacts to threatened, endangered, and sensitive species. The EIR must incorporate the impacts of climate change on water resources into analyses of Project impacts. Finally, the EIR must consider the Project's direct and cumulative impacts to riparian habitats.

1. **The EIR must include a water availability analysis that does not presume unappropriated flows to be excess flows.**

In 2017 CSPA submitted comments on the 'Draft Water Available for Replenishment Report' (Draft WAFR Report). CSPA's comments on the Draft WAFR Report are attached as Appendix-1 to these scoping comments. The Draft WAFR Report "considered surface water available when streamflow exceeded existing water demands and minimum instream flow requirements, and provided some opportunity for additional beneficial use."[2] In its comments on the Draft WAFR Report CSPA contested this oversimplified narrative.

The EIR for MICUP should not assume that high flows exceeding minimum instream flow requirements are excess and therefore 'available' for appropriation. High flows are of benefit to the environment and public trust resources. High flows support migration of anadromous fish. High flows also replenish sediment that supports aquatic, terrestrial and avian species, and spawning and rearing of anadromous fish.

The natural flow distribution and processes of the Mokelumne River have been severely altered by impoundment, diversions, and other human uses. The State Water Board has designated the Mokelumne River as fully appropriated for most of the water year. Efforts to appropriate more water from the Mokelumne River should be done with great caution, if at all.

Groundwater replenishment is necessary in the Central Valley but should not come at the cost of the survival of species that depend upon surface water. Many wild fish species in the Bay-Delta and the Mokelumne River have been depressed due to the overall reduction in surface water flows. Using more surface water to maintain the status quo of excessive water use in California is not the path forward to groundwater sustainability.

The EIR for MICUP must provide a thorough assessment of the environmental benefit of high flows in the Mokelumne River and a thorough accounting of what flows, if any, can be appropriated for aquifer recharge without causing harm to the environment and public trust resources.

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[2] California Department of Water Resources. (2019). Water Available for Replenishment. [PDF] Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/WAFR/White-Paper---Water-Available-for-Replenishment_ay_19 pg. 19.

2. **Modeling for flows should use more stringent conditions than those of the proposed Voluntary Agreements.**

San Joaquin County and its partners must produce an EIR that is protective of anadromous fish and other flow dependent aquatic species in the Mokelumne River, San Joaquin River and the Sacramento-San Joaquin Delta.

An EIR that only uses the conditions proposed by the Voluntary Agreements (VAs) will not meet this requirement.

VAs for the Mokelumne River and those proposed for the Sacramento-San Joaquin Delta are not sufficient to protect fish and wildlife. The flows required under the VAs are inadequate and difficult to enforce. VAs also have a limited term of applicability, whereas a water right has no expiration date. It is not appropriate to rely on an explicitly time-limited requirement as a constraint on a water right.

Flows in the lower Mokelumne as mandated by the Joint Settlement Agreement (JSA) can be as low as 15 to 20 cfs below Woodbridge in September and October. These flows are inadequate to even maintain connectivity downstream of Woodbridge. In addition, the flows proposed in the Mokelumne River VA would not necessarily be additive to the flows required under the 1996 Joint Settlement Agreement that presently governs flows in the lower Mokelumne River, but rather would often simply change the timing of the same volume of flows.

Flows proposed in the VAs for the Bay-Delta are also inadequate to protect fish and wildlife. Native fish in the Bay-Delta are deprived of the freshwater flows they need to recover and thrive. The VAs reinforce current water management practices that have caused the depression of native fish species. Thus the EIR for MICUP should include water modeling based on more stringent conditions than proposed by the VAs.

3. **The EIR should also investigate an alternative that includes bypass flow requirements for the proposed new water right of 55%, 65%, 75% of unimpaired flow downstream of Camanche Dam.**

The EIR should evaluate a percentage of unimpaired flow bypass requirement should be made with the compliance point below Camanche Dam for Delta outflow. Even if the State Water Board does not adopt the Bay-Delta Plan, it is nonetheless appropriate that new water rights applications be held to this higher standard.

New water rights applications should not reduce Delta inflow and outflow over and above the conditions under the baseline or VAs. If the State Water Board does adopt a percentage of unimpaired flow as a regulatory requirement the bypass flow will take care of itself. An unimpaired flow of 75% is identified in the Delta Flow Criteria Report as being protective of the Delta. The EIR should evaluate adherence of new water rights to this requirement even if old water rights are not held to it.

This issue was examined as Alternative 6a in the Draft Staff Report for the update of the Bay-

Delta Water Quality Control Plan with the rationale: "Because the VA flows are intended to be additive to required flows under D-1641 and resulting flows under the 2019 BiOps, additional mechanisms are needed to protect the base upon which the VA flows are intended to be additive from diversion."[3] Regardless of the potential adoption of the Voluntary Agreements or a regulatory update of the Bay-Delta Plan, State Water Board staff recognized in Alternative 6a the effective overallocation of water in the Bay-Delta watershed and the consequent need for stringent diversion criteria for diversions under new water rights.

4. **The EIR should include analysis of potential benefits of using existing works to divert allocated water.**

The natural features of the Mokelumne River have been highly altered by human use. The Mokelumne River is obstructed by seven reservoirs, four powerhouses, and a network of tunnels and flumes. These water development projects have caused the depression of native fish species, particularly by inhibiting up-river migration of Chinook salmon. An EIR that is protective of both wild and hatchery fish as well as other fish and wildlife impacted by construction would analyze the potential benefits of relying on existing works to divert any water that is allocated to Application 29835.

Using existing works for diversion would also be of benefit to San Joaquin County and partners as it would not require them to navigate the technical and regulatory challenges of building new works that alter the streambed. The time and expense saved by using existing works would make the goal of a high bypass flow requirement more attainable and feasible. This would be a more favorable outcome for fish and wildlife in the Mokelumne River watershed.

5. **The EIR should analyze the potential detrimental effect appropriation could have on groundwater reserves.**

Aquifers in San Joaquin County, the Central Valley, and other parts of California are overdrafted due to centuries of largely unregulated pumping of groundwater. The State Water Board considers many rivers in California to be fully appropriated. Many of the state's rivers are also, at times, completely dewatered for many miles of their reaches.

This systemic overallocation and overappropriation of water in California must cease in order to protect public trust resources. Application 29835 seeks to appropriate water from a river that is deemed to be fully appropriated for much of the water year. The EIR for MICUP must take into account the potential impact such appropriation could have on groundwater and surface water supplies in the Mokelumne River and beyond.

Unless the demand for water is brought into line with reliable supply, there is no path forward to sustainability. To meet such an objective, the EIR for MICUP should consider the potential of water right conditions that restrict the delivery of conjunctive use water to existing irrigated acreage and disallow delivery of such water to new irrigated acreage.

[3]State Water Board, "Draft Staff Report/Substitute Environmental Document in Support of Potential Updates to the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary for the Sacramento River and its Tributaries, Delta Eastside Tributaries, and Delta" (Sep. 2023), pp. 7.2-15 and 7.2-16.

6. **The EIR must consider the Project's direct and cumulative impacts to threatened, endangered, and sensitive species.**

The EIR must address the direct and cumulative impacts from both construction and operation of the proposed Project to threatened, endangered, and sensitive species and habitats within the project site and in the surrounding areas.

The proposed Project lies within an area that is important to numerous federal and state protected species, including the federal and state listed Chinook salmon (fall, winter, and spring run), steelhead, Delta smelt, western yellow-billed cuckoo, foothill yellow-legged frog, and many others. The impressive diversity of sensitive species found across the Mokelumne watershed underscores the ecological importance of the region.

The Mokelumne River is also one of the main tributaries of the Sacramento-San Joaquin Delta, an ecosystem that has been severely disrupted by water conveyance and continues to decline. The Project will likely lead to direct and indirect impacts on biological resources in the Delta, all of which should be thoroughly analyzed and evaluated in the EIR.

As described by the East Bay Municipal Utility District "The Mokelumne system and its associated habitats have been affected by human activities for more than a century, beginning with extensive gold mining in the 1850s. Since that time, riparian and instream habitats have been modified or converted for uses such as agriculture, gravel mining, water impoundments, increased water diversions, decreased instream flows, and levees. These major actions and other events have led to the deterioration of riparian and aquatic habitat conditions on the lower Mokelumne River."[4]

If Application 29835 was granted, up to 110,000 AF of water per year would be removed from the Mokelumne River to recharge groundwater aquifers. This withdrawal of surface water from the river could have significant impacts on wildlife and habitats. These include the downstream effects of reduced or altered flows, including temperature changes, turbidity, and water quality, among others.

The EIR must fully disclose and analyze impacts to any listed, candidate, or sensitive species, and discuss alternatives and enforceable mitigation measures to avoid, reduce, and mitigate impacts to the species. Enclosed is a species list that details the protected species that may be found within the Project area (See Appendix 2). All of these species and plant communities have been identified in previous projects [5] [6] as occurring in the vicinity of the lower Mokelumne River for part or all of their lifecycle. The EIR must therefore fully disclose and analyze any impacts to these locally rare, state and federally protected species within the

[4] East Bay Municipal Utility District (2014, August) *Initial Study and Mitigated Negative Declaration for the Lower Mokelumne River Spawning and Rearing Habitat Improvement Project*.

[5] San Joaquin County Resource Conservation District; The Lower Mokelumne River Watershed Stewardship Planning Committee. 2002. Lower Mokelumne River Watershed Stewardship Plan.

[6] EBMUD. 2014. Initial Study and Mitigated Negative Declaration for the Lower Mokelumne River Spawning and Rearing Habitat Improvement Project.

Project's footprint, including impacts to wildlife connectivity.

To that end, careful documentation of the current site resources is imperative to analyze how best to site the Project to avoid and minimize impacts, and to mitigate any unavoidable impacts. The EIR must include thorough, seasonal surveys performed for sensitive plant species, vegetation communities, and animal species under the direction and supervision of the land management and resource agencies such as the US Fish and Wildlife Service and the California Department of Fish and Wildlife with full disclosure of survey methods and results to the public and other agencies. Adequate surveys covering all likely seasons in likely conditions must be implemented to evaluate the existing on-site conditions. Complete surveys will allow the public and decision-makers to fully comprehend the scope of Project impacts.

Surveys for the plants and plant communities should follow California Native Plant Society (CNPS)[7] and California Department of Fish and Wildlife (CDFW) floristic survey guidelines[8] and should be documented as recommended by CNPS and California Botanical Society policy guidelines. A full floral inventory of all species encountered needs to be documented and included in the EIR.

Surveys for animals should include an evaluation of the California Wildlife Habitat Relationship System's (CWHR) Habitat Classification Scheme.[9] All rare species (plants or animals) need to be documented with a California Natural Diversity Database form and submitted to the California Department of Fish and Wildlife using the CNDDB's online submission form.[10]

The EIR must include an analysis of the direct impacts of MICUP, including potential reduced or altered flows, to biological resources within, adjacent to, and in the vicinity of the project site. In addition, the EIR must include a detailed analysis of the cumulative impacts of this project together with other completed, current, and reasonably foreseeable development projects in the area including, but not limited to, the Delta Conveyance Project.

The EIR must also include concrete, enforceable mitigation measures to reduce direct and indirect impacts to all protected species. If the direct and indirect impacts of the Project on biological diversity cannot be reduced with mitigation to less than significant, San Joaquin County should abandon the Project.

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[7] California Native Plant Society 2018, *CNPS Rare Plant Survey Protocol*, California Native Plant Society, viewed 29 July 2024, https://cnps.org/wp-content/uploads/2018/03/cnps_survey_guidelines.pdf.

[8] California Department of Fish and Wildlife (2024) *Survey and Monitoring Protocols and Guidelines*, [online] Available at: https://wildlife.ca.gov/conservation/survey-protocols [Accessed 29 July 2024].

[9] California Department of Fish and Wildlife (2024) *California Wildlife Habitat Relationships (CWHR)*, [online] Available at: https://wildlife.ca.gov/Data/CWHR [Accessed 29 July, 2024].

[10] California Department of Fish and Wildlife (2024) *California Natural Diversity Database (CNDDB) Submitting Data*, [online] Available at: https://wildlife.ca.gov/Data/CNDDB/Submitting-Data#44524419-online-field-survey-form [Accessed 29 July, 2024].

7. The EIR must incorporate the impacts of climate change on water resources into analyses of Project impacts.

The EIR must also incorporate the impacts of climate change on water resources into analyses of Project impacts. Climate change is expected to decrease snowpack, lower spring and summer streamflow, increased evapotranspiration, more extreme storms, and decreased water quality during droughts, among others. As stated by the California Water Plan 2023 Update issued April 3, 2024:

> In the five-year period since the publication of California Water Plan Update 2018 (Update 2018), climate change has put unprecedented stress on natural and human systems. During that time, Californians experienced increased wildfires, rising sea levels, and highly variable precipitation and runoff patterns that manifested as historic droughts and floods — all of which increased socio-economic uncertainty. Although climate change certainly is not the only water-related challenge disrupting natural and human systems, all water sectors are vulnerable to its interrelated impacts.[11]

8. The EIR must consider the Project's direct and cumulative impacts to riparian habitats.

The EIR must assess and mitigate the Project's impacts to riparian corridors and the cascading effects of removed habitat and connectivity, reduced groundwater, and ongoing climate change on the special-status species and other animals and plants that rely on these habitats.

Riparian habitats can provide some resilience to climate change. The canopy cover of riparian trees and the availability of groundwater have a cooling effect for both air and water temperatures, which creates a cooler microclimate for species to find refuge from a warming climate.[12] Such connectivity also helps animals and plants adjust to shifts in resource availability and maintain a suitable climate space as climate change alters habitats and ecological processes and causes shifts in species' ranges .[13] Removing already limited water could compromise the integrity and functionality of the riparian ecosystems in and near the Project area.

With the driest 22-year period in 1,200 years in the western US and drought conditions that will likely continue[14] climate change refugia and resilience provided by ecosystems like riparian areas will be ever more critical for species survival and ecosystem health. As discussed in a 2021 Center report:[15]

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[11] California Department of Water Resources (2024, April 3) California Water Plan 2023 Update: Executive Summary, p. ES-1.

[12] Gray, M., Micheli, E., Comendant, T., & Merenlender, A. (2020). Quantifying climate-wise connectivity across a topographically diverse landscape. Land, 9(10), 355.

[13] Cushman, S. A., McRae, B., Adriaensen, F., Beier, P., Shirley, M., & Zeller, K. (2013). Biological corridors and connectivity. In D. W. Macdonald & K. J. Willis (Eds.), Key Topics in Conservation Biology 2 (First Edit, pp. 384–403). John Wiley & Sons, Ltd.

[14] Williams, A. P., Cook, B. I., & Smerdon, J. E. (2022). Rapid intensification of the emerging southwestern North American megadrought in 2020–2021. Nature Climate Change.

[15] Yap, T. A., Rose, J. P., Anderson, I., & Prabhala, A. (2021). California Connections: How Wildlife Connectivity Can Fight Extinction and Protect Public Safety.

> Climate change is worsening ecosystem stress and species extinction risk .[16] Increasing variability and extremes in temperature, wind, and precipitation are all products of a warming climate, leaving species struggling to adapt. As a result, species' genes are changing, physiological and physical features such as body size are changing, ranges are shifting as species try to maintain a suitable climate space, and numerous species are expressing new breeding and migration behaviors[17].

For example, some plants are budding and flowering earlier, some marine and freshwater fishes are spawning either earlier or later, and some species with temperature-dependent sex determination are experiencing shifts in sex ratios. ***Climate-related local extinctions have already occurred in hundreds of plant and animal species*** .[18] One study found that terrestrial bird and mammal populations that are experiencing greater climate warming are more likely to be experiencing greater population declines[19].

Reportedly, climate change is already impacting 82% of key ecological processes that form the foundation of healthy ecosystems .[20] If climate change goes unabated, more than one-third of all plant and animal species could become extinct in the next 50 years.[21]

Wildlife connectivity is critical for biodiversity resilience and climate change adaptability. A permeable landscape that has multiple pathways or linkages between habitat patches allows a wide variety of species to adjust to shifts in resource availability.[22] For smaller species with poor dispersal abilities, like San Francisco garter snakes, CRLF and San Bernardino kangaroo rats, multiple linkages can provide habitat while still allowing for their dispersal.

Multiple connections also help populations persist after extreme events worsened by climate change. During floods, landslides or wildfires, these pathways provide escape routes or refugia for animals seeking safety . Such events can cause local extinctions in small, isolated populations.

The EIR must therefore assess and mitigate the Project's impacts to riparian habitats as well as habitat connectivity in the context of a changing climate and increasing drought conditions. One possible form of mitigation is the creation or enhancement of floodplain habitat that can also serve to recharge groundwater.

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[16] Trisos, C. H., Merow, C., & Pigot, A. L. (2020). The projected timing of abrupt ecological disruption from climate change. Nature, 580, 496–501.

[17] Scheffers, B. R., De Meester, L., Bridge, T. C. L., Hoffmann, A. A., Pandolfi, J. M., Corlett, R. T., Butchart, S. H. M., Pearce-Kelly, P., Kovacs, K. M., Dudgeon, D., Pacifici, M., Rondinini, C., Foden, W. B., Martin, T. G., Mora, C., Bickford, D., & Watson, J. E. M. (2016). The broad footprint of climate change from genes to biomes to people. Science, 354(6313).

[18] Wiens, J. J. (2016). Climate-related local extinctions are already widespread among plant and animal species. PLoS Biology, 14(12), 1–18.

[19] Spooner, F. E. B., Pearson, R. G., & Freeman, R. (2018). Rapid warming is associated with population decline among terrestrial birds and mammals globally. Global Change Biology, 24, 4521–4531.

[20] Scheffers et al. (2016)

[21] Román-Palacios, C., & Wiens, J. J. (2020). Recent responses to climate change reveal the drivers of species extinction and survival. Proceedings of the National Academy of Sciences of the United States of America, 117(8), 4211–4217.

[22] Mcrae, B. H., Dickson, B. G., Keitt, T. H., & Shah, V. B. (2008). Using circuit theory to model connectivity in ecology , evolution , and conservation. Ecology, 89(10), 2712–2724.

Conclusion

Water in California is overallocated and overappropriated. Too much is promised, too much is delivered, and not enough is left in rivers and in the ground. The result is ecosystem collapse, sinking land, and dry wells.

Projects that aim to replenish depleted aquifers are needed, but should not come at the cost of further degradation of the state's rivers, fish and wildlife, and the people who depend on these resources.

Application 29835 seeks to divert water characterized as "excess" to replenish San Joaquin County's overdrafted aquifers. Flood stage water in the Mokelumne River provides crucial flows to many flow dependent aquatic species. Flood stage water is not synonymous with excess water. An EIR for Application 29835 and MICUP must prioritize the protection of these already imperiled hydrological and biological resources.

Respectfully submitted,



Sarah Vardaro
Administrative and Policy Associate
California Sportfishing Protection Alliance
sarah@calsport.org
530-919-9701



Sofia Prado-Irwin, PhD
Staff Scientist
Urban Wildlands Program
Center for Biological Diversity - Denver
spradoirwin@biologicaldiversity.org
(510) 844-7100 x548

Appendix 1

California Sportfishing Protection Alliance

December 5, 2017 Comments

'*Flood MAR – Using Flood Water for Managed Aquifer Recharge to Support Sustainable Water Resources'*
(November 2017)

California Sportfishing Protection Alliance

"An Advocate for Fisheries, Habitat and Water Quality"

Chris Shutes, Water Rights Advocate
1608 Francisco St., Berkeley, CA 94703
Tel: (510) 421-2405 E-mail: blancapaloma@msn.com
http://calsport.org/news/

December 5, 2017

Ms. Jennifer Marr
Statewide Infrastructure Investigations Branch
Division of Statewide Integrated Water Management
California Department of Water Resources
Jennifer.Marr@water.ca.gov
Via e-mail

Dear Ms. Marr:

The California Sportfishing Protection Alliance (CSPA) respectfully submits these comments on the Discussion Draft of the White Paper entitled *Flood MAR – Using Flood Water for Managed Aquifer Recharge to Support Sustainable Water Resources* (November, 2017, hereinafter *MAR Discussion Draft*).

CSPA believes there may be opportunities for managed groundwater recharge using high flows in rivers in some circumstances. However, CSPA is concerned about the loss of surface flows, particularly in watersheds that are already over-appropriated and in rivers in which required flows are already insufficient.

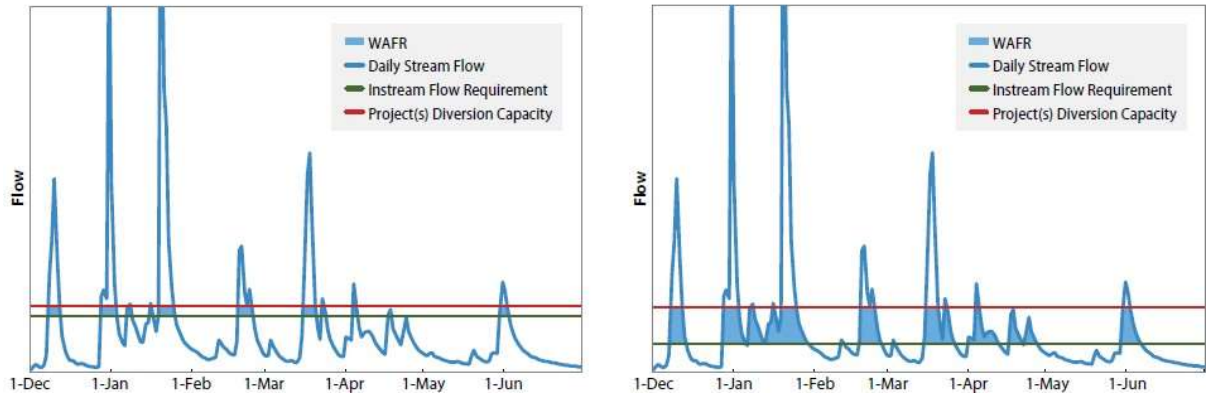
The diversion of surface water to groundwater in overappropriated watersheds and/or from rivers whose flow requirements are inadequate to protect instream resources defeats the stated purpose of increasing sustainability. Therefore, CSPA recommends several general approaches for placing appropriate limits on diversions of surface water to groundwater. CSPA also recommends several policy approaches that may benefit surface water and groundwater resources, as well as the people and other life forms that these resources support. Finally, CSPA comments on the necessary legal framework for using surface water to replenish groundwater.

Hydrological framework of "flood flows"

The *Draft Water Available for Replenishment Report* (hereinafter, *Draft WAFR Report*, January, 2017 available at: https://d3.water.ca.gov/owncloud/index.php/s/FUKYqcl1LblWTeZ) recognized that there is a potential range of surface water that may be available for replenishment of groundwater. This range depends on both regulatory and physical limitations. Generally, pages 25-27 of the *Draft WAFR Report* discuss these options. The *MAR Discussion Draft* figures 7 and 8 borrow from pages 25-27 of the *Draft WAFR Report*.

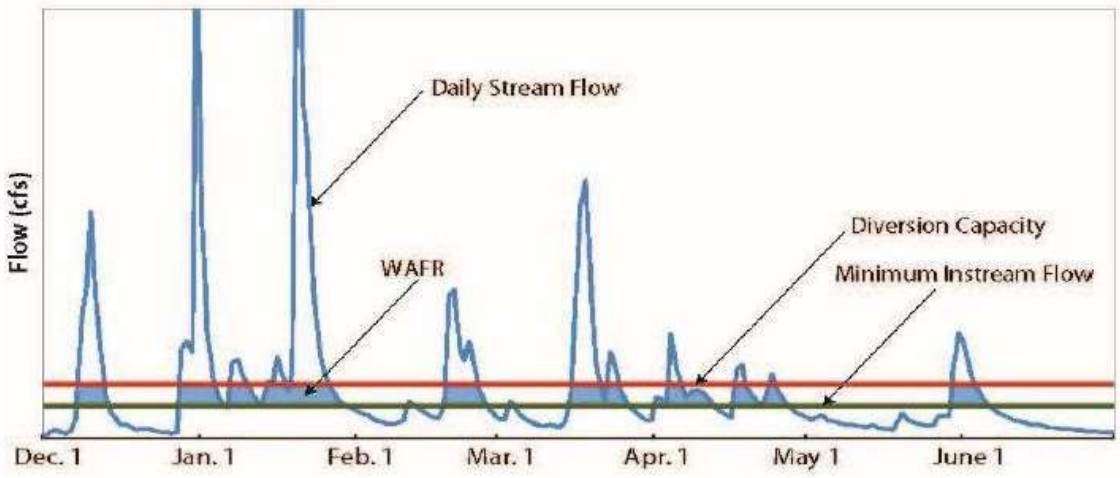
Below is pasted Figure 4 from p. 25 the *Draft WAFR Report.* This figure conceptually demonstrates potential ranges of surface water available for groundwater replenishment.

Figure 4. Lower Uncertainty Range Estimate (left) Upper Uncertainty Range Estimate (right) Conceptual Projects, with WAFR for Multiple Streams



The present *MAR Discussion Draft* downplays the important nuance that the potential range incorporates. Figure 7 in the *MAR Discussion Draft* is pasted below:

Figure 7. Surface Water Available for Replenishment



The narrative in the *MAR Discussion Draft* that is directly below this Figure 7 reads as follows:

> This white paper uses the term high flows to designate the flows in a channel that are above regulatory instream flow requirements (the combination of regulatory environmental/water quality flows and water required to satisfy water rights). A similar designation was used in the WAFR analysis conducted for SGMA. It generally considered surface water available when streamflow exceeded existing water demands

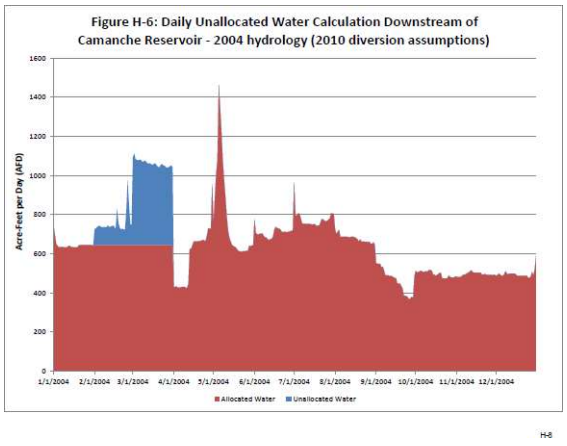
and minimum instream flow requirements, and provided some opportunity for additional beneficial use. (*MAR Discussion Draft*, p. 19).

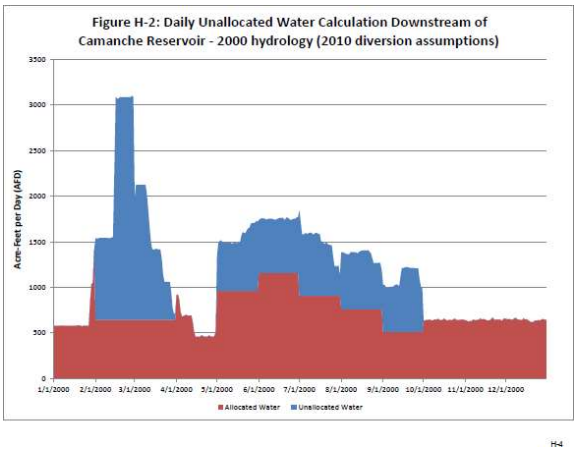
This narrative on p. 19 of the *MAR Discussion Draft* contains an oversimplification that obscures a fundamental point. All streamflow in a river that exceeds "existing water demands and minimum instream flow requirements" is not necessarily ***available*** for appropriation for groundwater replenishment or any other particular use. It is fair to say that it is unallocated or unappropriated. However, whether it is "available" is a legal and regulatory question that requires definition.

The figures pasted above are helpful in conceptualizing availability. However, it is important to recognize their limitations. The hydrographs represented above generally represent an unregulated system, or a system without storage. These hypothetical hydrographs are driven by unimpaired flow. In an unregulated system, setting a higher minimum instream flow does more than allow less total diversion of water out of the system. It also maintains much of the hydrological variability that is achieved during small flow pulses. In the contrasting hydrographs shown above from Fig. 4 of the *Draft WAFR Report*, a regulatory requirement that allowed the lower minimum flow in the hydrograph on the right would mostly or entirely eliminate the small flow spikes that (without diversion for replenishment) currently appear in January, April and May.

If the hydrographs above represented a regulated system, the green line would be the required minimum instream flow. Assuming it was on hand, storage would make up the differential between the blue line and the green line whenever the blue line fell below the green line. Thus, the blue line would follow the green line in those cases where the blue line now falls below the green line. A real-world example is found in the two figures of hydrographs pasted below that represent actual annual flow in the Mokelumne River at the Camanche gage just downstream of Camanche Dam. These are from the document entitled "*MokeWISE Program Final Memorandum*: *Water Availability Analysis* (9 Jan. 2015). The document is available at: https://azslide.com/appendix-g-water-availability-analysis_59c210bc1723dd7d5d1d1ed1.html[1] Note that the units for the y-axis in the hydrographs below are acre-feet per day, not cfs.

[1] "MokeWISE" was a voluntary stakeholder collaborative funded by a DWR grant. The collaborative evaluated opportunities and obstacles for water development projects in the Mokelumne River watershed, as well as opportunities for habitat improvements, and issued a final report. Appendix G of that report is titled "Water Availability Analysis" and is the source of the figures below.





Each hydrograph above represents a calendar year. The red shaded area represents "allocated water": water that is required for minimum instream flow plus water released to meet downstream water deliveries. The blue shaded area represents "unallocated water." Note that the scales on the y-axis are different: 2000 was a much wetter water year than 2004 in the Mokelumne watershed.

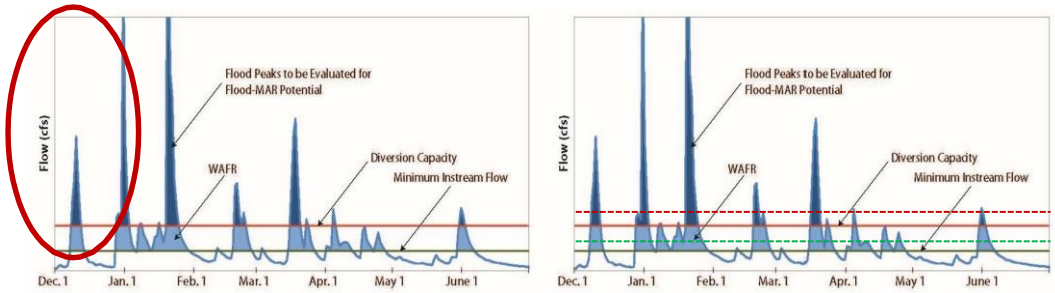
In the left-hand hydrograph above (for the year 2004), the horizontal line at the top of the red area in the first three months generally represents the flow requirement: there are few required downstream deliveries until the irrigation season starts. The blue area from about February 1 through April 1 represents flood releases. In 2004, irrigation deliveries evidently started in mid-April, which is apparent from the sharp increase in releases at that time. By the beginning of October, releases are once again largely limited to the required instream flow; the required flow increased on October 1. Since 2004 was a relatively dry year, there were no flood releases after the spring. The large spike on about the first of May was likely a release to stimulate outmigration of juvenile salmon.

The right-hand hydrograph above (for the year 2000) shows the hydrograph for a wetter water year. Wet year minimum flows are higher. Irrigation deliveries did not start until about May 1. There are two sets of flood releases in 2000: one set in the winter and spring to stay under the flood curve, and a second set from late spring into the fall to bring Camanche Reservoir down to the winter flood storage curve that goes into effect in early November. As CSPA understands East Bay Municipal Utility District's (EBMUD) operation of Camanche Reservoir, the timing and volumes of the spring releases in the winter-spring of 2000 were largely required by the Army Corps' flood curve. However, while the volume of the summer-fall releases was largely required by the Army Corps' requirement to draw down the reservoir to a specified level, EBMUD had considerable discretion about the timing of the summer-fall releases.

Additional approaches to defining water available for replenishment: unregulated systems

Using the hydrographs reproduced above for both unregulated and regulated systems, it is possible to consider additional approaches to defining "available" water.

The *Draft WAFR Report* contemplates different minimum flow levels (as in the unregulated hydrographs shown above). Below certain levels, no diversions for replenishment would be allowed. But above the minimum flow level, diversion would be allowed up to the capacity of the diversion works. A different approach would be to allow no diversions from the first two pulses of the water year, as illustrated in the modified hydrograph shown on the left below:



No diversion for replenishment would be allowed of the pulses inside the red circle. A variation on this approach would be to set a threshold in acre-feet, prior to which no diversions for replenishment would be allowed. One could compare this to a deductible in an insurance plan.

A second variation, shown on the right above, would be to restrict diversions above a specificed minimum instream flow to a ***percentage*** of the flow above the minimum. One could compare this to a co-payment in an insurance plan. Limiting diversion to a percent of flood flows (flows above the minimum required flow and the flow needed to meet existing deliveries) would have the effect of maintaining some of the shape of the hydrograph. It would also increase the flow level at which the capacity of the diversion works was reached. While it is more difficult to demonstrate this visually on a conceptual graph (i.e., without re-graphing actual data), the dotted green line represents where the hydrograph in the range below the dotted red line might peak if the hydrograph did not exceed the dotted red line.

The set of hydrographs from the Mokelumne reproduced from the MokeWISE Report above allows visualization of the additional conceptual approaches in a regulated system to the use of "flood flows" for groundwater replenishment.

In a year like 2004 (Figure H-6), the total amount of flood flows was on the order of 15,000 acre-feet: 400 acre-feet per day for about a month, plus a small additional increment. In this circumstance, it would be appropriate to disallow any diversion for groundwater replenishment. The instream benefit would greatly outweigh the recharge benefit. The "deductible" concept would be appropriate here.

In 2000 (Figure H-2), there were two distinct sets of flood releases. The first was during the time when unregulated runoff was entering Camanche Reservoir (and EBMUD Pardee Reservoir immediately upstream of Camanche). Although it would be appropriate to limit diversion for replenishment to a percentage of the flood flows, in much of this year the size of any diversion works would likely limit such diversion to a small percentage in any case. A good rule of thumb for required pass-through of inflow to the Bay-Delta would be a percent of

February-June unimpaired flow, as suggested conceptually by the State Water Board for the update of the Bay-Delta Plan.

The summer "flood flows" shown in the Mokelumne River in the year 2000 represent release of stored water from EBMUD's facilities or from PG&E's reservoirs farther upstream. Much of the Mokelumne River fisheries benefit of these releases would be improved water temperature for resident or oversummering *O. mykiss*. However, flow through the Delta could also be beneficial in maintaining the Low Salinity Zone west of the Delta. A percent of the flow would again be an appropriate consideration.

One can imagine a situation in which an entity would pay EBMUD to store water in Camanche Reservoir for summer release for downstream replenishment. This opportunity might be exercised in drier years, so that some recharge benefits were gained and diversion facilities could be used even in years without flood flows. Under these circumstances, it is more conceivable that full diversion of this stored water would be allowed. The release of this stored water, over and above minimum requirements and water needed for other downstream diverters, could still have a summer water temperature benefit in the Mokelumne River upstream of the point of diversions, assuming of course that the river would be used for conveyance to the point of diversion for groundwater replenishment.

Water Rights

Another way of making the diversion of surface water for groundwater replenishment more acceptable is to use existing water rights. This is particularly important in overappropriated watersheds. Bluntly, senior diverters in some overappropriated watersheds need to reduce their irrigation diversions in order to maintain a sustainable water balance. The over-diversion of water, particularly to new acreage, consititutes in the opinion of CSPA an unreasonable use of water. One way of maintaining the water rights associated with these senior diverters would be to require a reduction of irrigation diversions and routine water sales from the baseline condition, but to allow diversion for groundwater replenishment up to the full amount of the water right in very wet water years such as 2017.

If, for example, an irrigation district were required to reduce its baseline diversions by 10% in all water years, it could divert up to that 10% for groundwater replenishment in very wet years like 2017. In most watersheds, there would still be substantial flood flows in years like 2017 that were not diverted for replenishment or for irrigation. This would be a more sustainable business model than the current rags-or-riches paradigm that plagues irrigators in many watersheds. Under an improved model, irrigation districts would deliver as a baseline condition an achievably smaller but more reliable amount of irrigation water. Using the generally unused portion of their water right for replenishment in very wet years would create a more reliable groundwater situation to call on in critically dry years or in dry year sequences.

In any event, there are additional water rights concerns that groundwater replenishment raises. Groundwater replenishment is not a designated beneficial use. CSPA does not support making it one. Allowing water rights simply to divert surface water to underground storage will in all likelihood perpetuate the rob-Peter-to-pay-Paul paradigm that water users in many

overappropriated watersheds seem all too eager to apply. Devoting a portion of existing rights to recharge, within the constraints of reasonable use, is a better model. New rights may be possible, with long-term demonstration of beneficial use of water. However, new rights would need to be carefully conditioned in recognition of the importance of flood flows and would need to preserve the value and instream functions of existing flood flows.

Finally, diverting water for groundwater replenishment under a never-ending series of temporary rights or emergency proclamations is unacceptable. Groundwater replenishment is going to occur. It needs an appropriate legal framework. It needs real water rights for the diversion of surface water. It needs CEQA review.

Conclusion

In sum, the presence of water in a surface river or stream, over and above the sum of the required minimum instream flow and water required for existing diversions, does not make that water "available" for replenishment. It is important to maintain the existing benefits of high flows. This letter has suggested some conceptual approaches to maintaining those benefits, keeping any diversion of surface water for groundwater replenishment within the framework of reasonable use. In addition, the use of surface water for groundwater replenishment needs to take place within the appropriate legal framework of real (not temporary) water rights and CEQA review.

Thank you for the opportunity to comment on the Discussion Draft of the White Paper entitled *Flood MAR – Using Flood Water for Managed Aquifer Recharge to Support Sustainable Water Resources.*

Respectfully submitted,



Chris Shutes
Water Rights Advocate
California Sportfishing Protection Alliance

Appendix 2

Non-exhaustive list of species potentially present in and around the lower Mokelumne River

Appendix 2

Non-exhaustive list of species potentially present in and around the lower Mokelumne River. FT=federally threatened, FE=federally endangered, ST=state threatened, SE=state endangered, SSC=species of special concern, FP=fully protected, WL=watch list.

Species	USFWS Designation	CDFW Designation
vernal pool fairy shrimp (Branchinecta lynchi)	FT	
valley elderberry longhorn beetle (Desmocerus californicus dimorphus)	FT	
vernal pool tadpole shrimp (Lepidurus packardi)	FE	
Delta smelt (Hypomesus transpacificus)	FT	SE
Central Valley steelhead Oncorhynchus mykiss	FT	
Spring-run Chinook salmon (Oncorhynchus tshawytscha)	FT	ST
Fall-run Chinook salmon (Oncorhynchus tshawytscha)	FT	
Winter-run Chinook salmon Oncorhynchus tshawytscha	FE	SE
California tiger salamander, central population (Ambystoma californiense)	FT	ST
California red-legged frog (Rana draytonii)	FT	SSC
Western spadefoot toad (Spea hammondi)	Proposed FT	
Foothill yellow-legged frog (Rana boylii)	FE	SE
Giant garter snake (Thamnophis gigas)	FT	ST
Western pond turtle (Actinemys marmorata)	Proposed FT	
Bald Eagle (Haliaeetus leucocephalus)	-	FP
Bank Swallow (Riparia riparia)	-	ST
Burrowing owl (Athene cunicularia)	-	SSC
Common Loon (Gavia immer)	-	SSC
Golden Eagle (Aquila chrysaetos)	-	FP
Osprey (Pandion haliaetus)	-	WL
Prairie Falcon (Falco mexicanus)	-	WL
Swainson's hawk (Buteo swainsoni)	-	ST
Tricolored blackbird Agelaius tricolor	-	ST
White-tailed kite (Elanus leucurus)	-	FP
Yellow-breasted chat (Icteria virens)	-	SSC
Mountain plover (Charadrius montanus)		SSC
Western yellow-billed cuckoo (Coccyzus americanus occidentalis)	FT	SE
Greater sandhill crane (Grus canadensis tabida)	-	ST
California black rail (Laterallus jamaicensis coturniculus)	-	ST
Cooper's hawk (Accipter cooperi)	-	WL
Short-eared owl (Asio flammens)	-	SSC
Northern harrier (Circus cyanus)	-	SSC
Yellow warbler (Setophaga petechia)	-	SSC
Ringtail/ringtail cat (Bassaricus astutus)	-	FP

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STATE OF CALIFORNIA – CALIFORNIA NATURAL RESOURCES AGENCY **GAVIN NEWSOM**, GOVERNOR

CENTRAL VALLEY FLOOD PROTECTION BOARD
3310 El Camino Ave., Ste. 170
SACRAMENTO, CA 95821
(916) 574-0609

July 31, 2024

Ashley Couch, PE, CFM
Water Resources Manager
San Joaquin County
1810 East Hazelton Ave./PO Box 1810
Stockton, CA 95201
acouch@sjgov.org

Subject: Comments for the Notice of Preparation of an Environmental Impact Report and Scoping Meeting, Mokelumne River Integrated Conjunctive Use Program, SCH# 2024070107, San Joaquin County

Dear Ashley Couch,

The Central Valley Flood Protection Board (Board) appreciates the opportunity to comment on the Notice of Preparation of an Environmental Impact Report (EIR) for the Mokelumne River Integrated Conjunctive Use Program (proposed project). The EIR will be prepared to disclose and address potential environmental impacts associated with the proposed project.

The proposed project involves improving North San Joaquin Water Conservation District water diversions and pipelines to increase diversion capacity and/or improve operations efficiency, and install new Mokelumne Aqueduct turnouts for the Stockton East Water District. The proposed project is located in the Mokelumne River, a regulated stream and designated floodway that is within the Board's permitting authority. Project activities occurring within the Mokelumne River and floodway may require an encroachment permit.

Any work that modifies Board regulated streams, designated floodways, or elements of the State Plan of Flood Control within the watershed may require review and approval by the Central Valley Flood Protection Board. This includes activities that introduce encroachments, increase peak flow rates, or alter flow velocities, potentially altering channel conveyance capacity and sediment transport patterns and causing negative downstream impacts. For any such activities, compliance with California Code of Regulations Title 23, Division 1 (Central Valley Flood Protection Board) and Part 4 of Division 5 of the California Water Code would be necessary.

Responsibility of the Central Valley Flood Protection Board

The Board is the State's regulatory agency responsible for enforcing appropriate standards for the construction, maintenance, and operation of the flood control system that protects life, property, and habitat in California's Central Valley. The Board serves as the State coordinator between local flood management agencies and the federal government, with the goal of providing the highest level of flood protection possible to California's Central Valley.

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The Board operates under authorities as described in California Water Code (Water Code), which requires the Board to oversee future modifications or additions to facilities of the State Plan of Flood Control (SPFC). In addition, pursuant to assurances provided to the United States Army Corps of Engineers (USACE) by the Board on behalf of the State, the USACE Operation and Maintenance Manuals, Code of Federal Regulations, Title 33, Section 208.10, and United States Code, Title 33, Section 408, the Board is responsible for the operation and maintenance of the SPFC facilities. The USACE requires the Board to serve as the lead non-Federal sponsor for projects to improve or alter facilities of the SPFC pursuant to Code of Federal Regulations, Title 33, Section 408. The State's objectives include fulfilling the USACE's expectations pursuant to the assurances provided to the USACE.

Encroachment Permit

Per California Code of Regulations, Title 23, Waters, Division 1 (Title 23), Section 6, approval by the Board is required for all proposed work or uses, including the alteration of levees within any area for which there is an Adopted Plan of Flood Control within the Board's jurisdiction. In addition, Board approval is required for all proposed encroachments within a floodway, on adjacent levees, and within any Regulated Stream identified in Title 23, Table 8.1. Specifically, Board jurisdiction includes the levee section, the waterward area between project levees, a minimum 10-foot-wide strip adjacent to the landward levee toe, the area within 30 feet from the top of bank(s) of Regulated Streams, and inside Board's Designated Floodways. Activities outside of these limits which could adversely affect Federal-State flood control facilities, as determined by Board staff, are also under the Board's jurisdiction. Permits may also be required for existing unpermitted encroachments or where it is necessary to establish the conditions normally imposed by permitting, including where responsibility for the encroachment has not been clearly established or ownership or uses have been changed.

Federal permits, including USACE Section 404 and Section 10 regulatory permits and Section 408 Permission, in conjunction with a Board permit, may be required for the proposed project. In addition to federal permits, state and local agency permits, certification, or approvals may also be required. State approvals may include, but are not limited to, California Department of Fish and Wildlife's Lake and Streamed Alteration Agreement and Central Valley Regional Water Quality Control Board's Section 401 Water Quality Certification and/or Waste Discharge Requirement. The Applicant must obtain all authorizations that the proposed project may require.

Flood Impacts Analysis

Pursuant to Section 15 of Title 23, the Board may deny an encroachment permit if the proposed project could:

- Jeopardize directly or indirectly the physical integrity of levees or other works
- Obstruct, divert, redirect, or raise the surface level of design floods or flows, or the lesser flows for which protection is provided
- Cause significant adverse changes in water velocity or flow regimen
- Impair the inspection of floodways or project works
- Interfere with the maintenance of floodways or project works
- Interfere with the ability to engage in flood fighting, patrolling, or other flood emergency activities

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- Increase the damaging effects of flood flows
- Be injurious to, or interfere with, the successful execution, functioning, or operation of any adopted plan of flood control
- Adversely affect the State Plan of Flood Control, as defined in the California Water Code

As a responsible agency under the California Environmental Quality Act (CEQA), the Board will need to have adequate information in order to evaluate whether to issue a permit at a future date. Accordingly, please be prepared to provide specific analyses to determine if the proposed project could result in any potential impacts listed above. This includes direct impacts to facilities under construction, as well as indirect impacts from the project to surrounding facilities. This encompasses any proposed work that contemplates modifications to a SPFC Facility, Lower San Joaquin Levee District Facility, or operation of any adopted plan of flood control or the hydrology of the water ways. It is therefore recommended that the environmental document include a specific flood facility impacts analysis section.

Closing

The potential risks to public safety, including increased flood risks, need to be considered when developing proposed projects that seek to modify flood control works or the hydrology of the water ways. Board staff is available to discuss any questions you have regarding the above comments. Please contact Jordan Robbins at (916) 524-3454, or via email at Jordan.Robbins@CVFlood.ca.gov if you have any questions.

Sincerely,

Andrea Buckley

Andrea Buckley
Deputy Executive Officer

cc: Office of Planning and Research
State.Clearinghouse@opr.ca.gov

Steve Lamb
Permitting Section Manager
Central Valley Flood Protection Board
Steven.Lamb@cvflood.ca.gov

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NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov

July 19, 2024

Ashley Couch, PE, CFM
San Joaquin County
1810 East Hazelton Avenue
P.O. Box 1810
Stockton CA 95201

Re: 2024070107, Mokelumne River Integrated Conjunctive Use Project, San Joaquin County

Dear Ms. Couch:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (https://ohp.parks.ca.gov/?page_id=30331) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.

b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:

a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.

b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.

a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.

b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.

c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Pricilla.Torres-Fuentes@NAHC.ca.gov.

Sincerely,

Pricilla Torres-Fuentes

Pricilla Torres Fuentes
Cultural Resources Analyst

cc: State Clearinghouse

State Water Resources Control Board

July 29, 2024

In Reply Refer to:
ET: A029835

Ashley Couch, PE, CFM
Water Resources Manager
San Joaquin County
1810 East Hazelton Ave.
P.O. Box 1810
Stockton, CA 95201

NOTICE OF PREPARATION FOR MOKELUMNE RIVER INTEGRATED CONSUMPTIVE USE PROGRAM (SCH# 2024070107) IN SAN JOAQUIN COUNTY

State Water Resources Control Board (State Water Board), Division of Water Rights (Division) staff reviewed the Notice of Preparation (NOP) for the Mokelumne River Integrated Conjunctive Use Program (MICUP) (SCH# 2024070107). Per the NOP, the MICUP lead is the County of San Joaquin, together with the partner agencies: North San Joaquin Water Conservation District, Stockton East Water District, City of Stockton, Woodbridge Irrigation District, East Bay Municipal Utilities District, and California Water Service.

The Project would involve the diversion and use of surface water from the Mokelumne River and would require a water right permit. Based on the information provided in the notice, the MICUP includes pursuit of pending application A029835, filed by Mokelumne River Water & Power Authority (MRWPA). To the extent that the Project requires a United States Army Corps permit under Clean Water Act section 404, the project would also require a water quality certification from the Board under Clean Water Act, section 401. Additionally, pursuant to Clean Water Act sections 301 and 402, the discharge of waste to stormwater resulting from construction activities requires a permit. The proposed project may require coverage under the State Water Board's Construction General Permit.

The State Water Board would act as a Responsible Agency for this project. Accordingly, the State Water Board may need to rely on the California Environmental Quality Act (CEQA) document developed by the Lead Agency to support the evaluation of requested approvals. The Lead Agency should therefore ensure that any CEQA document prepared for the project considers all potential direct and indirect environmental impacts associated with the diversion and use of water and of all discharges to the state's waters.

Water Availability and Public Interest

The State Water Board will consider any hydrologic analyses, diversion criteria, and water availability findings that are included in the draft Environmental Impact Report (EIR) while processing the water right application filed for the proposed project. However, the County of San Joaquin and MRWPA are advised that the State Water Board is required under the Water Code to make its own independent findings on the availability of unappropriated water as well as public interest findings to supply the proposed project as a prerequisite to any water right permitting decision. In determining the amount of water available for appropriation and permit conditions, the State Water Board has statutory mandates to take multiple factors into consideration, including but not limited to hydrology, water rights already committed, the public interest and the relative benefit to be derived from all beneficial uses of the water concerned, including irrigation, municipal, industrial, recreation, preservation and enhancement of fish and wildlife resources, and the water quality needed to protect beneficial uses. In order to inform the State Water Board's decision making, the EIR should include an evaluation of a range of operating criteria as discussed further below. If such analyses are not included in the EIR, additional analyses will likely be required during the water right permitting process to inform and support the State Water Board's water availability findings. These additional analyses may ultimately lead to water availability findings and associated restrictions on the proposed diversions that differ from those that may be presented in draft EIR.

Public Trust and Listed Species

In addition to the State Water Board's obligations under the Water Code, the State Water Board has an independent obligation to consider the effect of an application for a water right permit on public trust resources, and to avoid or minimize harm to those resources to the extent feasible and in the public interest (*National Audubon Society v. Superior Court* (1983) 33 Cal.3d 419, 446-447.). The common law public trust doctrine protects public uses of navigable water bodies, including fishing, recreation, and the preservation of fish and wildlife habitat. Under the public trust doctrine, the State Water Board has a duty of continuing supervision over the appropriation of water. The State Water Board is not confined by past allocation decisions, and the CEQA baseline should not be construed as the appropriate baseline for consideration of the need to protect public trust resources. In addition, it is the policy of this state that all state agencies, boards, and commissions seek to conserve endangered species and threatened species and use their authority in furtherance of the purposes of the California Endangered Species Act. State agencies should not approve projects which would jeopardize the continued existence or habitat of any endangered species or threatened species if there are reasonable and prudent alternatives available consistent with conserving the species or its habitat which would prevent jeopardy (Fish & G. Code, §§ 2053 & 2055.).

Range of Alternatives and Evaluation of the Effects of the Project

The draft EIR should include an evaluation of a reasonable range of operational alternatives or mitigation measures, including operating alternatives or mitigation measures that would result in concentrated diversions during high flow periods and avoiding proposed diversions during lower flow periods when those flows provide for protection of water quality, fish, and wildlife.

The EIR should evaluate the effects the proposed project would have on stream flows in and downstream of the Mokelumne River, including the Sacramento-San Joaquin Delta (Delta), and any associated impacts on water temperature, water quality, and fish and wildlife species, including cumulative impacts. The EIR should include mitigation measures that would reduce operational impacts of the proposed project to native fish and wildlife in the Mokelumne River and Delta, including but not limited to ESA-listed salmonids, Delta smelt, and longfin smelt. The State Water Board's 2017 Scientific Basis Report in Support of New and Modified Requirements for Inflows from the Sacramento River and its Tributaries and Eastside Tributaries to the Delta, Delta Outflows, Cold Water Habitat, and Interior Delta Flows[1] (Scientific Basis Report) indicates that average Delta outflows as high as 42,800 cfs from January through June provide benefits to longfin smelt and other Delta species. Evaluating a range of bypass flows needed to achieve Delta outflows up to this level, and other levels identified in the Scientific Basis Report as protective of native fish and wildlife species, is important to understand the benefits and tradeoffs of this Project.

The EIR should also evaluate the proposed project in the context of the State Water Board's current efforts to update and implement the Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary (Bay-Delta Plan). In particular, the State Water Board is considering amendments to the Bay-Delta Plan focused on the Sacramento River and its tributaries, Delta eastside tributaries, Delta outflows, and interior Delta flows (referred to as the Sacramento/Delta update to the Bay-Delta Plan). In July 2018, State Water Board staff released a Framework for a possible Sacramento/Delta update to the Bay-Delta Plan[2] (Framework) that identifies a possible new Delta inflow objective of 55 percent of unimpaired flow with an adaptive range of 45 to 65 percent of unimpaired flow and a possible new inflow-based Delta outflow objective that would specify that required inflows from the Sacramento/Delta tributaries and the San Joaquin River be provided as outflow. In addition, in 2022, the State Water Board received a Memorandum of Understanding Advancing a Term Sheet

[1] Available at: https://waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/2022/201710-bdphaseII-sciencereport.pdf

[2] Available at: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/sed/sac_delta_framework_070618%20.pdf

for Voluntary Agreements[3] (VAs) proposing voluntary measures for the update and implementation of the Bay-Delta Plan.

The EIR should evaluate alternatives or mitigation measures consistent with the Sacramento/Delta update to the Bay-Delta Plan, including the Framework and VAs. Specifically, bypass flow criteria should be evaluated that are consistent with achieving Delta inflows and outflows of 55 percent of unimpaired flow, within a range of 45 to 65 percent of unimpaired flow. In addition, the draft EIR should evaluate how the proposed project would affect tributary flows and Delta outflows that would be provided through the VAs and demonstrate, through imposition of appropriate operational criteria, that the project would not detract from VA flows.

In addition, the EIR should fully describe how the Project is proposed to be integrated with other major existing and planned water infrastructure projects in the Delta watershed, including planned operations and accounting for those operations. The EIR should also evaluate the cumulative impacts of the Project and other water infrastructure projects, including cumulative impacts on water quality, water temperatures, and native fish and wildlife.

Conclusion

If you have any questions, please contact Erica Thompson at Erica.Thompson@Waterboards.ca.gov or (916) 323-5177. Written correspondence or inquiries should be addressed as follows: State Water Resources Control Board, Division of Water Rights, Attn: Erica Thompson, P.O Box 2000, Sacramento, CA 95812- 2000.

Sincerely,

Mike Conway

Mike Conway, Senior Engineering Geologist
Recharge and Major Projects Unit
Division of Water Rights

ecc: acouch@sjgov.org
rstolfus@wbecorp.com

[3] Available at: https://waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/proposed_voluntary_agreements.html

DIRECTORS
WILLIAM STOKES
PRESIDENT
ED LUCCHESI
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WILLIAM ROGAN

WOODBRIDGE IRRIGATION DISTRICT
18750 N. LOWER SACRAMENTO ROAD
P.O. BOX 580
WOODBRIDGE, CALIFORNIA 95258
PHONE: (209) 625-8438
FAX: (209) 625-8663

STAFF
KEITH BUSSMAN
MANAGER
SECRETARY / TREASURER
JAIME CANTU
SUPERINTENDENT

Tuesday, July 30, 2024

Ashley Couch, PE, CFM
Water Resources Manager
San Joaquin County
1810 East Hazelton Ave./PO Box 1810
Stockton, CA 95201

Email:acouch@sjgov.org

Re: NOP Comment: "MICUP EIR"

Dear Mr. Couch:

The Woodbridge Irrigation District ("WID") appreciates this opportunity to provide comments in response to the County of San Joaquin's Notice of Preparation ("NOP") of an Environmental Impact Report for the Mokelumne River Integrated Conjunctive Use Program ("MICUP").

WID has essential interests that will potentially be affected by MICUP. WID is an irrigation district with senior rights to divert water from the Mokelumne River. WID provides vital water supplies to an area of approximately 63 square miles. This water is used for irrigation of lands generally west of the City of Lodi and north of the City of Stockton, as well as for domestic uses in Lodi and Stockton. WID owns and operates significant infrastructure required to divert and maintain the flow of high quality Mokelumne River water to its customers. This infrastructure includes a state-of-the-art fish screen at its main diversion canal in Woodbridge, and a vast network of canals extending to the north, west, and south from Woodbridge. WID is identified in the NOP as a Partner Agency because it is well positioned to divert and deliver water developed under MICUP for groundwater recharge projects within its service area.

WID offers the following comments in response to the NOP:

1. MICUP Must Respect Existing Senior Water Rights

As the County has previously acknowledged WID holds existing, senior water rights on the Mokelumne River including both pre-1914 rights and licenses issued by the State Water Resources Control Board. It is imperative that those rights not be infringed or impaired by exercise of the new water rights sought for diversions under the MICUP. The principle that MICUP will not be implemented in a way to diminish or reduce the water supplies available for

diversion by existing senior rights holders should be expressly stated as an essential element of the project. It should also be included as a proposed condition in the County's planned amended water rights application to the State Water Resources Control Board. The description of MICUP and the requested water rights permit should be clear that new diversions on the Mokelumne River under MICUP will occur only when and to the extent that they do not diminish the water supplies available to WID and other existing right holders.

As one example, in many years East Bay Municipal Utility District ("EBMUD") stores water in its upstream reservoirs but later releases that water because it cannot itself use the water or retain it in storage after November 5 each year consistent with flood control requirements. WID's existing rights include the right to divert that water. When the flows resulting in the Mokelumne River exceed required flows for fish and other requirements, WID has historically diverted all or a portion of that additional water to augment the permanent regulated base supply it is due under its agreements with EBMUD. The NOP says the planned water rights application for MICUP may seek permission to divert water stored by EBMUD, including after June 30. The protest dismissal agreement between the County and EBMUD further describes this stored water as water EBMUD must release by November 5 to meet flood control requirements. The up to 48,000 acre-feet total is based on the maximum quantity in a certain period of record that was flowing at a gauge downstream of WID's diversion. That is, it is based on a quantity in excess of WID's diversions. The Draft EIR and the application should make clear that the EBMUD stored water to be diverted and used under proposed the rights for MICUP program is limited to water in excess of WID's need for and ability to divert and use that water under WID's existing rights.

2. The County Should Clarify That MICUP Water Will be Used Only for Direct Groundwater Recharge or In-Lieu Groundwater Recharge

As WID understands MICUP, it is intended to allow for new diversions for direct recharge to the groundwater basin or to offset use of groundwater by existing uses through "in-lieu" recharge. Under in-lieu recharge, MICUP water would directly serve existing uses if those uses would otherwise be served with groundwater, resulting in a savings to the groundwater basin. In some communications related to MICUP, including the NOP, the limitation that existing uses will be served directly only if that use would otherwise use groundwater is not always made clear. For example, the NOP states that "MICUP would entail diverting unappropriated Mokelumne River water either to serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge water into underground storage for later extraction to meet such demands." The "either/or" phrasing might be construed to suggest an existing use may be directly served with MICUP water without any limitation that the MICUP water is replacing use of groundwater. The MICUP should include specific conditions and procedures to ensure that MICUP water is delivered for direct use only when it is a substitute for groundwater use, and that the basin will therefore benefit from reduced groundwater pumping because of the delivery.

3. The Draft EIR Should Describe and Analyze Use of MICUP Water For Recharge In the WID Service Area And Using WID Facilities

The NOP correctly identifies WID as a Partner Agency, because WID has the infrastructure and capacity to divert and convey water for groundwater recharge within its service area, and for recharge by the City of Stockton at its proposed Delta Water Treatment Plant ("DWTP") Groundwater Recharge Basin project and potentially other basins owned by the City. The Draft EIR should describe and analyze any environmental impacts such uses of MICUP water, to support any discretionary decisions by WID or the City to implement such recharge activities.

4. The Draft EIR Should Describe the Conditions, Coordination, Agreements and Construction Necessary to Accommodate Proposed MICUP Diversions and Uses

The proposed new diversions under MICUP would require new coordination among agencies with existing facilities and diversion on the Mokelumne River, including EBMUD, WID and North San Joaquin Water Conservation District. For example, currently EBMUD and WID coordinate operations on a weekly or even daily basis to maintain flows in the river sufficient to meet regulatory requirements including fishery flows, manage pulse flows for the benefit of fish, satisfy existing water rights including riparian rights, and maintain the necessary elevation in Lodi Lake to support recreation uses and to meet needs of WID's canal system. Use of existing facilities to divert and convey water will require agreements, and are subject to capacity and use limitations. New facilities may be necessary to support some proposed uses.

5. The Draft EIR Should Identify and Analyze the Potential Benefits of MICUP for Achieving Groundwater Sustainability

Finally, WID supports the stated purpose of MICUP, to provide a supplemental surface water supply to help achieve sustainability of the Eastern San Joaquin Groundwater Subbasin. The Draft EIR should describe and assess the potential for MICUP to help achieve that purpose. That information will be useful to groundwater sustainability agencies in the subbasin, including WID, in demonstrating compliance with the requirements of state law.

Thank you for your consideration of these comments. If you have any questions or need additional information, please let me know.

Regards,

Keith Bussman,
General Manager

Mokelumne River Integrated Conjunctive Use Program
California Environmental Quality Act (CEQA) Public Scoping Meeting (July 16, 2024)

Speaker Comment Card

Contact Information: (please print clearly)

Name: Keith Bussman

Agency/Organization: WID

Email Address: bussmanWID@gmail.com

Mailing Address: PO Box 580, Woodbridge, CA 95258

Mokelumne River Integrated Conjunctive Use Program
California Environmental Quality Act (CEQA) Public Scoping Meeting (July 16, 2024)

Speaker Comment Card

Contact Information: (please print clearly)

Name: EDDIE LUCCHESI

Agency/Organization: WOODBRIDGE IRRIGATION DISTRICT

Email Address: ELUCCHESI19@GMAIL.COM

Mailing Address: 1150 METTLER RD. LODI CA 95242

Scoping Meeting Comments – July 16, 2024

Verbal Scoping Meeting Comment Summaries

Eddie Lucchesi, Woodbridge Irrigation District

For a project that may not be ready until 2025, a recharge project, would an additional EIR beyond the MICUP EIR be required for that project? Or is this an umbrella EIR that would cover this future project?

Keith Bussman, Woodbridge Irrigation District

From 1990 to 2000 there are protests against the application that are missing from the timeline. I would like to make sure that the public is aware that there are protests on this water right application.

Sarah Vardaro, California Sportfishing Protection Alliance

Our concern is with the water availability analysis. This was an issue for CSPA in the previous iteration of this project. Just because there is water in the system that is allocated does not mean that there is excess. Flood flows are important biologically for salmon and for other fish. Remember going forward that trying to do modeling that includes stringent scenarios, possibly more stringent than what is proposed through this process.

Appendix B

Petition for Change

Please indicate County where your project is located here:

Calaveras and San Joaquin

MAIL FORM AND ATTACHMENTS TO:
State Water Resources Control Board
DIVISION OF WATER RIGHTS
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
http://www.waterboards.ca.gov/waterrights

PETITION FOR CHANGE

Separate petitions are required for each water right. Mark all areas that apply to your proposed change(s). Incomplete forms may not be accepted. Location and area information must be provided on maps in accordance with established requirements. (Cal. Code Regs., tit. 23, § 715 et seq.) Provide attachments if necessary.

☒ **Point of Diversion** Wat. Code, § 1701
☒ **Point of Rediversion** Cal. Code Regs., tit. 23, § 791(e)
☐ **Place of Use** Wat. Code, § 1701
☒ **Purpose of Use** Wat. Code, § 1701

☒ **Distribution of Storage** Cal. Code Regs., tit. 23, § 791(e)
☐ **Temporary Urgency** Wat. Code, § 1435
☐ **Instream Flow Dedication** Wat. Code, § 1707
☐ **Waste Water** Wat. Code, § 1211

☐ **Split** Cal. Code Regs., tit. 23, § 836
☐ **Terms or Conditions** Cal. Code Regs., tit. 23, § 791(e)
☐ **Other**

Application A029835 Permit License Statement

I (we) hereby petition for change(s) noted above and described as follows:

Point of Diversion or Rediversion – Provide source name and identify points using both Public Land Survey System descriptions to ¼-¼ level and California Coordinate System (NAD 83).
Present: See attachment

Proposed: See attachment

Place of Use – Identify area using Public Land Survey System descriptions to ¼-¼ level; for irrigation, list number of acres irrigated.
Present:

Proposed:

Purpose of Use
Present: See attachment

Proposed: See attachment

Split
Provide the names, addresses, and phone numbers for all proposed water right holders.

In addition, provide a separate sheet with a table describing how the water right will be split between the water right holders: for each party list amount by direct diversion and/or storage, season of diversion, maximum annual amount, maximum diversion to offstream storage, point(s) of diversion, place(s) of use, and purpose(s) of use. Maps showing the point(s) of diversion and place of use for each party should be provided.

Distribution of Storage
Present: 434,000 af by surface storage.

Proposed: 110,000 by underground storage and 48,000 af by surface storage. See attachment.

Temporary Urgency
This temporary urgency change will be effective from to .

Include an attachment that describes the urgent need that is the basis of the temporary urgency change and whether the change will result in injury to any lawful user of water or have unreasonable effects on fish, wildlife or instream uses.

Instream Flow Dedication – Provide source name and identify points using both Public Land Survey System descriptions to ¼-¼ level and California Coordinate System (NAD 83).
Upstream Location:

Downstream Location:

List the quantities dedicated to instream flow in either: ☐ cubic feet per second or ☐ gallons per day:

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Will the dedicated flow be diverted for consumptive use at a downstream location? ☐ Yes ☐ No
If yes, provide the source name, location coordinates, and the quantities of flow that will be diverted from the stream.

Waste Water
If applicable, provide the reduction in amount of treated waste water discharged in cubic feet per second.

Will this change involve water provided by a water service contract which prohibits your exclusive right to this treated waste water? ☐ Yes ☐ No

Will any legal user of the treated waste water discharged be affected? ☐ Yes ☐ No

General Information – For all Petitions, provide the following information, if applicable to your proposed change(s).

Will any current Point of Diversion, Point of Storage, or Place of Use be abandoned? ☒ Yes ☐ No

I (we) have access to the proposed point of diversion or control the proposed place of use by virtue of:
☐ ownership ☐ lease ☐ verbal agreement ☐ written agreement

If by lease or agreement, state name and address of person(s) from whom access has been obtained.*

* The propose project will rely on existing diversion, storage, and conveyance facilities operated by EBMUD, WID, and MICUP partner agencies NSJWCD, SEWD, and City of Stockton under future operating agreements.

Give name and address of any person(s) taking water from the stream between the present point of diversion or rediversion and the proposed point of diversion or rediversion, as well as any other person(s) known to you who may be affected by the proposed change.

See SWRCB's CALWATRS database.

All Right Holders Must Sign This Form: I (we) declare under penalty of perjury that this change does not involve an increase in the amount of the appropriation or the season of diversion, and that the above is true and correct to the best of my (our) knowledge and belief. Dated 5/15/2026 at Stockton, CA .

Right Holder or Authorized Agent Signature

Right Holder or Authorized Agent Signature

NOTE: All petitions must be accompanied by:
(1) the form Environmental Information for Petitions, including required attachments, available at: http://www.waterboards.ca.gov/waterrights/publications_forms/forms/docs/pet_info.pdf
(2) Division of Water Rights fee, per the Water Rights Fee Schedule, available at: http://www.waterboards.ca.gov/waterrights/water_issues/programs/fees/
(3) Department of Fish and Wildlife fee of $850 (Pub. Resources Code, § 10005)

ATTACHMENT TO PETITION FOR CHANGE
Water Right Application 29853 (accepted August 4, 1990)
of Mokelumne River Water and Power Authority

Application was filed with the State Water Board on October 4, 1990, and publicly noticed on September 27, 1996. This Attachment to the Petition for Change provides the *As applied for* and *As proposed* information for each numbered item in the 1990 Application that is changing.

Change in Source and Points of Diversion/Rediversion (Items 2 and 3 of Original Application)

Source:

As applied for: Mokelumne River tributary to San Joaquin River
Duck Creek tributary to Calaveras River thence San Joaquin River

As proposed: Mokelumne River tributary to San Joaquin River

Points of Diversion/Rediversion

As applied for:[1]

Map Point Designation	Description
#1	**Middle Bar Dam** - Point of Diversion and Storage: Located South 56°45' East, 3552' from the NW corner of Section 16, T5 N, R11 E, MDB&M; being within the SE¼ of the NW¼ of said Section 16.
#2	**Pardee Dam** - Point of Direct Diversion and Point of Rediversion for Water Stored at Point #1: Located South 18°10' East, 3420 feet from the NW corner of Section 26, T5N, R10E, MDB&M; being within the NW¼ of the SW¼ of said Section 26.
	Various Points of Direct Diversion and Points of Rediversion for Water Diverted at Point #1 located between Points #3(a) and #3(b):
#3(a)	**Camanche Dam:** Located South 43°15' West, 1900 feet from the E¼ corner of Section 6, T4N, R9E, MDB&M; being within the SE¼ of the SE¼ of said Section 6.
#3(b)	**Intersection of Mokelumne River and Interstate 5:** Located N.640,050 and E.1,728,100 of the California Coordinate System, Zone 3; being within the SE¼ of the NE¼ of projected Section 29, T5N, R5E, MDB&M.
	Various Points of Rediversion for Water Diverted at Point #1 located between Points #4(a) and #4(b) and between Points #4(a) and #4(c) :

[1] The California Coordinate System used to describe certain map points has been revised since Application 29835 was filed in 1990.

#4(a)	**Bellota Weir:** Located N.2200' and E.2050' from the SW corner of Section 5, T2N, R9E, MDB&M; being within the NE¼ of the SW¼ of said Section 5.
#4(b)	**Intersection of Stockton Diverting Canal and Calaveras River:** Located N.545,050 and E.1,775,500 of the California Coordinate System, Zone 3; being within the SE¼ of the NE¼ of projected Section 24, T2N, R6E, MDB&M.
#4(c)	**Intersection of Calaveras River and Interstate 5:** Located N.539,800 and E.1,757,800 of the California Coordinate System, Zone 3; being within the SE¼ of the NW¼ of projected Section 32, T2N, R6E, MDB&M.
#5	**Duck Creek Dam** - Point of Diversion and Storage and Point of Rediversion for Water Diverted at Point #2: Located N.1650' and W.1600' from the SE corner of Section 21, T3 N, R9 E, MDB&M, being within the NW¼ of the SE¼ of said Section 21.

As proposed:

Map Point Designation	Description
#1	**Pardee Dam** - Point of direct diversion, diversion to storage and diversion to Underground Storage: Located N.2,280,443' and E.6,461,060' of the California Coordinate System, NAD83, Zone 3 and being within the NW 1/4 of the SW 1/4 of Section 26, T5N, R10E, MDB&M.
#2	**Camanche Dam**: Point of direct diversion, diversion to storage, diversion to underground storage, and rediversion: Located N.2,268,941' and E. 6,411,485' of the California Coordinate System, NAD83, Zone 3 and being within the SE1/4 of the SE1/4 of Section 6, T4N, R9E, MDB&M.
#3	**North San Joaquin Water Conservation District North Pump Station**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,248,724' and E.6,368,412' of the California Coordinate System, NAD83, Zone 3 and being within the SE1/4 of the NE1/4 of Section 26, T4N, R7E, MDB&M.
#4	**North San Joaquin Water Conservation District South Pump Station**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,243,275' and E.6,364,793' of the California Coordinate System, NAD83, Zone 3 and being within the NW1/4 of the SW1/4 of Section 35, T4N, R7E, MDB&M.
#5	**North San Joaquin Water Conservation District CalFed System**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,243,629' and E.6,355,205' of the California Coordinate System, NAD83, Zone 3 and being within the SE1/4 of the NW1/4 of Section 33, T4N, R7E, MDB&M.
#6	**Woodbridge Irrigation District Diversion Dam**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,244,462' and E.6,332,349' of the California Coordinate System, NAD83, Zone 3 and being within the SW1/4 of the NW1/4 of Section 35, T4N, R6E, MDB&M.
#7	**City of Stockton Delta Pump Intake**: Point of diversion and rediversion to underground storage: Located N.2,203,929' and E.6,274,737' of the California Coordinate System, NAD83, Zone 3 and being within the NE1/4 of the NE1/4 of Projected Section 11, T2N, R4E, MDB&M.

#8	**North San Joaquin Water Conservation District Pixley Pump Station:** Point of rediversion, and diversion to underground storage. Located N.2,218,306' and E.6,353,191' of the California Coordinate System, NAD83, Zone 3 and being within the NW1/4 of the NW1/4 of Section 28, T4N, R7E, MDB&M.
#9A - #9H (not shown on map)	**Additional 8 Points within NSJWCD between Point #2 and Intersection of Mokelumne River and Highway 99:** Points of direct diversion, diversion to underground storage, and rediversion at existing privately owned diversion facilities to be identified at a future date and not to be activated without prior notice to the SWRCB. Intersection of Mokelumne River and Highway 99 is located N. 2,243,223' & E. 6,340,131' of the California Coordinate System, NAD83, Zone 3 and being within the SE 1/4 of the SE 1/4 of Projected Section 36, T4N, R6E, MDB&M.

Change in Purpose of Use, Amount and Season
(Item 4 of Original Application)

As applied for: Municipal, industrial, irrigation, and incidental hydroelectric power generation

620 cfs by direct diversion for consumptive use, up to 110,000 acre-feet

1,000 cfs by direct diversion for incidental power

434,000 acre-feet by storage

Season of diversion for all: December 1 to June 30

Total combined amount taken by direct diversion and storage during any one year will be 544,000 acre-feet.

As proposed: Municipal, industrial, and irrigation

620 cfs by direct diversion, up to 110,000 acre-feet

110,000 acre-feet by underground storage

48,000 acre-feet by storage

Season of diversion for all: December 1 to June 30

Total combined amount taken by direct diversion, diversion to underground storage, and diversion to storage during any one year will be 158,000 acre-feet.

Change in Justification of Use
(Items 5a, 5e, and 5j of original application)

As applied for:

5a. IRRIGATION - The original Application 29835 indicated a total irrigable acreage of 208,450 acres within NSJWCD, WID, SEWD, Central San Joaquin Water Conservation District, and San Joaquin County Flood Control & Water Conservation District. Total demand was projected to be

709,800 acre-feet for the year 2015. Almost all of the irrigable lands within the proposed place of use were indicated to be currently developed to a variety of crops including truck crops, deciduous orchards, vineyards, row crops, alfalfa and pasture.

5e. MUNICIPAL – The original Application 29835 indicated the following ranges of municipal use parameters for present day to the year 2020:

Parmeter	**Present***	**Year 2020**
Population	470,000	837,700
Average daily use per capita in max month (gallons)	248	220
Rate of diversion in max month (cfs)	180	285
Annual average daily use (gal. per capita)	147	131
Annual use (acre-foot per capita)	0.17	0.15
Annual use total acre-feet)	77,600	123,000

* Application 29835 was filed in 1990.

The month of maximum use was indicated to be July. The month of minimum us was indicated to be February.

5j. INCIDENTAL POWER – The original application inodiated that after use, water will be discharged into Mokelumne River in SE ¼ of NW ¼ of Section 16, T5N, R11E, MDB&M.

As proposed:

5a. IRRIGATION

The extent of irrigated land within the Place of Use is approximately 246,000 acres. Irrigation within the Place of Use is comprised of a variety of crop types. Vineyards dominate the northern portion of the Place of Use. Deciduous fruits and nuts dominate the southern portion, along with field crops and pasture. Other crop types such as truck, nursery, and berry crops, and citrus and subtropical crops, are scattered across the Place of Use. Per the GSP for the Eastern San Joaquin Groundwater Subbasin (Revised 2022), the average agricultural demand is about 1.17 million acre-feet per year.

5e. MUNICIPAL

Per the GSP for the Eastern San Joaquin Groundwater Subbasin (Revised 2022), the average urban demand is about 122,000 acre-feet per year.

Estimates of 2025 population for the various municipalities within the Place of Use are based on information from the State of California, Department of Finance for January 1, 2025, as follows:

Stockton	320,877
Lodi	67,093
Lathrop	38,596
Manteca	93,733

Estimates of current and future projections of the County of San Joaquin are based on information from the State of California, Department of Finance as follows:

Year	Population
2025	801,190
2030	836,082
2040	936,977
2050	1,028,505
2060	1,101,082
2070	1,166,812

Change in Place of Use
(Item 6 of Original Application)

As applied for:

Water will be used on land located within the special districts and other areas within the Flood Control and Water Conservation District. The service area (see accompanying map) will consist of a gross area of 399,700 acres within the following townships:

Township	Range
1 South	6, 7, 8, 9 East
2 South	6, 7 East
1 North	5, 6, 7, 8, 9 East
2 North	5, 6, 7, 8, 9 East
3 North	5, 6, 7, 8, 9 East
4 North	5, 6, 7, 8 East
5 North	5, 6, 7, 8 East

As proposed:

Place of use as shown in the accompanying map and consisting of a gross area of 417,245 acres within the following townships, all within the Mount Diablo Base & Meridian:

Township	Range
1 South	6, 7, 8, 9 East

2 South	6, 7 East
1 North	5, 6, 7, 8, 9 East
2 North	5, 6, 7, 8, 9 East
3 North	5, 6, 7, 8, 9 East
4 North	5, 6, 7, 8 East
5 North	5, 6, 7, 8 East

Note: The boundary of the Place of Use did not change from the 1990 Application 29835. The gross area was re-calculated using GIS to be 417,245 acres.

Change in Diversion Works
(Items 7a, 7b, and 7c of Original Application)

As applied for:

Rather than repeat the tabular information in the original Application, the following narrative summarizes the original Application 29835 based on the State Water Board's public notice of September 27, 1996.

The original Application 29835 was for diversion to storage of up to 434,000 acre-feet and direct diversion of up to 110,000 acre-feet at a rate of up to 620 cfs during the period of December 1 of each year to June 30 of the following year for diversions from the Mokelumne River, and December 1 to April 30 for diversions from Duck Creek. Two project alternatives were proposed:

Alternative A

Alternative A proposed the construction of Middle Bar Reservoir, formed by a concrete arch dam on the Mokelumne River upstream from the existing Pardee Reservoir, with a capacity of 454,000 acre-feet. Water released from Middle Bar Reservoir would accrue to Pardee Reservoir and be diverted and/or rediverted at Pardee Dam to Duck Creek via ten miles of tunnel and pipeline having a capacity of 620 cfs, for discharge into Duck Creek thence the Calaveras River for rediversion within the Calaveras River system. The portion of the water released from Pardee Reservoir and Camanche Reservoir into the lower Mokelumne River would be diverted and/or rediverted at an unspecified number of points along the Mokelumne River along the stream reach between Camanche Dam and the intersection of the Mokelumne River and Interstate 5.

Alternative B

Alternative B proposed construction of Duck Creek Reservoir, formed by an earth and rockfill dam on Duck Creek tributary to the Calaveras River, with a capacity of 150,000 acre-feet. Water would be conveyed from Pardee Dam to Duck Creek Reservoir via ten miles of tunnel and pipeline having a capacity of 1,000 cfs. Releases from Duck Creek Reservoir would be rediverted at various locations within the Calaveras River system. Similar to Alternative A, the portion of the water released from Pardee Reservoir and Camanche Reservoir into the lower Mokelumne River would be

diverted and/or rediverted at an unspecified number of points along the Mokelumne River along the stream reach between Camanche Dam and the intersection of the Mokelumne River and Interstate 5

Common to Both Alternatives

Under either Alternative, water would be used for municipal, industrial, irrigation, and incidental hydroelectric power generation. Water would be used for irrigation on a net irrigable acreage of 208,450 acres within the service areas of the North San Joaquin Water Conservation District, Woodbridge Area, Stockton East Water District, Central San Joaquin Water Conservation District, and the San Joaquin County Flood Control and Water Conservation District, including unincorporated areas of San Joaquin County. The water would be used for industrial and municipal purposes within the cities of Lodi, Stockton, Lathrop, and Manteca, and for municipal purposes within unincorporated areas in San Joaquin County.

As proposed:

Mokelumne River Integrated Water Storage and Conjunctive Use Program (MICUP)

San Joaquin County, on behalf of the Applicant, has signed onto a Partnership Charter for the Mokelumne River Integrated Water Storage and Conjunctive Use Program (MICUP). Other signatories to the Charter include North San Joaquin Water Conservation District (NSJWCD), City of Stockton (City), Cal Water, and Stockton East Water District (SEWD). East Bay Municipal Water District (EBMUD) is an interested party.

MICUP is a regionally coordinated effort to identify projects for putting available Mokelumne River water to beneficial use in the Eastern San Joaquin Groundwater Subbasin. A water right permit issued on A029835 is a key component of MICUP.

The principal goal of the MICUP is to utilize existing facilities and develop new facilities to capture unappropriated flows from the Mokelumne River, address critical groundwater overdraft, meet sustainability goals identified in the Eastern San Joaquin Groundwater Sustainability Plan (GSP), and provide new surface supply for recharge operations in the Eastern San Joaquin Groundwater Subbasin. This will improve the reliability and resiliency of the water supply, increase the ability to respond to drought and climate change, and preserve the local economy. Application 29835 is a major element of the MICUP program.

Fundamental facility changes to the original Application 29853 include elimination of Middle Bar Reservoir and Duck Creek Reservoir and their associated conveyance facilities from the application. The proposed project entails assignment of stored water by EBMUD in the existing Pardee Reservoir and Camanche Reservoir (subject to development of an operating agreement with EBMUD) and the use of new and existing facilities along the lower Mokelumne River for diversion/rediversion for direct use of water for agricultural uses and diversion/rediversion to underground storage for later withdrawal for agricultural and M&I uses. Diversions from the Mokelumne River would be made from existing facilities (with proposed upgrades) within

NSJWCD and at the Woodbridge Irrigation District (WID) Diversion Dam. Water wheeled through WID's South Canal system would be conveyed to the City of Stockton (City). In addition, MICUP water would be conveyed through EBMUD's existing Mokelumne Aqueduct to existing and new turnouts for NSJWCD and SEWD when excess capacity exists in the Aqueduct. Existing and proposed facilities associated with these agencies are described in the following sections.

i. Diversion and Conveyance Facilities in NSJWCD

NSJWCD currently operates several diversion facilities on the Mokelumne River under its existing water right Permit 10477 (A012842). Some elements of the projects described below may be implemented under separate permitting actions through NSJWCD and later integrated into MICUP.

a. North System - The North System includes an existing pump station on the north bank of the Mokelumne River with a current capacity of approximately 17.5 cubic feet per second (cfs) depending on water surface elevation in the Mokelumne River. NSJWCD is currently working on plans to rebuild the North Pump Station to restore its historical capacity of 40 cfs, expandable to 60 cfs for purposes of diverting high flows when available. Major transmission pipelines within the North System run along N. Tretheway Road and Acampo Road. Proposed modernization of the North System includes upgrading and replacing pipeline segments as summarized in Table 1.

Table 1. Planned Upgraded and New Pipelines in NSJWCD North and CalFed Systems.

Approximate Length	Pipeline Diameter	Location
Up to 19,000 feet	18 - 42 inches	Along Acampo Road starting at furthest west point of system near Highway 99 going east to approximately N. Sowles Road
1,300 feet	42 inches	Recently constructed along N Tretheway Road going south between Acampo Road and the Lakso Property
1,400 feet	30 inches	Recently constructed along N Tretheway Road going south along the Lakso Property
1,400 feet	14 inches	Along N Tretheway Road going south to the Reynolds Property
2,000 feet	48 inches	Along unmarked road from Lakso Property east to the North System Pump Station
Up to 20,000 feet	Up to 24 inches	Lateral pipelines to connect main pipelines to basins
Up to 26,000 feet	Up to 42 inches	Unknown pipeline alignment to connect CALFED to the North System

b. South System - The South System includes the existing South System pump station located on the south side of the Mokelumne River off of Tretheway Road and a distribution system extending to the south. The distribution system includes approximately seven miles of cast-in-place concrete pipeline, an open ditch, lateral pipes, and portions of Pixley Slough and Bear Creek. The South System pump

station currently has a capacity of approximately 35 cfs depending on water surface elevation in the Mokelumne River, expandable to 40 cfs.

In 2023, NSJWCD purchased a 10-acre property close to the South System and converted it to a direct recharge basin, the Tecklenburg Basin. NSJWCD currently conveys water from the main south pipeline to the Tecklenburg Basin using a 24-inch district lateral. In addition, the Peterson site has been used for Flood-MAR operations when water is available for recharge. Proposed modernization of the South System includes upgrading the South System pumping station to a capacity of 60 cfs and upgrading pipeline segments as summarized in Table 2.

Table 2. Planned Upgraded Pipelines in NSJWCD South System.

Approximate Length	Pipeline Diameter	Location
11,500 feet	60 inches	From the pump station east to N. Tretheway, south to Brandt, west along Brandt to private farm road, south along private farm road 2,600 feet south of Highway 12 then west 1300 feet to junction box. This is an upgrade to existing pipe in current pipeline alignment.
5,700 feet	48 inches	West from junction box along existing farm road. Upgrade to existing pie in current pipeline alignment.
4,000 feet	48 inches	South along existing farm road. Upgrade to existing pipe in current pipeline alignment.
Up to 50,000 feet	Up to 24 inches	Lateral pipelines to connect main pipelines to basins and irrigated parcels

c. CalFed System - The existing CalFed System includes a 10 cfs pump station situated on the north bank of the Mokelumne River and a pipeline that distributes water to nearby lands for Flood-MAR. Additional pipelines would be added to the system to distribute that water to nearby farmland for irrigation, Flood-MAR, or direct recharge.

d. NSJWCD plans to partner with landowners who have existing private pumps along the Mokelumne River to expand the MICUP diversion capacity. Specifically, the District would contract with up to eight private landowners with individual pumps with capacities of 1 to 5 cfs to divert Mokelumne River water during both the diversion and re-diversion windows. This water would be used or recharged on existing agricultural lands for irrigation or during non-active periods for Flood-MAR. NSJWCD would require that each private pump have an approved fish screen to participate.

   Additional piping may be needed to convey the water pumped from these private pumps to adjacent parcels for use or recharge. It is assumed that the average land area that would receive water from each private pump is up to 100 acres, up to 800 acres in total. Identification of specific parcels for this project component has not been finalized. Accordingly, a 1-mile radius buffer was established along the

Mokelumne River to indicate where the potential Flood-MAR activities may occur once the proper agreements and infrastructure are established.

e. ASR Wells – NSJWCD may construct aquifer storage and recovery (ASR) wells to pump water directly into the groundwater aquifer; the ASR wells would be located in areas adjacent to the EBMUD's Mokelumne Aqueduct and supplied by water conveyed through Aqueduct under agreement with EBMUD. The location of the intertie into the EBMUD Aqueduct has not been established at this time, and the arrangement of pipelines to convey water from the Aqueduct to the ASR wells has not been determined. Up to 20 ASR wells with a capacity of 1 cfs each would be installed to recharge up to 20 cfs. To connect the ASR wells to the Aqueduct, it is anticipated that up to 11,000 feet of 24-inch diameter pipeline will be installed for a main connection, and up to 16,000 feet of 15-inch diameter pipeline will be installed as laterals to connect to the ASR wells.

ii. City of Stockton Diversion and Conveyance Facilities

a. Delta Water Treatment Plant and Intake Pump Station - The City of Stockton (City) will divert MICUP water at its existing Delta Water Supply Intake Pump Station located on the San Joaquin River near Little Potato Slough. Because Mokelumne River water is commingled with other sources within Delta channels, rediversion of MICUP water at the City's Delta Intake will be subject to terms and conditions developed through petition process. Water diverted at the Delta Intake will be conveyed via the City's existing Delta Water Supply Intake Pipeline to the City's existing Delta Water Treatment Plant (DWTP). The Delta Supply Intake Pipeline extends for over 12 miles, and has a diameter of 54 inches and a capacity of 47 cfs.

The City's ability to make diversions under its Permit 21176 (A030531A) at the Delta Water Supply Intake Pump Station is limited regulatorily during the period from February 15 to June 15. Diversion of MICUP water at this location would similarly be restricted during this period. During the restricted period, the City would receive MICUP water wheeled through WID's existing South Canal system via the Wilkerson Canal or Pixley Lateral Pipeline.

b. Regional Conveyance Facilities – Under agreement with WID, the City will divert MICUP water from the Mokelumne River using existing diversion facilities owned and operated by WID. The City will convey MICUP water diverted from the Mokelumne River at the existing Woodbridge Diversion Dam and deliver to the DWTP through WID's South Main Canal and then through the Wilkerson Canal or Pixley Slough pipeline to the DWTP.

c. Recharge Basins – The City will construct a 70-acre recharge basin within 0.5 miles of the WID South Main Canal, south of Armstrong Road. Lateral pipelines will need to be built to convey water from existing surface conveyance infrastructure owned by WID to the basin. The lateral pipelines are estimated to require a total of about 4,000 linear feet of 18-inch diameter pipeline.

d. DWTP Recharge Basin Project - The City is proposing to construct three infiltration basins totaling 43.5 acres at the DWTP site. The City would construct the recharge facilities under a separate project and has filed a Petition for Change and Underground Storage Supplement with the State Water Board to modify its Permit 21176 to allow for underground storage. The proposed project would include the construction of two dry wells within each basin for enhanced infiltration capacity. The DWTP recharge basins are intended to have a recharge capacity of approximately 31 cfs. These basins would receive MICUP water from the City Delta Water Supply Intake Pipeline or via existing canals and pipelines owned and operated by WID. No new conveyance pipelines would be constructed.

e. Stormwater Basins – The City owns and operates four existing storm water retention basins that will receive MICUP water for groundwater recharge when they are not needed for storm water operations. The City will divert up to 8 cfs of MICUP water to these facilities through existing infrastructure owned by WID. No new pipelines or other infrastructure will be constructed.

iii. SEWD Infrastructure

There are no diversion facilities proposed within SEWD. SEWD will divert MICUP water via existing and new connections to EBMUD's Mokelumne Aqueduct for distribution to several proposed recharge areas and an existing ASR well as described below:

a. West Linden Project – SEWD is proposing a new intertie to EBMUD's Mokelumne Aqueduct and construction of a 70,000-foot-long pipeline system to provide surface water in-lieu of groundwater to an approximate 5,700-acre area of existing farmland. The proposed 60-inch diameter pipeline will run south approximately 10,000 feet along Jack Tone Road from the aqueduct intertie to the northerly boundary of West Linden Recharge Area. Main system pipelines will also be constructed along Comstock Road, Baker Road, Duncan Road, Tully Road, and N. Tully Road. The system will have a maximum pipeline capacity of 65 cfs. Laterals off of the main pipeline system to fields are estimated to be about 18-inch diameter and total up to 10,000 feet in length. The West Linden Recharge Area would include 4 ASR wells and up to 142 dry wells for direct recharge to the groundwater basin.

b. Mosher Creek at Tully Dam Recharge Basin – SEWD is proposing a 104-acre recharge basin and dry wells to be located within a proposed recharge area near the intersection of Live Oak Road and N. Tully Road. MICUP water would be delivered to the recharge area at a rate of 54 cfs by either of two potential routes:

1) from a turnout from the West Linden Project main pipeline about 2,400 feet south of the Mokelumne Aqueduct intertie. From that location, a 60-inch diameter pipeline would run east along Live Oak Road approximately 8,000 feet to N. Tully Road.

2) from the northeastern side of the West Linden Project pipeline system via a 60-inch diameter pipeline running north from Eight Mile Road approximately 7,000 feet along N. Tully Road, crossing the Old Calaveras River and Mosher Creek along the way.

c. East Mosher Creek at Messick Road Recharge Area – SEWD is proposing an 80-acre recharge basin within an area located along the west side of Clements Road approximately 1 mile south of the intersection with Frazier Road. MICUP water would be delivered to this area via a 60-inch diameter pipeline extension from the West Linden Project pipeline system at a rate of up to 46 cfs. The proposed alignment would run east along Comstock Road from the intersection with Duncan Road approximately 2,700 feet, then turn north and run approximately 2,700 feet to Messick Road, crossing the Old Calaveras River along the way.

d. Beckman ASR Well and Additional ASR Wells – The Beckman Well is an existing ASR Well connected to the Mokelumne Aqueduct through an existing turnout. The well and turnout are located along the south side of the Mokelumne Aqueduct, approximately 1 mile east of the intersection of the Aqueduct with State Highway 88. The Beckman Well would be upgraded to inject MICUP water into the aquifer, with a diversion capacity of up to 500 gallons per minute.

   SEWD may consider additional ASR wells adjacent to the Mokelumne Aqueduct within the general area shown on the map. The design of these structures will require an agreement and coordination with EBMUD.

Change Distribution of Storage
(Item 7d of Original Application)

As applied for: Alt. A: Storage of 434,000 acre-feet at proposed Middle Bar Dam to be constructed on Mokelumne River upstream from Pardee Reservoir.

Alt. B: Storage of 150,000 acre-feet at proposed Duck Creek Dam to be constructed on Duck Creek tributary to Calaveras River.

As proposed: 110,000 acre-feet by underground storage within the Eastern San Joaquin Groundwater Subbasin. 48,000 acre-feet by storage in East Bay Municipal Utility District's Pardee Reservoir and Camanche Reservoir.

Change in Completion Schedule
(Item 8 Original Application)

As applied for:

The Pardee Dam is complete. The Middle Bar Dam or the Duck Creek Dam, tunnel and pipelines for conveyance of the water will be completed by the year 2000. Most of the service area is developed to irrigated agriculture or urban areas. Conveyance systems are in place but some additions will be

required. Although most of the water can be placed to immediate use, it will take until the year 2020 for full municipal use.

As proposed:

a. Year work will start: 2026

b. Year work will be completed: 2034

c. Year water will be used to full extent intended: 2060

d. If completed, year of first use: There has been no use of water requested by the application. Many of the project facilities exist and most of the service area has been developed. Water has been diverted and used pursuant to other rights.

* * * * *

State of California
State Water Resources Control Board
DIVISION OF WATER RIGHTS
P.O. Box 2000, Sacramento, CA 95812-2000
Tel: (916) 341-5300 Fax: (916) 341-5400
http://www.waterboards.ca.gov/waterrights

ENVIRONMENTAL INFORMATION FOR PETITIONS

This form is required for all petitions.

Before the State Water Resources Control Board (State Water Board) can approve a petition, the State Water Board must consider the information contained in an environmental document prepared in compliance with the California Environmental Quality Act (CEQA). This form is not a CEQA document. If a CEQA document has not yet been prepared, a determination must be made of who is responsible for its preparation. As the petitioner, you are responsible for all costs associated with the environmental evaluation and preparation of the required CEQA documents. Please answer the following questions to the best of your ability and submit any studies that have been conducted regarding the environmental evaluation of your project. If you need more space to completely answer the questions, please number and attach additional sheets.

DESCRIPTION OF PROPOSED CHANGES OR WORK REMAINING TO BE COMPLETED

For a petition for change, provide a description of the proposed changes to your project including, but not limited to, type of construction activity, structures existing or to be built, area to be graded or excavated, increase in water diversion and use (up to the amount authorized by the permit), changes in land use, and project operational changes, including changes in how the water will be used. For a petition for extension of time, provide a description of what work has been completed and what remains to be done. Include in your description any of the above elements that will occur during the requested extension period.

See Attachment 1, Item A.

Insert the attachment number here, if applicable:

Coordination with Regional Water Quality Control Board

For change petitions only, you must request consultation with the Regional Water Quality Control Board regarding the potential effects of your proposed change on water quality and other instream beneficial uses. (Cal. Code Regs., tit. 23, § 794.) In order to determine the appropriate office for consultation, see: http://www.waterboards.ca.gov/waterboards_map.shtml. Provide the date you submitted your request for consultation here, then provide the following information.

Date of Request

See Attachment 1, Item B

Will your project, during construction or operation, (1) generate waste or wastewater containing such things as sewage, industrial chemicals, metals, or agricultural chemicals, or (2) cause erosion, turbidity or sedimentation? ☒ Yes ☐ No

Will a waste discharge permit be required for the project? ☐ Yes ☒ No

If necessary, provide additional information below:

Wastewater will be treated at the existing treatment plants for the cities. These plants are already operating under Waste Discharge Requirements from the RWQCB.

Insert the attachment number here, if applicable:

Local Permits

For temporary transfers only, you must contact the board of supervisors for the county(ies) both for where you currently store or use water and where you propose to transfer the water. (Wat. Code § 1726.) Provide the date you submitted your request for consultation here.

Date of Contact

For change petitions only, you should contact your local planning or public works department and provide the information below.

Person Contacted: Fritz Buchman, Director of Public Works Date of Contact: August 18, 2025

Department: San Joaquin County Dept. of Public Works Phone Number: (209) 468-3000

County Zoning Designation: Various

Are any county permits required for your project? If yes, indicate type below. ☒ Yes ☐ No

Grading Permit Yes Use Permit Yes Watercourse Obstruction Permit

Change of Zoning General Plan Change Other (explain below)

If applicable, have you obtained any of the permits listed above? If yes, provide copies. ☐ Yes ☒ No

If necessary, provide additional information below:

Insert the attachment number here, if applicable:

Federal and State Permits

Check any additional agencies that may require permits or other approvals for your project:

☒ Regional Water Quality Control Board ☒ Department of Fish and Game

☐ Dept of Water Resources, Division of Safety of Dams ☐ California Coastal Commission

☐ State Reclamation Board ☒ U.S. Army Corps of Engineers ☐ U.S. Forest Service

☐ Bureau of Land Management ☐ Federal Energy Regulatory Commission

☐ Natural Resources Conservation Service

Have you obtained any of the permits listed above? If yes, provide copies. ☐ Yes ☒ No

For each agency from which a permit is required, provide the following information:

Agency	Permit Type	Person(s) Contacted	Contact Date	Phone Number
California Dept. of Fish & Wildlife	Lake or Streambed Alteration Agreement			
US Army Corps of Engineers	404 Permit			
California Regional Water Quality Control Board, Central Valley Region	401 Water Quality Certification			

If necessary, provide additional information below: The July 2, 2024 NOP was sent to the listed agencies, as well as many others at the federal, state, and local levels.

The proposed project involves use of existing and proposed facilities for making diversions under a new water right permit. The facilities are or will be owned by MICUP member agencies (NSJWCD, SEWD, or City of Stockton) as well as EBMUD and Woodbridge ID. To the extent existing facilities currently operate under existing permits, the agency holding the permits will request modification as necessary for the changes in operations. For proposed facilities, the agencies will apply for and obtain required permits for specific projects as required.

Insert the attachment number here, if applicable:

Construction or Grading Activity

Does the project involve any construction or grading-related activity that has significantly altered or would significantly alter the bed, bank or riparian habitat of any stream or lake? ☒ Yes ☐ No

If necessary, provide additional information below:

Construction of Pardee Dam, Camanche Dam, and Woodbridge Diversion Dam significantly altered the Mokelumne River decades ago. Construction of diversion pump stations on the Mokelumne River and Pixley Slough within NSJWCD likely involved local alterations to the bank of these watercourses. Expansion of existing District-owned diversion pump stations and private pumps on the Mokelumne River within NSJWCD may involve alterations of the bank and/or channel. The significance of any such alterations will be determined through CDFW's Lake or Streambed Alteration Notification process.

Insert the attachment number here, if applicable:

Archeology

Has an archeological report been prepared for this project? If yes, provide a copy. ☐ Yes ☒ No

Will another public agency be preparing an archeological report? ☒ Yes ☐ No

Do you know of any archeological or historic sites in the area? If yes, explain below. ☒ Yes ☐ No

If necessary, provide additional information below:

Information regarding known archaeological, historic, and tribal resources will be provided in the Draft EIR for this project.

Insert the attachment number here, if applicable:

Photographs

For all petitions other than time extensions, attach complete sets of color photographs, clearly dated and labeled, showing the vegetation that exists at the following three locations:

☒ Along the stream channel immediately downstream from each point of diversion

☒ Along the stream channel immediately upstream from each point of diversion

☒ At the place where water subject to this water right will be used

See Attachment 2

Maps

For all petitions other than time extensions, attach maps labeled in accordance with the regulations showing all applicable features, both present and proposed, including but not limited to: point of diversion, point of rediversion, distribution of storage reservoirs, point of discharge of treated wastewater, place of use, and location of instream flow dedication reach. (Cal. Code Regs., tit. 23, §§ 715 et seq., 794.)

Pursuant to California Code of Regulations, title 23, section 794, petitions for change submitted without maps may not be accepted.

All Water Right Holders Must Sign This Form:
I (we) hereby certify that the statements I (we) have furnished above and in the attachments are complete to the best of my (our) ability and that the facts, statements, and information presented are true and correct to the best of my (our) knowledge. Dated!! 5/15/2026 at Stockton, CA .

Water Right Holder or Authorized Agent Signature

Water Right Holder or Authorized Agent Signature

NOTE:
- **Petitions for Change may not be accepted unless you include proof that a copy of the petition was served on the Department of Fish and Game. (Cal. Code Regs., tit. 23, § 794.)**
- **Petitions for Temporary Transfer may not be accepted unless you include proof that a copy of the petition was served on the Department of Fish and Game and the board of supervisors for the county(ies) where you currently store or use water and the county(ies) where you propose to transfer the water. (Wat. Code § 1726.)**

ATTACHMENT 1 TO ENVIRONMENTAL INFORMATION FORM
FOR PETITION FOR CHANGE TO APPLICATION 29835

ITEM A - Description of Proposed Changes or Work Remaining To Be Completed

This Petition proposes changes to pending water right Application 29835 in support of the Mokelumne River Integrated Conjunctive Use Program (MICUP). MICUP will rely on existing diversion, storage, and conveyance facilities operated by East Bay Municipal Utilities District (EBMUD), Woodbridge Irrigation District (WID), and MICUP partner agencies North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), and City of Stockton (City) that are fully permitted. Construction of new facilities will include the following, noting that some of these projects may be constructed under project-specific permitting actions by MICUP partners and incorporated into MICUP:

NSJWCD Projects:

- Expansion of three existing District-owned water diversion pump stations (North, CalFed, and South Systems) on the Mokelumne River to increase total diversion capacity from approximately 68 cfs to 130 cfs.
- Expansion of up to eight privately owned water diversion pumps on the Mokelumne River having capacities ranging from 1 to 5 cfs. A combined total capacity of 24 cfs has been assumed for planning purposes.
- Construction of groundwater recharge basins on up to 1,000 acres of land that is currently in agricultural production or fallow.
- Development of Flood Managed Aquifer Recharge (Flood-MAR) on up to 1,300 acres of land that is currently in agricultural production or fallow.
- Construction of up to 20 Aquifer Storage and Recovery (ASR) Wells having a combined capacity of up to 20 cfs, to inject water obtained from a proposed turnout on EBMUD's Mokelumne Aqueduct. For each ASR well, construction will involve temporary disturbance of up to 3 acres of land and a permanent footprint of approximately 1 acre of land.
- Upgrade or new construction of up to approximately 192,000 feet of large diameter water distribution pipeline.

SEWD Projects:

- Upgrade the existing Beckman ASR Well, including but not limited to construction of a new well pump, new piping, and a new valving. The existing turnout from EBMUD's Mokelumne Aqueduct will be rehabilitated and a pipeline from the turnout to the Beckman ASR Well will be constructed to deliver water to the well.
- Construction of new Mokelumne Aqueduct intertie and new ASR wells on agricultural lands along the Mokelumne Aqueduct. Together with ASR wells constructed along the

Mokelumne Aqueduct within NSJWCD, the combined number of wells between the two districts is projected to be 20.

- Construction of a new turnout on the Mokelumne Aqueduct near Jack Tone Road to facilitate delivery of surface water to agricultural lands within SEWD.
- Construction of approximately 70,000 feet of pipeline from the Mokelumne Aqueduct intertie to the proposed West Linden Recharge Area, and construction of up to 4 ASR wells and 142 dry wells within the West Linden Project Recharge Area, to provide surface water to up to 5,700 acres of farmland.
- Construction of 104-acre recharge basin and dry wells within the Mosher Creek at Tully Dam Recharge Basin area.
- Construction of an 80-acre recharge basin located within the East Mosher Creek at Messick Road Recharge Area.
- Construction of approximately 7,000 feet of pipelines connecting Mosher Creek at Tully Dam Recharge Basin Area to the West Linden Project Recharge Area.
- Construction of approximately 8,000 feet of pipeline connecting East Mosher Creek at Messick Road Recharge Area to the West Linden Project Recharge Area.

City of Stockton Projects:

- Construction of three recharge basins totaling 43.5 acres at the existing Delta Water Treatment Plant, and two dry wells within each basin for enhanced infiltration capacity. This project City's existing water right permit and would be built by the City under separate project-specific environmental review.
- Construction of a 70-acres of recharge basin located within ½ mile of the WID South Main Canal and other conveyances, on agricultural lands south of Armstrong Road. Lateral pipeline needed is estimated to be 4,000 linear feet of 18-inch diameter pipeline.

ITEM B - Coordination with Regional Water Quality Control Board

The Notice Of Preparation of an Environmental Impact Report And Scoping Meeting for the Mokelumne River Integrated Conjunctive Use Program dated July 2, 2024 (NOP), was transmitted to the California Regional Water Quality Control Board via the Governor's Office of Planning and Research (OPR) State Clearinghouse. The NOP describes Application 29835 and how the water right permit will support implementation of the proposed project.

Attachment 2
Photographs to Accompany Environmental Information for Petition for Petition for Change to Application No. 29835 of Mokelumne River Water and Power Authority



View Upstream from Pardee Dam, Point #1 (per Google Earth Street view, March 2025)



View Downstream from Pardee Dam, Point #1 (per Google Earth Street view, March 2025)



View upstream from Camanche Parkway S crossing of Camanche Reservoir above Camanche Dam, Point #2 (per Google Earth Street view, March 2025)



View Upstream from Highway 88 crossing of Mokelumne River below Camanche Dam, Point #2 (per Google Earth Street view, March 2025)



View Downstream from Highway 88 Crossing of Mokelumne River below Camanche Dam, Point #2 (per Google Earth Street view, March 2025)



North San Joaquin Water Conservation District (NSJWCD) North Pump Station, Point #3, Looking upstream (per NSJWCD)



NSJWCD North Pump Station, Point #3, Looking downstream (per NSJWCD)



NSJWCD South Pump Station, Point #4, Looking Upstream (per NSJWCD)



NSJWCD South Pump Station, Point #4, Looking Downstream (per NSJWCD)



NSJWCD CalFed System, Point #5, Looking Upstream (per NSJWCD)



NSJWCD CalFed System, Point #5, Looking Downstream (per NSJWCD)



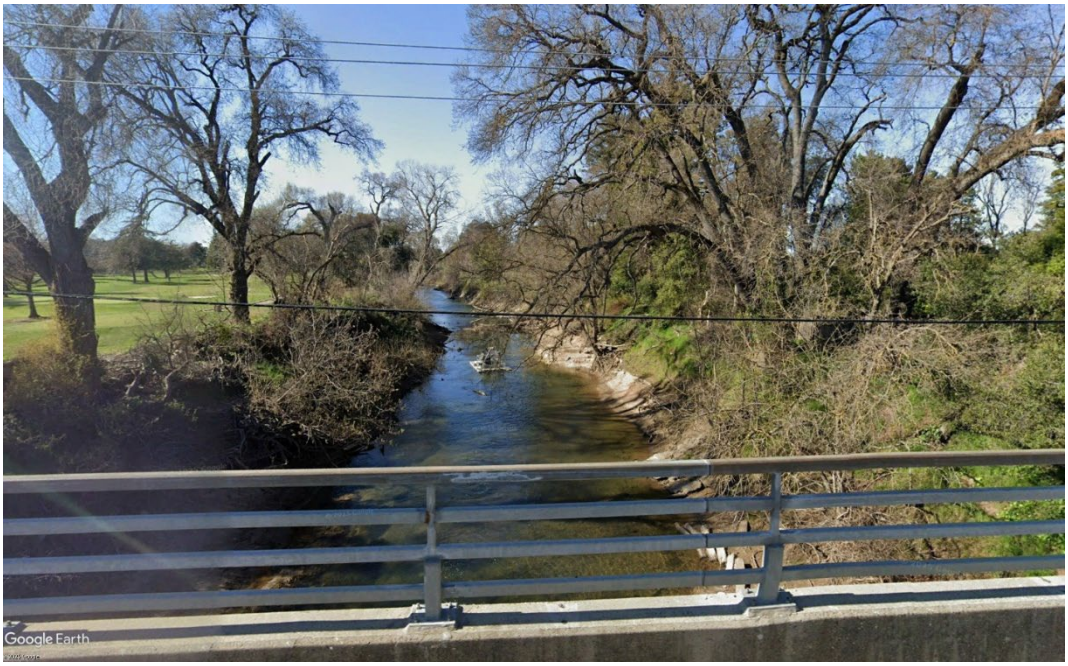
Intersection of Highway 99 and Mokelumne River Looking Upstream (per Google Earth Street View, February 2025)



Intersection of Highway 99 and Mokelumne River Looking Downstream (per Google Earth Street View, March 2025)



Looking Upstream at Woodbridge Irrigation District (WID) Diversion Dam, Point #6, (per Google Earth Street View, March 2025)



Looking Downstream from Lower Sacramento Road Crossing of Mokelumne River Below WID Diversion Dam, Point #6 (per Google Earth Street View, March 2025)



City of Stockton Delta Pump Intake, Point #7, Looking Upstream (per City of Stockton)



City of Stockton Delta Pump Intake, Point #7, Looking Downstream (per City of Stockton)



NSJWCD Pixley Pump Station, Point #8, Looking Up Slough (per NSJWCD)



NSJWCD Pixley Pump Station, Point #8, Looking Down Slough (per NSJWCD)



Typical Place of Use (per NSJWCD)



Typical Flood-MAR in Place of Use (per NSJWCD)



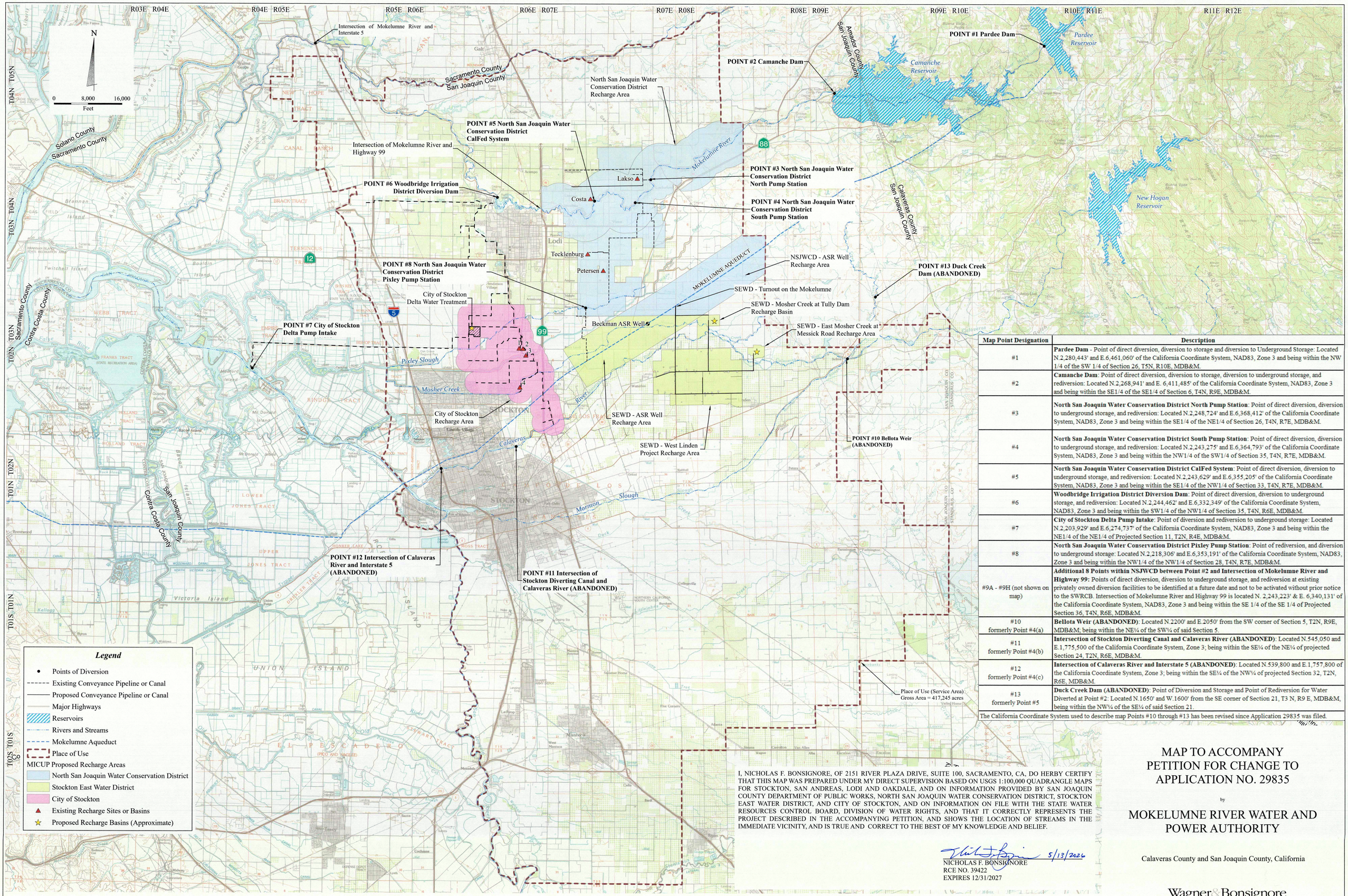
Typical urban developments within the City of Stockton (per Google Maps Street View, February 2022)



Typical commercial development within the City of Stockton (per Google Maps Street View, November 2024)



Typical industrial developments within the City of Stockton (per Google Maps Street View, November 2024)



Map Point Designation	Description
#1	**Pardee Dam** - Point of direct diversion, diversion to storage and diversion to Underground Storage: Located N.2,280,443' and E.6,461,060' of the California Coordinate System, NAD83, Zone 3 and being within the NW 1/4 of the SW 1/4 of Section 26, T5N, R10E, MDB&M.
#2	**Camanche Dam**: Point of direct diversion, diversion to storage, diversion to underground storage, and rediversion: Located N.2,268,941' and E. 6,411,485' of the California Coordinate System, NAD83, Zone 3 and being within the SE1/4 of the SE1/4 of Section 6, T4N, R9E, MDB&M.
#3	**North San Joaquin Water Conservation District North Pump Station**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,248,724' and E.6,368,412' of the California Coordinate System, NAD83, Zone 3 and being within the SE1/4 of the NE1/4 of Section 26, T4N, R7E, MDB&M.
#4	**North San Joaquin Water Conservation District South Pump Station**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,243,275' and E.6,364,793' of the California Coordinate System, NAD83, Zone 3 and being within the NW1/4 of the SW1/4 of Section 35, T4N, R7E, MDB&M.
#5	**North San Joaquin Water Conservation District CalFed System**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,243,629' and E.6,355,205' of the California Coordinate System, NAD83, Zone 3 and being within the SE1/4 of the NW1/4 of Section 33, T4N, R7E, MDB&M.
#6	**Woodbridge Irrigation District Diversion Dam**: Point of direct diversion, diversion to underground storage, and rediversion: Located N.2,244,462' and E.6,332,349' of the California Coordinate System, NAD83, Zone 3 and being within the SW1/4 of the NW1/4 of Section 35, T4N, R6E, MDB&M.
#7	**City of Stockton Delta Pump Intake**: Point of diversion and rediversion to underground storage: Located N.2,203,929' and E.6,274,737' of the California Coordinate System, NAD83, Zone 3 and being within the NE1/4 of the NE1/4 of Projected Section 11, T2N, R4E, MDB&M.
#8	**North San Joaquin Water Conservation District Pixley Pump Station**: Point of rediversion, and diversion to underground storage: Located N.2,218,306' and E.6,353,191' of the California Coordinate System, NAD83, Zone 3 and being within the NW1/4 of the NW1/4 of Section 28, T4N, R7E, MDB&M.
#9A - #9H (not shown on map)	**Additional 8 Points within NSJWCD between Point #2 and Intersection of Mokelumne River and Highway 99:** Points of direct diversion, diversion to underground storage, and rediversion at existing privately owned diversion facilities to be identified at a future date and not to be activated without prior notice to the SWRCB. Intersection of Mokelumne River and Highway 99 is located N. 2,243,223' & E. 6,340,131' of the California Coordinate System, NAD83, Zone 3 and being within the SE 1/4 of the SE 1/4 of Projected Section 36, T4N, R6E, MDB&M.
#10 formerly Point #4(a)	**Bellota Weir (ABANDONED)**: Located N.2200' and E.2050' from the SW corner of Section 5, T2N, R9E, MDB&M; being within the NE¼ of the SW¼ of said Section 5.
#11 formerly Point #4(b)	**Intersection of Stockton Diverting Canal and Calaveras River (ABANDONED)**: Located N.545,050 and E.1,775,500 of the California Coordinate System, Zone 3; being within the SE¼ of the NE¼ of projected Section 24, T2N, R6E, MDB&M.
#12 formerly Point #4(c)	**Intersection of Calaveras River and Interstate 5 (ABANDONED)**: Located N.539,800 and E.1,757,800 of the California Coordinate System, Zone 3; being within the SE¼ of the NW¼ of projected Section 32, T2N, R6E, MDB&M.
#13 formerly Point #5	**Duck Creek Dam (ABANDONED)**: Point of Diversion and Storage and Point of Rediversion for Water Diverted at Point #2: Located N.1650' and W.1600' from the SE corner of Section 21, T3 N, R9 E, MDB&M, being within the NW¼ of the SE¼ of said Section 21.

The California Coordinate System used to describe map Points #10 through #13 has been revised since Application 29835 was filed.

I, NICHOLAS F. BONSIGNORE, OF 2151 RIVER PLAZA DRIVE, SUITE 100, SACRAMENTO, CA, DO HERBY CERTIFY THAT THIS MAP WAS PREPARED UNDER MY DIRECT SUPERVISION BASED ON USGS 1:100,000 QUADRANGLE MAPS FOR STOCKTON, SAN ANDREAS, LODI AND OAKDALE, AND ON INFORMATION PROVIDED BY SAN JOAQUIN COUNTY DEPARTMENT OF PUBLIC WORKS, NORTH SAN JOAQUIN WATER CONSERVATION DISTRICT, STOCKTON EAST WATER DISTRICT, AND CITY OF STOCKTON, AND ON INFORMATION ON FILE WITH THE STATE WATER RESOURCES CONTROL BOARD, DIVISION OF WATER RIGHTS, AND THAT IT CORRECTLY REPRESENTS THE PROJECT DESCRIBED IN THE ACCOMPANYING PETITION, AND SHOWS THE LOCATION OF STREAMS IN THE IMMEDIATE VICINITY, AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

5/13/2026

NICHOLAS F. BONSIGNORE
RCE NO. 39422
EXPIRES 12/31/2027

MAP TO ACCOMPANY PETITION FOR CHANGE TO APPLICATION NO. 29835

by

MOKELUMNE RIVER WATER AND POWER AUTHORITY

Calaveras County and San Joaquin County, California

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation

Basemap per USGS 1:100,000 quad maps for "Stockton" (1989), "Lodi" (1993), "San Andreas" (1993), and "Oakdale" (1994).
Highway Data per California Open Data, updated August 30, 2024, https://data.ca.gov/dataset/national-highway-system accessed August 30, 2024.
Parcel data per San Joaquin Open Data,https://opendata.sjgov.org/dataset/parcels accessed July 26, 2023.
River, Stream and Aqueduct per California Department of Fish and Game data clearinghouse, https://wildlife.ca.gov/Data/GIS/Clearinghouse accessed July 13, 2023.

Path: Q:\Drawings\San Joaquin County\SJC Water Rights\A29835 Mokelumne R\A29835 Mokelumne R.aprx

May 2026



GEI Consultants



Supplement to Water Right Application

MICUP: Underground Storage Supplement Supporting Information

San Joaquin County, California

Submitted to:
San Joaquin County
1810 Hazelton Avenue
Stockton, CA 95205

Submitted by:
GEI Consultants, Inc.
11010 White Rock Road, Suite 200
Rancho Cordova, CA 95670
916.671.4970

May 15, 2026
Project No. 2303724 Task 1.5.4



Michael J. Cornelius, P.G.
Principal Geologist

Amy Naumovski McBride, E.I.T.
Project Professional

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Acronyms and Abbreviations

AF	acre-feet
AFD	acre-feet per day
AFY	acre-feet per year
ASR	Aquifer Storage and Recovery
Cal Water	California Water Service
CFS	cubic feet per second
CoS or The City	City of Stockton
DD Window	Direct Diversion Window
RFS Window	Rediversion from Storage Window
DTW	depth to water
DWTP	Delta Water Treatment Plant
DWR	California Department of Water Resources
EBMUD	East Bay Municipal Utility District
ESJ Subbasin or Subbasin	East San Joaquin Groundwater Subbasin
Flood-MAR	Flood-Managed Aquifer Recharge
GSP	Groundwater Sustainability Plan
MICUP	Mokelumne River Integrated Conjunctive Use Program
North System	North System Improvement Project
NSJWCD	North San Joaquin Water Conservation District
PODs	Points of Diversion
PIR	Project Identification Report
RMS	representative monitoring sites
SGMA	Sustainable Groundwater Management Act
SEWD	Stockton East Water District
WSMP	Water Supply Master Plan
WID	Woodbridge Irrigation District

Executive Summary

E.S.1. Summary

San Joaquin County's Mokelumne River Integrated Conjunctive Use Program (MICUP) encompasses 17 individual recharge areas distributed across three districts: North San Joaquin Water Conservation District (NSJWCD), Stockton East Water District (SEWD), and the City of Stockton (CoS, the City). Each of these recharge areas is detailed in Sections 14.3, 14.4, and 14.5 respectively of this Underground Storage Supplement to Water Right Application 29835 (A029835). These comprehensive descriptions aim to support the Underground Storage Supplement to A029835 by illustrating their collective contributions to groundwater recharge in the Eastern San Joaquin Groundwater Subbasin (ESJ Subbasin, Subbasin). This document provides detailed information about the points of diversion, conveyance, methods of recharge, and groundwater conditions to support regulatory requirements and the water right application and compliance with the Sustainable Groundwater Management Act (SGMA).

E.S.2. Approaches and Assumptions

The SGMA Data Viewer[1] and recent groundwater level maps were utilized to identify groundwater levels and gradients. This approach allowed for pinpointing areas where groundwater recharge would bring the most benefit to the Subbasin. Recharge efforts were targeted towards the center of the basin, near the cone of depression, which has the greatest storage capacity, ensuring effective utilization of available space. The sizing of recharge areas was informed by several factors, including diversion locations and diversion capacity, facility capacity, and recharge capacity, with detailed recharge calculations guiding decisions. The Direct Diversion (DD) Window, specifically from December 1 to June 30, and the Rediversion from Storage (RFS) Window from July 1 to November 5, were considered to determine the appropriate times for water diversion. The RFS Window was shortened to end October 31 for conservative planning assumptions.

Additionally, a groundwater model was employed to simulate various scenarios and predict the outcomes of recharge strategies, ensuring a data-driven approach to groundwater management.

[1] https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer&landsub#currentconditions

1. MICUP Overview

1.1. Background

In 1980, the California Department of Water Resources (DWR) determined that the ESJ Subbasin was in a state of critical overdraft[2]. The Subbasin, as seen in Figure 1, continues to be in an overdraft condition due to the overreliance on groundwater supply to meet demand. To address this overdependence on groundwater, local agencies in San Joaquin County have long sought to appropriate water from the Mokelumne River to meet current and future demand and address the critical overdraft condition.

On March 22, 2023, the San Joaquin County Department of Public Works on behalf of the County of San Joaquin and/or the Mokelumne River Water and Power Authority requested technical proposals for MICUP, which is a coordinated effort between the County of San Joaquin and three entities in northern San Joaquin County including NSJWCD, SEWD, and the City, to implement groundwater storage projects, see Figure 1. These three entities and San Joaquin County are also partnering with East Bay Municipal Utilities District (EBMUD) and California Water Service (Cal Water). EBMUD owns and operates facilities on the Mokelumne River including Pardee Reservoir, Camanche Reservoir, and the Mokelumne Aqueduct. Cal Water delivers groundwater to customers in its services area located within the City and surrounding areas. Cal Water is participating because of their interest in the sustainable groundwater management of the region. There are 17 identified project components that provide recharge through the following methods:

- Flood Managed Aquifer Recharge (4)
- In-Lieu Recharge (3)
- Recharge Basins (6)
- Recharge through Storm Detention Facilities (1)
- Aquifer Storage and Recovery Wells (2)
- Dry Wells (1)*

*Dry wells are included in two of the recharge basin projects.

Two of the in-lieu recharge project components identified for NSJWCD are associated with existing water rights under Permit 10477 and are therefore not evaluated as part of this Underground Storage Supplement. These components are included in select tables and referenced where appropriate but are not evaluated further in this document. Accordingly, the project components evaluated in this document total 15, and in-lieu recharge is represented by one component. The combined capacity of these excluded in-lieu components (up to 20,000 AFY) is not included in the MICUP total capacity, consistent with the assumptions presented in the Project Identification Report (PIR; GEI, 2026).

In-Lieu[3] recharge is considered beneficial by the State Water Resources Control Board because it is the ultimate use of the water. The remaining five methods can be categorized into two general descriptions

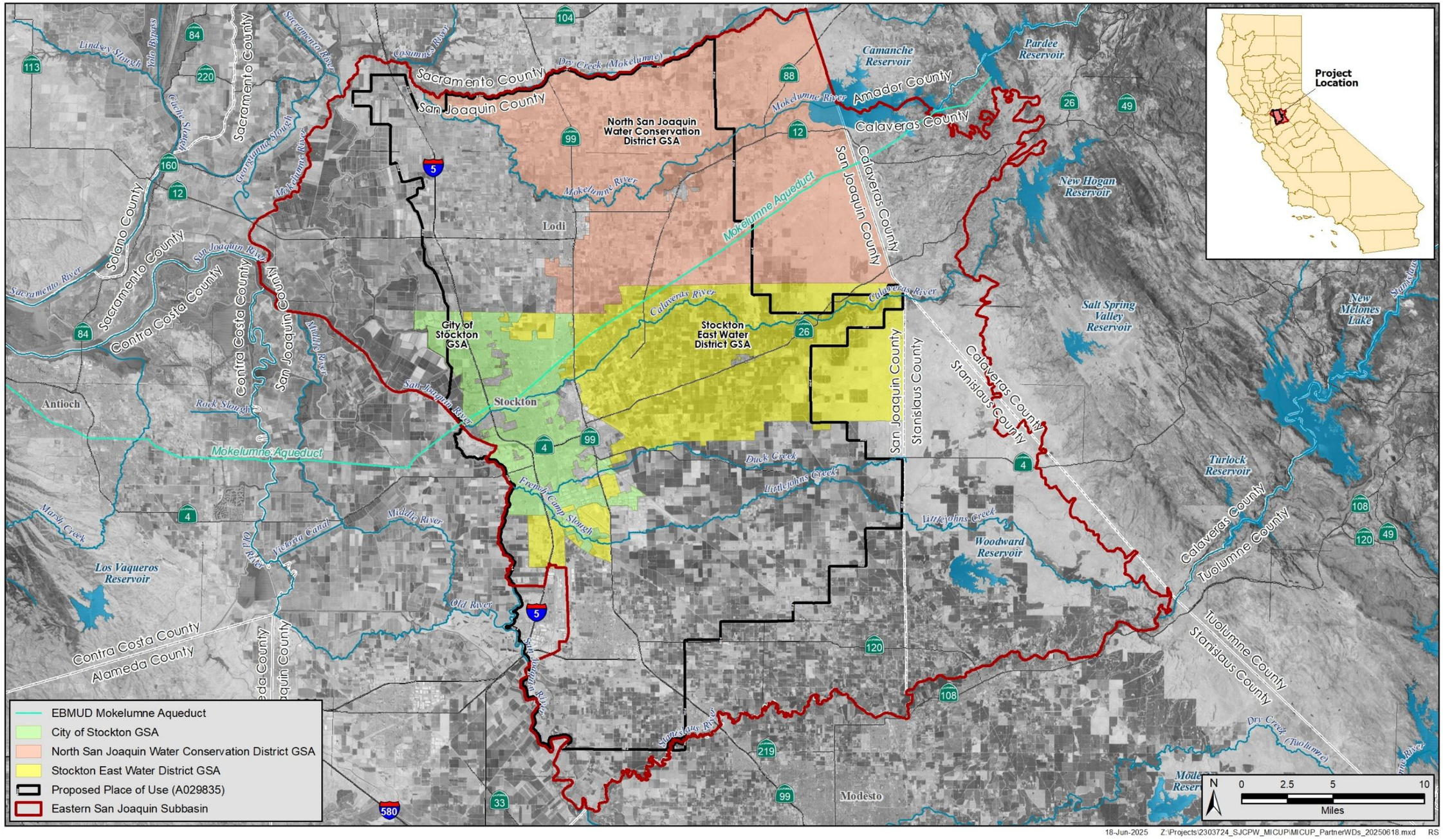
[2] As defined by SGMA, "A basin is subject to **critical overdraft** when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." Overdraft occurs where the average annual amount of groundwater extraction exceeds the long-term average annual supply of water to the basin. Effects of overdraft can include seawater intrusion, land subsidence, groundwater depletion, and/or chronic lowering of groundwater levels.

[3] **In-Lieu Recharge** is the use of surface water "in-lieu" of groundwater pumping for beneficial use. Using surface water instead of pumping groundwater keeps water in the aquifer that would otherwise be pumped and delivered

of groundwater recharge methods: Direct Surface Recharge and Direct Subsurface Recharge. Direct Surface Recharge can be subcategorized into Flood Managed Aquifer Recharge (Flood-MAR) and Dedicated Surface Based Recharge. Dry wells and Aquifer Storage and Recovery (ASR) wells are used as direct recharge into the subsurface. These methods are described in the following sections.

for irrigation. This is considered a form of “recharge” and requires that surface water be available during periods when groundwater is used.

Figure 1: MICUP Groundwater Sustainability Agencies



1.2. Groundwater Recharge Methods Descriptions (14)

1.2.1. Flood-MAR (4)

Flood-MAR, a form of direct recharge, is accomplished by intentionally flooding agricultural fields with excess surface water available during high flow or flood conditions. Benefits of this specific type of recharge are

(1) it does not require significant modifications to existing land or agricultural practices of the land
(2) it is relatively inexpensive
(3) it utilizes existing water infrastructure

However, recharge is restricted based on agricultural practices, as flooding cannot interfere with crop production, as well as the amount of moisture crops can handle and the recharge rate of the shallow soil layers. Flood-MAR is also dependent on landowner participation and understanding of soil conditions. There are four Flood-MAR recharge areas planned within MICUP.

1.2.2. Dedicated Surface Based Recharge (7)

Dedicated Surface Based Recharge can be done in many different types of facilities, including recharge basins and storm detention facilities that provide surface area for water to infiltrate from the surface into the subsurface. The ability of the facilities to facilitate recharge is highly dependent on the local geologic conditions near the surface and can vary over short distances from about 0.1 to 1.0 foot or more per day depending on conditions. There are seven Dedicated Surface Based Recharge areas planned within MICUP.

1.2.3. Wells (3)

There are two types of wells proposed for MICUP – Dry wells and ASR wells.

1) A dry well is an underground, man-made structure situated above the groundwater aquifer that allows water to bypass impermeable layers near the surface, facilitating infiltration into more permeable subsurface layers to enhance groundwater recharge. Dry wells require maintenance to clean out debris to maintain the infiltration rates. There are two proposed project components for MICUP that will include dry wells and one proposed project that is a dry well-specific project.
2) ASR wells deliver water directly into the aquifers in the subsurface. These wells can be dedicated to recharge or dual-purpose wells capable of extracting stored water. ASR wells can be drilled in the target aquifer, providing direct recharge, and take up a small footprint, not being restricted by overlying land use. ASR wells can recharge whenever water is available but require pressurized water, maintenance, and specific infrastructure, including possible pretreatment or filtration recharge water. ASR wells are the most expensive recharge option. There are two ASR Well recharge areas proposed for MICUP.

1.3. Groundwater Monitoring Wells

Using data from wells to determine the approximate depth to groundwater is essential for each recharge area because it provides representative, localized information about the water table and the available storage to receive recharged groundwater. This is particularly important given the significant differences in groundwater levels in the recharge areas. Pre-development groundwater levels followed the slope of the ground surface, which were generally higher in the eastern part of the ESJ Subbasin and lower moving west towards the Sacramento-San Joaquin River Delta (at mean sea level). The eastern part of the subbasin is characterized by higher elevations due to the presence of the granitic rocks of the Sierra Nevada foothills which also define the bottom of the aquifer system. To the west, the groundwater elevations gradually decrease, transitioning into the lower-lying areas of the Central Valley. Groundwater pumping within the Subbasin has modified groundwater levels and flow patterns. Significant long-term pumping that exceeds the rate of recharge has resulted in groundwater overdraft throughout the basin and cones of depression at localized areas within the Subbasin. MICUP aims to address these overdraft issues by reducing the need for groundwater pumping and implementing various methods for groundwater recharge, thereby supporting sustainable groundwater management and reducing further depletion.

Table 1 identifies 9 wells that will be used to estimate the depth to water for each of the seventeen recharge areas within MICUP. These wells are all identified as representative monitoring sites (RMS) for groundwater level monitoring in the 2024 Amendment to the Eastern San Joaquin Groundwater Subbasin Groundwater Sustainability Plan (GSP). The location of these wells relative to the MICUP recharge areas is shown in Figure 2. Table 2 identifies the monitoring wells associated with each of the recharge areas (which are described in the next section) to identify groundwater level trends in the vicinity of each recharge area.

Table 1: Monitoring Well Information

Local Well Name	NAD 83 North	NAD 83 East	DTW (FT)	Date	DTW Max (FT)	Max Date	DTW Min (FT)	Min Date
04N07E20H003M	38.18367	-121.22616	113.18	7/8/2024	119.5	9/8/2022	69.2	3/22/1984
#3 Bear Creek	38.15520	-121.13800	151	4/17/2023	160.0	10/12/2022	130	4/1/2012
Lodi City Well #2	38.13760	-121.27400	50	3/16/2023	63	11/15/2022	21.36	12/31/1942
03N06E05N003	38.13170	-121.35240	28	3/21/2024	43.5	10/26/2022	23.5	3/6/1997
03N07E21L003	38.09090	-121.21530	108.5	4/17/2023	118.5	10/21/1991	76.5	3/23/2000
02N07E03D001	38.05780	-121.20170	107.5	3/21/2024	136.0	10/12/2016	3	3/31/2022
02N08E15M002	38.02060	-121.09430	154.60	10/13/2016	166.60	10/17/2000	48.7	5/6/1948
Swenson-3	38.00670	-121.34580	14	3/4/2024	23.3	10/21/2015	13.8	4/17/2023
02N07E29B001	37.99760	-121.23080	90.8	10/25/2022	130.5	4/2/1991	69.9	3/28/2000

Notes: Well location and depth to water (DTW) data was retrieved from the DWR Sustainable Groundwater Management Act (SGMA) Data Viewer; FT = feet

Figure 2: RMS Wells

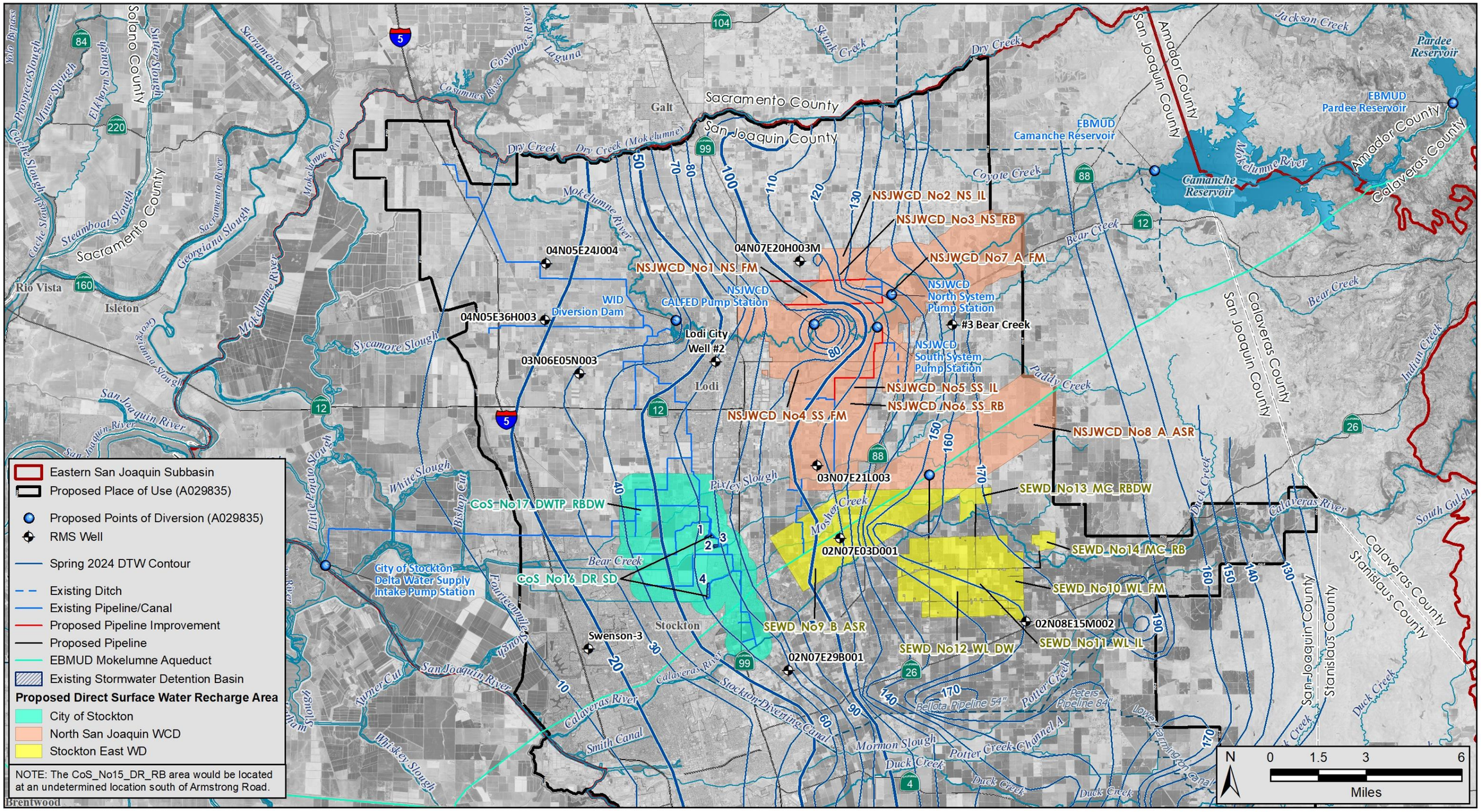


Table 2: Recharge Areas and their RMS Wells

Recharge Area Number	District	Recharge Area Name	Recharge Method	Recharge Capacity (AFY)	04N07E20H003M	#3 Bear Creek	Lodi City Well #2	03N06E05N003	03N07E21L003	02N07E03D001	02N08E15M002	Swenson-3	02N07E29B001
1	NSJWCD	NSJWCD_No1_NS_FM	Flood-MAR	800	X		X						
2	NSJWCD	NSJWCD_No2_NS_IL	In - Lieu	10,000*	X		X						
3	NSJWCD	NSJWCD_No3_NS_RB	Recharge Basin	32,600	X		X						
4	NSJWCD	NSJWCD_No4_SS_FM	Flood-MAR	800		X			X				
5	NSJWCD	NSJWCD_No5_SS_IL	In - Lieu	10,000*		X			X				
6	NSJWCD	NSJWCD_No6_SS_RB	Recharge Basin	32,600		X			X				
7	NSJWCD	NSJWCD_No7_A_FM	Flood-MAR	4,300	X	X	X		X				
8	NSJWCD	NSJWCD_No8_A_ASR	Wells (ASR)	13,400						X			
NSJWCD Total				**84,500**									
9	SEWD	SEWD_No9_B_ASR	Wells (ASR)	500						X			
10	SEWD	SEWD_No10_WL_FM	Flood-MAR	1,800						X	X		
11	SEWD	SEWD_No11_WL_IL	In - Lieu	17,300						X	X		
12	SEWD	SEWD_No12_WL_DW	Wells (Dry Wells)	24,100						X	X		
13	SEWD	SEWD_No13_MC_RBDW	Recharge Basin	35,700					X	X			
14	SEWD	SEWD_No14_MC_RB	Recharge Basin	30,900					X	X			
SEWD Total				**110,300**									
15	CoS	CoS_No15_DR_RB	Recharge Basins	10,700			X	X		X			
16	CoS	CoS_No16_DR_SD	Recharge Basin	2,700			X	X		X			
17	CoS	CoS_No17_DWTP_RBDW	Recharge Basin	8,800								X	X
CoS Total				**22,200**									
MICUP Total				**217,000**									

Note: AFY = acre-feet per year; Recharge Capacity includes both the Direct Diversion and Rediversion from Storage Windows; *These are Permit 10477 Water and not included in MICUP Capacity Totals

2. Section 14.3

The following sections provide a comprehensive overview of the 17 recharge areas across three agencies, detailing each project component's method of groundwater recharge. Two in-lieu recharge components associated with existing Permit 10477 are not evaluated in detail in this document; therefore, 15 project components are described in the sections that follow. The sections describe the physical works and operations, including location and capacity, surface area, depth to water, and recharge capacity. It also covers the types of wells used, the amount of water applied, actual infiltration rates accounting for losses such as evapotranspiration and soil absorption, and the crop types if water is applied to agricultural fields. This can be used to populate the information needed for Section 14.3 of the Underground Storage Supplement to Water Right Application.

Each recharge area has brief tables describing the assumptions that were used to calculate the reasonable amount of water applied and any losses due to root zone or evapotranspiration. Details of these calculations can be found in Appendix A, Appendix B, and supplementary Excel files. Capacity numbers were rounded to a whole number as part of the planning assumptions. Appendix C and Appendix D hold the spatial data for local crops and any previous permitting that has been completed.

2.1. North San Joaquin Water Conservation District

NSJWCD would primarily divert MICUP water using existing diversions on the Mokelumne River. Some diversions may be improved to increase diversion capacity and/or improve operational efficiency. Water diverted from the Mokelumne River would be conveyed through existing conveyance pipelines that are currently being improved or are planned to be improved. New pipelines would also expand the geographic extent of the recharge activities within NSJWCD. Several recharge methods would be used to recharge MICUP water as described above, within NSJWCD boundaries.

NSJWCD also may take delivery of MICUP water from EBMUD's Mokelumne Aqueduct. Recharge areas would be coordinated with EBMUD as the owner and operator of the Mokelumne Aqueduct. These recharge areas would require a new turnout from the Mokelumne Aqueduct as well as new facilities to convey MICUP water for recharge.

2.1.1. North System – CALFED

The North System Improvement Project (North System) aims to utilize surface water when available to support irrigation and recharge in the ESJ Subbasin. In addition to direct recharge, the project may also include In-Lieu Recharge, which uses surface water in place of groundwater pumping to effectively retain water in the aquifer. In-Lieu Recharge is not considered a designated recharge area for this application. The North System with CALFED recharge area includes:

1. Flood-MAR Recharge Area
2. Recharge Basins Recharge Area

Each of these recharge areas are described below.

2.1.1.1. Flood-MAR Recharge

Method: Flooding Farmland (e.g., On-Farm Recharge)

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The North System Pump Station, located on the north side of the Mokelumne River, will pump and convey to the North System Pipeline, which runs from the North Pumping Station north to Acampo Road and then westerly along Acampo Road approximately 25,100 feet. The CALFED Pump Station located downstream from the North System Pump Station near the Costa Property will be tied into the North System with up to 26,000 feet of pipeline (10 cubic feet per second [CFS] capacity) dependent upon final alignment. The North System pipeline will also have up to 20,000 feet of lateral pipelines to convey water to the various recharge areas. The North System would have a total capacity of 70 CFS.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

Lateral pipelines will be added from the North System Pipeline to the surrounding farmland (mostly vineyards) to enable Flood-MAR from December to Mid-March within the DD Window and in the latter half of October in the RFS Window. The Flood-MAR project components for NSJWCD are assumed to include up to 500 acres and are distributed evenly between the North and South Systems for planning purposes. Accordingly, up to 250 acres may occur within the North System; however, 60 acres was used as the planning assumption for the capacity calculations and this analysis. The following are the specifics for this recharge area:

- Surface Area for Recharge: 60 acres
- Depth to Water: 50 – 120 feet
- Capacity: 800 acre-feet per year (AFY)

The range of the depth to water can be attributed to historical agricultural groundwater pumping towards the central and eastern portions of the basin. The following wells represent conditions in this area: 04N07E20H003M and Lodi City Well #2.

Question 2b: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 800 AFY, as seen in Table 3. Details of this calculation can be found in Appendix A.

Table 3: NSJWCD North System Flood-MAR

Flood-MAR NSJWCD North System		
Recharge Rate	0.1	FT/Day
Potential Area	60	Acres
Daily Capacity	6	AFD
Days	122.25	Days
Yearly Capacity	800	AFY

Note: Yearly Capacity is rounded

Question 3: Provide calculations for estimating the amount of water applied to pre-irrigation. For these calculations you may consider variables including soil capacity, root depth of crops in infiltration area, and size of infiltration area that is / may be planted to crops.

Approximately 750 AFY, as seen in Table 4 . Details of this calculation can be found in Appendix B.

Table 4: NSJWCD North System Flood-MAR Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
NSJWCD_No1_NS_FM	800	750	50

Note: AFY = acre-feet per year; Losses are rounded

Question 4a: Identify crop type by acreage.

Table 5: NSJWCD North System FloodMAR Land Cover by Acreage

Land Cover Type	Acres
Cropland	556
Deciduous Orchard	3,995
Dryland Grain Crops	329
Evergreen Orchard	33
Irrigated Grain Crops	2,835
Irrigated Hayfield	5,247
Irrigated Row and Field Crops	314
Pasture	4,180
Rice	1
Vineyard	22,975
Total	40,465

Question 4b: Spatial Data for Crops by Type will be uploaded with this Supplement at the bottom of the page.

Spatial Data for Crops by Type will be uploaded with this Supplement (See Figure 6).

2.1.1.2. Recharge Basins

Method: Recharge Basins

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The North System Pump Station, located on the north side of the Mokelumne River, will pump water and then convey it to the North System Pipeline, which runs from the North Pumping Station north to Acampo Road and then westerly along Acampo Road approximately 25,100 feet. The CALFED Pump Station located downstream from the North System Pump Station near the Costa Property will be tied into the North System with up to 22,000 feet of pipeline (10 CFS capacity) dependent upon final alignment. The North System pipeline will also have up to 100,000 feet of lateral pipelines to convey water to the various recharge areas. The North System would have a total capacity of 70 CFS.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin. (surface area / depth / capacities)

The District is actively seeking opportunities to purchase or lease parcels to construct recharge basins to provide groundwater recharge during the months of December to June within the DD Window and July to October in the RFS Window. The following are the specifics for this recharge area:

- Surface Area: 530 acres (split into smaller basins)
- Depth to Water: 50 – 120 feet
- Capacity: 32,600 AFY

The range of the depth to water can be attributed to historical groundwater pumping with larger depth to water on the eastern side of the area and smaller depth to water on the western side of the area. The following wells represent conditions in this area: 04N07E20H003M and Lodi City Well #2.

Question 3: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 32,600 AFY, as seen in Table 6. Details of this calculation can be found in Appendix A. The Recharge Basins for the North System were fitted to maximize the available capacity after deliveries for Flood-MAR and In-Lieu.

Table 6: Recharge Capacity NSJWCD North System

Recharge Capacity NSJWCD North System					
		System Capacity	Flood-MAR	In-Lieu	Recharge Basins
	Days	(AF per Month)	(AF per Month)	(AF per Month)	(AF per Month)
Jan	31	3,996	184		3,811
Feb	28.25	3,641	173		3,565
Mar	31	3,996	92	74	3,830
Apr	30	3,867		552	3,314
May	31	3,996		1,449	2,517
Jun	30	3,867		1,878	2,043
Jul	31	3,996		2,040	1,955
Aug	31	3,996		1,884	2,112
Sep	30	3,867		1,429	2,436
Oct	31	3,996	92	688	3,215
Nov					
Dec	31	3,996	184		3,811
Yearly Total	336	43,400 AFY	800 AFY	10,000 AFY	32,600 AFY

Note: AF = acre-feet; CFS = cubic foot per second; AFY = acre-feet per year; Yearly Totals are rounded

After accounting for estimated system losses, the net recharge capacity would be approximately 30,200 AFY, as seen in Table 7. Details of the calculations can be found in Appendix B.

Table 7: Recharge Basins NSJWCD North System Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
NSJWCD_No3_NS_RB	32,600	30,200	2,400

Note: AFY = acre-feet per year; Losses are rounded

2.1.2. South System

Similar to the North System, the South System Improvement Project aims to utilize surface water when available for irrigation and groundwater recharge on the south side of the Mokelumne River. In addition to direct recharge, the project components may also include In-Lieu Recharge, which uses surface water in place of groundwater pumping to effectively retain water in the aquifer. In-Lieu Recharge is not considered a designated recharge area for this application. The South System recharge areas include:

1. Flood-MAR Recharge Area
2. Recharge Basins Recharge Area

Each of these recharge areas are described below.

2.1.2.1. Flood-MAR

Method: Flooding Farmland (e.g., On-Farm Recharge)

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The South System Pump Station located just north of the intersection of Locke Road and Brandt Road on the south bank of the Mokelumne River will be connected to the South System Pipeline (approximately 30,250 feet), and laterals (up 50,000 feet) from this pipeline will convey water for recharge areas. The South System will have a total capacity of approximately 60 CFS.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

NSJWCD has done outreach to bring farmers on board for this recharge area. Lateral pipelines will be added from the South System to the surrounding farmland (mostly vineyards). These farmers will then be able to flood their vineyards from December to Mid-March within the DD Window and in the latter half of October in the RFS Window. The Flood-MAR project components for NSJWCD are assumed to include up to 500 acres and are distributed evenly between the North and South Systems for planning purposes. Accordingly, up to 250 acres may occur within the South System; however, 60 acres was used as the planning assumption for the capacity calculations and this analysis. The following are the specifics for this recharge area:

- Surface Area for Recharge: 60 acres
- Depth to Water: 100 – 150 feet
- Capacity: 800 AFY

The range of the depth to water can be attributed to historical groundwater pumping with larger depth to water on the eastern side of the area and smaller depth to water on the western side of the area. The following wells represent conditions in this area: #3 Bear Creek and 03N07E21L003M.

Question 2b: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 800 AFY, as seen in Table 8. Details of this calculation can be found in Appendix A.

Table 8: Flood-MAR NSJWCD South System

Flood-MAR NSJWCD South System		
Recharge Rate	0.1	FT/Day
Potential Area	60	Acres
Daily Capacity	6	AFD
Days	122.25	Days
Yearly Capacity	800	AFY

Note: FT/Day = feet per day; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity is rounded

Question 3: Provide calculations for estimating the amount of water applied to pre-irrigation. For these calculations you may consider variables including soil capacity, root depth of crops in infiltration area, and size of infiltration area that is / may be planted to crops.

Approximately 750 AFY, as seen in

Table 9. Details of this calculation can be found in Appendix B.

Table 9: Flood-MAR NSJWCD South System Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
NSJWCD_No4_SS_FM	800	750	50

Note: AFY = acre-feet per year; Losses are rounded

Question 4a: Identify crop type by acreage.

Table 10: NSJWCD South System FloodMAR Land Cover Type

Land Cover Type	Acres
Cropland	637
Deciduous Orchard	8,584
Dryland Grain Crops	148
Evergreen Orchard	292
Irrigated Grain Crops	261
Irrigated Hayfield	1,319
Irrigated Row and Field Crops	218
Pasture	669
Vineyard	12,579
Total	24,707

Question 4b: Spatial Data for Crops by Type will be uploaded with this Supplement at the bottom of the page.

Spatial Data for Crops by Type will be uploaded with this Supplement (See Figure 6).

2.1.2.2. Recharge Basins

Method: Recharge Basins

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The South System Pump Station located just north of the intersection of Locke Road and Brandt Road on the south bank of the Mokelumne River will be connected to the South System Pipeline (approximately 30,250 feet) and laterals (up 50,000 feet) from this pipeline will convey water for recharge areas. The South System will have a total capacity of approximately 60 CFS.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin. (surface area / depth / capacities)

The recharge basins will be able to provide groundwater recharge from December to June within the DD Window and from July to October within the RFS Window. The following are the specifics for this recharge area:

- Surface Area: 465 acres (split into smaller basins)
- Depth to Water: 100 – 150 feet
- Capacity: 32,600 AFY

The range of the depth to water can be attributed to historical groundwater pumping with larger depth to water on the eastern side of the area and smaller depth to water on the western side of the area. The following wells represent conditions in this area: #3 Bear Creek and 03N07E21L003M.

Question 3: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 32,600 AFY, as seen in Table 11. Details of this calculation can be found in Appendix A. The Recharge Basins for the South System were designed to maximize the available capacity after deliveries for Flood-MAR and In-Lieu.

Table 11: Recharge Capacity NSJWCD South System

Recharge Capacity NSJWCD South System					
		System Capacity	Flood-MAR	In-Lieu	Recharge Basins
	Days	(AF per month)	(AF per month)	(AF per month)	(AF per month)
Jan	31	3,996	184		3,811
Feb	28.25	3,641	173		3,565
Mar	31	3,996	92	74	3,830
Apr	30	3,867		552	3,314
May	31	3,996		1,449	2,517
Jun	30	3,867		1,878	2,043
Jul	31	3,996		2,040	1,955
Aug	31	3,996		1,884	2,112
Sep	30	3,867		1,429	2,436
Oct	31	3,996	92	688	3,215
Nov					
Dec	31	3,996	184		3,811
Yearly Total	336	43,400 AFY	800 AFY	10,000 AFY	32,600 AFY

Note: AF = acre-feet per; CFS = cubic foot per second; AFY = acre-feet per year; Yearly Totals are rounded

Accounting for estimated system losses, the estimated net recharge capacity would be approximately 30,500 AFY after losses, as seen in Table 12. Details of this calculation can be found in Appendix B.

Table 12: Recharge Basin NSJWCD South System Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
NSJWCD_No6_SS_RB	32,600	30,500	2,100

Note: AFY = acre-feet per year; Losses are rounded

2.1.3. Additional

In addition to the North and South System Projects, the district has the Existing PODs[4] Flood-MAR recharge areas and ASR Wells recharge areas. Both these recharge areas aim to utilize surface water when available for irrigation and groundwater recharge. The additional recharge areas for NSJWCD include:

1. Existing PODs Flood-MAR
2. ASR Well

Each of these recharge areas are described below.

2.1.3.1. Existing PODs Flood-MAR

Method: Flooding Farmland (e.g., On-Farm Recharge)

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

These PODs and the land they will be providing water to for Flood-MAR are located along the Mokelumne River. The recharge lands are on both the north and south sides of the Mokelumne River, east of the city of Lodi to the east district boundary.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

NSJWCD has done outreach to bring farmers on board for this recharge area. Lateral pipelines will be added from the existing PODs to the surrounding farmland (mostly vineyards). These farmers will then be able to flood their vineyards from December to February within the DD Window. This process will allow for a substantial amount of recharge in the area. These existing PODs can utilize up to 800 acres broken into smaller parcels; however, 500 acres was used as the planning assumption for the capacity calculations and this analysis. The following are the specifics for this recharge area:

- Surface Area for Recharge: 500 acres
- Depth to Water: 50 – 150 feet
- Capacity: 4,300 AFY

The range of the depth to water can be attributed to historical groundwater pumping with larger depth to water on the eastern side of the area and smaller depth to water on the western side of the area. The following wells represent conditions in this area: 04N07E20H003M, #3 Bear Creek, Lodi City Well #2, and 03N07E21L003M.

[4] Points of Diversion

Question 2b: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 4,300 AFY, as seen in Table 13. Detailed calculations can be found in Appendix A.

Table 13: Flood-MAR NSJWCD Existing PODs

Flood-MAR NSJWCD Existing PODs		
Total Diversions	8	PODs
Capacity per POD	3	CFS
Daily Capacity	47.62	AFD
Days	91.25	Days
Yearly Capacity	4,300	AFY

Note: PODs = Point of Diversions; CFS = cubic foot per second; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity are rounded The per-POD capacity for each of the eight diversions is estimated to range from 1 to 5 cfs. For planning purposes, a per-POD capacity of 3 cfs is assumed.

Question 3: Provide calculations for estimating the amount of water applied to pre-irrigation. For these calculations you may consider variables including soil capacity, root depth of crops in infiltration area, and size of infiltration area that is / may be planted to crops.

After accounting for estimated system losses, the estimated net recharge capacity would be approximately 4,050 AFY, as seen in Table 14. Detailed Calculations can be found in Appendix B.

Table 14: Flood-MAR NSJWCD Existing PODs Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
NSJWCD_No7_A_FM	4,300	4,050	250

Note: AFY = acre-feet per year

Question 4a: Identify crop type by acreage.

Table 15: NSJWCD Existing PODs FloodMAR Land Cover Type

Land Cover Type	Acres
Cropland	1,193
Deciduous Orchard	12,579
Dryland Grain Crops	477
Evergreen Orchard	325
Irrigated Grain Crops	3,096
Irrigated Hayfield	6,566
Irrigated Row and Field Crops	532
Pasture	4,848
Rice	1
Vineyard	35,554
Total	65,172

Question 4b: Spatial Data for Crops by Type will be uploaded with this Supplement at the bottom of the page.

Spatial Data for Crops by Type will be uploaded with this Supplement (See Figure 6).

2.1.3.2. ASR Wells

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

A new intertie would need to be added into the existing Mokelumne Aqueduct that would then convey water into a pipeline to feed up to 20 ASR wells. This pipeline can rely on residual pressure in the Mokelumne Aqueduct to pressurize the system.

Question 2: Identify type of well(s)

ASR Wells

Question 3: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

ASR Wells will be able to provide groundwater recharge from December to June within the DD Window and from July to October within the RFS Window. The following are the specifics for this recharge area:

- Depth to Water: 110 – 150 feet
- Capacity: 13,400 AFY

The following well represents conditions in this area: #3 Bear Creek, 03N07E21L003, and 02N07E03D001.

Question 4: Upload Copies of any Other Permitting or Approval from Other Agencies for the Wells

Applications for the proposed ASR wells have not yet been submitted to the permitting agencies.

Question 5: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 13,400 AFY, as seen in Table 16. Detailed calculations can be found in Appendix A.

Table 16: NSJWCD ASR Wells

NSJWCD ASR Wells		
Total ASR Wells	20	Wells
Capacity per Well	1	CFS
Daily Capacity	39.7	AFD
Days	336.25	Days
Yearly Capacity	13,400	AFY

Note: CFS = cubic foot per second; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Totals are rounded

2.2. Stockton East Water District

SEWD would divert MICUP water from new Mokelumne Aqueduct turnouts for conveyance to recharge facilities within the district. These recharge activities would be coordinated with EBMUD as the owner and operator of the Mokelumne Aqueduct. Recharge activities may include recharge basins, ASR wells, and dry wells. The project components may also include In-Lieu Recharge, which uses surface water in place of groundwater pumping to effectively retain water in the aquifer. In-Lieu Recharge is not considered a designated recharge area for this application. The SEWD recharge areas include:

1. Beckman ASR Well
2. West Linden Project
3. Mosher Creek at Tully Dam - Recharge Basin
4. East Mosher Creek Recharge Area at Messick Road

Each of these recharge areas are described below.

2.2.1. Beckman Property

2.2.1.1. Beckman ASR Well

Method: Methods Involving Wells

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The Beckman well is located next to the Mokelumne Aqueduct between Live Oak Road and Mosher Creek and between Highway 88 and Cherry Avenue on the Beckman Property. The Beckman ASR well will utilize water from the Mokelumne Aqueduct.

Question 2: Identify type of well(s).

ASR Well

Question 3: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

The Beckman ASR Well will provide groundwater recharge from December to June within the DD Window and from July to October within the RFS Window. The following are the specifics for this recharge area:

- Depth to Water: 110 feet
- Capacity: 500 AFY

The following wells represent conditions in this area: 02N07E03D001.

Question 4: Upload Copies of any Other Permitting or Approval from Other Agencies for the Wells

This is an existing well that will require refurbishing. The refurbishment process may require additional permits or approval.

Question 5: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 500 AFY, as seen in Table 17. Details of the calculations can be found in Appendix A.

Table 17: Beckman ASR Well SEWD

Beckman ASR Well SEWD		
Capacity	0.7	CFS
Daily Capacity	1.3	AFD
Days	336.25	Days
Yearly Capacity	500	AFY

Notes: CFS = cubic feet per second; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity is rounded

2.2.2. West Linden Project

The West Linden Project capacity was calculated using the capacity from the Water Supply Master Plan (GEI, 2025). This area can include in-lieu, Flood-MAR, and wells. Currently SEWD has expressed interest in constructing 142 dry wells and 4 ASR wells, which for planning purposes were assigned approximately 56 percent of the Yearly Capacity for the West Linden Project. Approximately 40 percent of the Yearly Capacity was allocated to In-Lieu Recharge and the other approximately 4 percent was allocated to Flood-MAR for planning purposes. Table 18 and Table 19 describe this allocation and be used as a reference for the information in the following Flood-MAR and Wells sections.

Table 18: West Linden Project

West Linden		
Capacity from WSEP Memo	65	CFS
Daily Capacity	128.7	AFD
Days	336.25	Days
Yearly Capacity	**43,200**	**AFY**

Notes: CFS = cubic feet per second; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Totals are rounded

Table 19: West Linden Project Recharge Components

West Linden Capacity Breakdown		
In-Lieu Capacity	17,300	AFY
Flood-MAR Capacity	1,800	AFY
Well Capacity	24,100	AFY
Yearly Capacity	**43,200**	**AFY**

Notes: AFY = acre-feet per year; Yearly Totals are rounded

2.2.2.1. Flood-MAR

Method: Flooding Farmland (e.g., On-Farm Recharge)

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The West Linden Project pipeline system would be an approximately 70,000 linear foot pipeline network with a maximum capacity of 65 CFS that would be supplied via a new intertie with the Mokelumne Aqueduct. There would also be lateral tie-ins to convey the water to the individual parcels of land. For planning purposes, it is assumed that Flood-MAR will be allocated approximately 4 percent of the West Linden Project's yearly capacity, which is approximately 10 CFS for 3 months.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

SEWD has done outreach to bring farmers on board for this recharge area. Lateral pipelines will be added from the West Linden Project pipeline system to the surrounding farmland. These farmers will then be able to flood their fields during the months of December to February within the DD Window. This process will allow for a substantial amount of recharge. The following are the specifics for this recharge area:

- Surface Area for Recharge: Up to 250 acres
- Depth to Water: 110 – 155 feet
- Capacity: 1,800 AFY

The following wells represent conditions in this area: 02N08E15M002 and 02N07E03D001.

Question 2b: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 1,800 AFY. Details of this calculation can be found in Appendix A. Table 18 and Table 19, above, show a brief overview.

Question 3: Provide calculations for estimating the amount of water applied to pre-irrigation. For these calculations you may consider variables including soil capacity, root depth of crops in infiltration area, and size of infiltration area that is / may be planted to crops.

Approximately 1,675 AFY after losses, as seen in Table 20. Details of this calculation can be found in Appendix B.

Table 20: West Linden Project Flood-MAR

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
SEWD_No10_WL_FM	1,800	1,675	125

Note: AFY = acre-feet per year; Losses are rounded

Question 4a: Identify crop type by acreage.

Table 21: SEWD West Linden FloodMAR Land Cover Type

Land Cover Type	Acres
Cropland	27
Deciduous Orchard	5,352
Irrigated Grain Crops	198
Irrigated Hayfield	43
Vineyard	8
Total	5,628

Question 4b: Spatial Data for Crops by Type will be uploaded with this Supplement at the bottom of the page.

Spatial Data for Crops by Type will be uploaded with this Supplement (See Figure 6).

2.2.2.2. Wells (Dry and ASR)

Method: Methods Involving Wells

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The West Linden Project pipeline system would be an approximately 70,000 linear foot pipeline network with a maximum capacity of 65 CFS that would be supplied via a new intertie with the Mokelumne Aqueduct. There would also be lateral tie-ins to convey the water to the individual parcels of land. For planning purposes, it is assumed that the Dry and ASR Wells will be allocated approximately 56 percent of the West Linden Project's yearly capacity. This will be proportionally assigned to the 142 dry wells and 4 ASR wells.

Question 2: Identify type of well(s)

Dry Well / ASR Well

Question 3: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

The Dry Wells will be able to provide groundwater recharge from December to June within the DD Window and from July to October within the RFS Window. The following are the specifics for this recharge area:

- Depth to Water: 110 – 155 feet
- Capacity: 24,100

The following wells represent conditions in this area: 02N08E15M002 and 02N07E03D001.

Question 4: Upload Copies of any Other Permitting or Approval from Other Agencies for the Wells

Applications for the proposed dry wells have not yet been submitted to the permitting agencies. Permits will not be applied for until the water right is secured.

Question 5: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 24,100 AFY. Details of this calculation can be found in Appendix A. Table 18 and Table 19, above, show a brief overview.

2.2.3. Mosher Creek

2.2.3.1. Mosher Creek at Tully Dam – Recharge Basin

Method: Recharge Basins

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

Mosher Creek at Tully Dam will include a 125-acre recharge basin and dry wells. For planning purposes, it assumed that the effective acreage of the recharge basin will be 85% of the total acreage or 104 acres. Water would be supplied via a new intertie with the Mokelumne Aqueduct into a pipeline running south along Jack Tone Road. Depending on the final configuration, the pipeline may branch east along Live Oak Road, or the water may be conveyed through the West Linden Project pipeline system (WLP) and a pipeline extended from the WLP to this recharge area. For planning purposes this is characterized as a recharge basin and the dry wells act as a feature to facilitate recharge.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin (surface area / depth / capacities).

The recharge basin will be able to provide groundwater recharge from December to June within the DD Window and from July to October within the RFS Window. The following are the specifics for this recharge area:

- Surface Area for Recharge: 104 acres
- Depth to Water: 110 feet
- Capacity: 35,700 AFY (in conjunction with the dry wells)

The following wells represent conditions in this area: 03N07E21L003 and 02N07E03D001.

Question 3: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 35,700 AFY (combined with dry wells), as seen in Table 22. Details of the calculations can be found in Appendix A. The dry wells function as a recharge facilitation method with the recharge basin rather than a standalone project component and are therefore not described separately.

Table 22: Mosher Creek at Tully Dam Recharge Basin

Mosher Creek at Tully Dam Recharge Basin		
Capacity from WSMP	54	CFS
Recharge Rate	1	FT/Day
Acres	104	Acres
Daily Capacity	104	AFD
Days	336.25	Days
Yearly Capacity	35,700	AFY

Notes: CFS = cubic feet per second; FT/Day = feet per day; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity is rounded

After accounting for estimated system losses, the estimated net recharge capacity would be approximately 35,200 AFY, as seen in Table 23. Details of the calculations can be found in Appendix B.

Table 23: Mosher Creek at Tully Dam Recharge Basin Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
SEWD_No13_MC_RBDW	35,700	35,200	500

Note: AFY = acre-feet per year; Losses are rounded

2.2.3.2. East Mosher Creek Recharge Area at Messick Road

Method: Recharge Basin

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

Proposed 80-acre recharge basin using the West Linden Project pipeline system to convey the water from the Mokelumne Aqueduct.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin. (surface area / depth / capacities)

The recharge basin will be able to provide groundwater recharge from December to June within the DD Window and from July to October within the RFS Window. The following are the specifics for this recharge area:

- Surface Area for Recharge: 80 acres
- Depth to Water: 110 feet
- Capacity: 30,900 AFY

The following wells represent conditions in this area: 03N07E21L003 and 02N07E03D001.

Question 3: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 30,900 AFY, as seen in Table 24. Details of the calculations can be found in Appendix A.

Table 24: East Mosher Creek at Messick Road Recharge Basin

East Mosher Creek at Messick Road Recharge Basin		
Capacity from WSMP	46	CFS
Recharge Rate	1	FT/Day
Acres	80	Acres
Daily Capacity	80	AFD
Days	336.25	Days
Yearly Capacity	30,900	AFY

Notes: CFS = cubic feet per second; FT/Day = feet per day; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity is rounded

After accounting for estimated system losses, the estimated net recharge capacity would be approximately 30,500 AFY, as seen in Table 25. Details of the calculations can be found in Appendix B.

Table 25: East Mosher Creek at Messick Road Recharge Basin Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
SEWD_No14_MC_RB	30,900	30,500	400

Note: AFY = acre-feet per year; Losses are rounded

2.3. City of Stockton

The City of Stockton (City) would divert MICUP water from the Mokelumne River using existing diversion facilities owned and operated by Woodbridge Irrigation District (WID). Water diverted from the Mokelumne River would be conveyed through existing canals and/or pipelines to the City for direct groundwater recharge at the proposed Delta Water Treatment Plant (DWTP) Groundwater Recharge Basins, at an additional recharge basin, and at multiple existing storm detention facilities. The DWTP is currently supplied by a diversion in the Sacramento-San Joaquin Delta. MICUP water may also be diverted at this location for recharge at the DWTP, subject to existing rules and restrictions. The City's recharge areas include:

1. Recharge Basins
2. Dry Wells
3. Storm Detention Facilities

Each of these recharge areas are described below.

2.3.1. Dedicated Surface Based Recharge

2.3.1.1. Recharge Basin

Method: Recharge Basin

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

Water will be diverted from the Mokelumne River into WID's canal system. Pipelines would then be used to convey the diverted water to nearby recharge basin within a ½-mile buffer of the canals south of Armstrong Road.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin. (surface area / depth / capacities)

The City is actively seeking opportunities to purchase or lease parcels to construct the recharge basin to provide groundwater recharge from December to June within the DD Window (accounting for 2 weeks of maintenance in February) and from July to Mid-October within the RFS Window. The following are the specifics for this recharge area:

- Surface Area: Up to 70 acres
- Depth to Water: 25 – 110 feet
- Capacity: 10,700 AFY

The following wells represent conditions in this area: Lodi City Well #2, 03N06E05N003, and 02N0703D001.

Question 3: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 10,700 AFY, as seen in Table 26. Details of the calculations can be found in Appendix A.

Table 26: Recharge Basins (not including DWTP)

Recharge Basins		
Recharge Rate	0.5	FT/Day
Potential Area	70	Acres
Daily Capacity	35	AFD
Days	306.25	Days
Yearly Capacity	10,700	AFY

Notes: FT/Day = feet per day; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity is rounded

After accounting for estimated system losses, the estimated net recharge capacity would be approximately 10,400 AFY, as seen in Table 27. Details of the calculations can be found in Appendix B.

Table 27: Recharge Basins Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
CoS_No15_DR_RB	10,700	10,400	300

Note: AFY = acre-feet per year; Losses are rounded

2.3.1.2. Storm Detention Facilities

Method: Recharge Basins

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

There are currently four existing storm detention facilities. These are used to hold storm water during wet months and can be used for recharge during drier months.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin. (surface area / depth / capacities)

The storm detention facilities would provide groundwater recharge from May to June within the DD Window and from July to Mid-October within the RFS Window. The following are the specifics for this recharge area:

- Surface Area for Recharge: 31 acres
- Depth to Water: 25 – 110 feet
- Capacity: 2,700 AFY

The following wells represent conditions in this area: Lodi City Well #2, 03N06E05N003, and 02N0703D001.

Question 3: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 2,700 AFY, as seen in Table 28. Details of this calculation can be found in Appendix A.

Table 28: Storm Detention Facilities

Storm Detention Facilities		
Recharge Rate	0.5	FT/Day
Potential Area	31	Acres
Daily Capacity	15.5	AFD
Days	169	Days
Yearly Capacity	2,700	AFY

Notes: FT/Day = feet per day; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity is rounded

After accounting for estimated system losses, the estimated net recharge capacity would be approximately 2,600 AFY, as seen in Table 29. Details of this calculation can be found in Appendix B.

Table 29: Storm Detention Facilities Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
CoS_No16_DR_SD	2,700	2,600	100

Note: AFY = acre-feet per year; Losses are rounded

2.3.2. Delta Water Treatment Plant

Method: Recharge Basins

Question 1: Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area (location / capacity).

The City of Stockton diverts water from the San Joaquin River within the Sacramento-San Joaquin Delta at an existing intake location near the confluence with Little Potato Slough. Existing raw water pipelines with a diversion capacity of 56 CFS extend from the Delta intake and run parallel to the Empire Tract levee to Eight Mile Road, where the pipelines turn east and parallel the north side of Eight Mile Road to Davis Road. The alignment then turns north and continues to the DWTP site. This site is located on the west side of North Lower Sacramento Road, just north of the City limits and approximately 3 miles east of Interstate 5 on a 126-acre parcel. The DWTP occupies approximately 56 acres along the western side of the parcel. For planning purposes this is characterized as a recharge basin and the dry wells act as a feature to facilitate recharge.

Question 2: Describe the physical works and operations used to infiltrate the water into the groundwater basin. (surface area / depth / capacities)

The recharge basin will be able to provide groundwater recharge from March to June within the DD Window and from July to September within the RFS Window. The following are the specifics for this recharge area:

- Surface Area for Recharge: 43.5 acres
- Depth to Water: 15 – 80 feet
- Capacity: 8,800 AFY (in conjunction with the dry wells)

The following well represents conditions in this area: Swenson-3 and 02N07E29B001.

Question 3: Provide estimations showing the amount requested in your application be reasonably transmitted into underground storage (calculations / models).

Approximately 8,800 AFY, as seen in Table 30. Details of these calculations can be found in Appendix A. The dry wells function as a recharge facilitation method with the recharge basins rather than as standalone project component and therefore are not described separately.

Table 30: Delta Water Treatment Plant

DWTP Recharge Basins with Dry Wells			
Monthly Capacities	January		
	February		
	March	1,844	AF
	April	1,844	AF
	May	1,844	AF
	June	1,725	AF
	July	430	AF
	August	799	AF
	September	357	AF
	October		
	November		
	December		
	Days	214	Days
	Potential Area	43.5	Acres
	Yearly Capacity	**8,800**	**AFY**

Notes: FT/Day = feet per day; AFD = acre-feet per day; AFY = acre-feet per year; Yearly Capacity is rounded

After accounting for estimated system losses, the estimated net recharge capacity would be approximately 8,600 AFY, as seen in Table 31. Details of this calculation can be found in Appendix B.

Table 31: DWTP Recharge Basins with Dry Wells Losses

	Inflow (AFY)	After Losses (AFY)	Losses (AFY)
CoS_No17_DWTP_RBDW	8,800	8,600	200

Note: AFY = acre-feet per year; Losses are rounded

2.4. Recharge Summary

Table 32: MICUP Recharge Summary Table

#	District	Recharge Area Name	Recharge Method	Recharge Capacity (AFY)	Evap Losses (AFY)	Root Zone Losses (AFY)	Total Losses (AFY)	Net Recharge (AFY)
1	NSJWCD	NSJWCD_No1_NS_FM	Flood-MAR	800	40	10	50	750
2	NSJWCD	NSJWCD_No2_NS_IL	In - Lieu	10,000*				
3	NSJWCD	NSJWCD_No3_NS_RB	Recharge Basin	32,600	2,400	-	-	30,200
4	NSJWCD	NSJWCD_No4_SS_FM	Flood-MAR	800	40	10	50	750
5	NSJWCD	NSJWCD_No5_SS_IL	In - Lieu	10,000*				
6	NSJWCD	NSJWCD_No6_SS_RB	Recharge Basin	32,600	2,100	-	2,100	30,500
7	NSJWCD	NSJWCD_No7_A_FM	Flood-MAR	4,300	180	70	250	4,050
8	NSJWCD	NSJWCD_No8_A_ASR	Wells (ASR)	13,400	-	-	-	13,400
9	SEWD	SEWD_No9_B_ASR	Wells (ASR)	500	-	-	-	500
10	SEWD	SEWD_No10_WL_FM	Flood-MAR	1,800	90	35	125	1,675
11	SEWD	SEWD_No11_WL_IL	In - Lieu	17,300	-	-	-	17,300
12	SEWD	SEWD_No12_WL_DW	Wells (Dry Wells)	24,100	-	-	-	24,100
13	SEWD	SEWD_No13_MC_RBDW	Recharge Basin	35,700	500	-	500	35,200
14	SEWD	SEWD_No14_MC_RB	Recharge Basin	30,900	400	-	400	30,500
15	CoS	CoS_No15_DR_RB	Recharge Basin	10,700	300	-	300	10,400
16	CoS	Cos_No16_DR_SD	Recharge Basin	2,700	100	-	100	2,600
17	CoS	CoS_No17_DWTP_RBDW	Recharge Basin	8,800	200	-	200	8,600
MICUP Totals				217,000	6,350	125	6,475	210,525

Note: Evap = Evaporation; Totals are rounded; *This water is from Permit 10477 and is not used in MICUP Capacity Totals

3. Section 14.4

3.1. North San Joaquin Water Conservation District

1) Information of Groundwater Basin NSJWCD North System (w/ CALFED): Flood-MAR, In-Lieu, & Recharge Basins

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,000 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	04N07E20H003M: 114.58 ft Lodi City Well #2: 50.94 ft	**Date of measurement of groundwater table depth**	04N07E20H003M: 10/14/2024 Lodi City Well #2: 3/16/23
Location of measurement depth of groundwater table (NAD 83) North:	04N07E20H003M: 38.18367 Lodi City Well #2: 38.13760	**Location of measurement depth of groundwater table (NAD 83) East:**	04N07E20H003M: -121.22616 Lodi City Well #2: -121.27400
Provide any historic maximum depth in the groundwater table in the area (feet)	04N07E20H003M: 119.5 ft Lodi City Well #2: 63 ft	**Date of measurement historic maximum depth of groundwater table**	04N07E20H003M: 9/8/2022 Lodi City Well #2: 11/15/2022
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	04N07E20H003M: 38.18367 Lodi City Well #2: 38.13760	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	04N07E20H003M: -121.22616 Lodi City Well #2: -121.27400
Provide any historic minimum depth in the groundwater table in the area (feet)	04N07E20H003M: 69.2 ft Lodi City Well #2: 21.36 ft	**Date of measurement historic minimum depth of groundwater table**	04N07E20H003M: 03/22/1984 Lodi City Well #2: 12/31/1942
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	04N07E20H003M: 38.18367 Lodi City Well #2: 38.13760	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	04N07E20H003M: -121.22616 Lodi City Well #2: -121.27400

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The Eastern San Joaquin Subbasin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the subbasin has significantly decreased. The water budget for the subbasin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)
The proposed changes in the use of the Eastern San Joaquin Subbasin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the basin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.
2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?
Yes
2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?
High – Critical Overdrafted Basin
2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?
Yes
2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?
Yes
2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?
Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin.
2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.
Yes- North San Joaquin Water Conservation District Groundwater Sustainability Agency

1) Information of Groundwater Basin NSJWCD South System: Flood-MAR, In-Lieu, & Recharge Basins

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,000 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	#3 Bear Creek: 151 ft 03N07E21L003M: 108.5 ft	**Date of measurement of groundwater table depth**	#3 Bear Creek: 4/17/2023 03N07E21L003M: 4/17/2023
Location of measurement depth of groundwater table (NAD 83) North:	#3 Bear Creek: 38.155200 03N07E21L003M: 38.090900	**Location of measurement depth of groundwater table (NAD 83) East:**	#3 Bear Creek: -121.138000 03N07E21L003M: -121.215000
Provide any historic maximum depth in the groundwater table in the area (feet)	#3 Bear Creek: 160 ft 03N07E21L003M: 118.5 ft	**Date of measurement historic maximum depth of groundwater table**	#3 Bear Creek: 10/12/2022 03N07E21L003M: 10/21/1991
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	#3 Bear Creek: 38.155200 03N07E21L003M: 38.090900	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	#3 Bear Creek: -121.138000 03N07E21L003M: -121.215000
Provide any historic minimum depth in the groundwater table in the area (feet)	#3 Bear Creek: 130 ft 03N07E21L003M: 76.5 ft	**Date of measurement historic minimum depth of groundwater table**	#3 Bear Creek: 4/1/2012 03N07E21L003M: 3/23/2000
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	#3 Bear Creek: 38.155200 03N07E21L003M: 38.090900	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	#3 Bear Creek: -121.138000 03N07E21L003M: -121.215000

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The East San Joaquin Sub-basin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the sub-basin has significantly decreased. The water budget for the sub-basin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)

The proposed changes in the use of the East San Joaquin Sub-basin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the basin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.

2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?

Yes

2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?
High – Critical Overdrafted Basin
2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?
Yes
2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?
Yes
2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?
Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin.
2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.
Yes- North San Joaquin Water Conservation District Groundwater Sustainability Agency

1) Information of Groundwater Basin NSJWCD ASR Wells

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,000 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	#3 Bear Creek: 151 ft 03N07E21L003: 108.50 ft 02N07E03D001: 107.50 ft	**Date of measurement of groundwater table depth**	#3 Bear Creek: 4/17/2023 03N07E21L003: 4/17/2023 02N07E03D001: 3/21/2024
Location of measurement depth of groundwater table (NAD 83) North:	#3 Bear Creek: 38.155200 03N07E21L003: 38.09090 02N07E03D001: 38.05780	**Location of measurement depth of groundwater table (NAD 83) East:**	#3 Bear Creek: -121.138000 03N07E21L003: -121.21530 02N07E03D001: -121.20170
Provide any historic maximum depth in the groundwater table in the area (feet)	#3 Bear Creek: 160.0 ft 03N07E21L003: 118.50 ft 02N07E03D001: 136 ft	**Date of measurement historic maximum depth of groundwater table**	#3 Bear Creek: 10/12/2022 03N07E21L003: 10/21/1991 02N07E03D001: 10/12/2016
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	#3 Bear Creek: 38.155200 03N07E21L003: 38.09090 02N07E03D001: 38.05780	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	#3 Bear Creek: -121.138000 03N07E21L003: -121.21530 02N07E03D001: -121.20170
Provide any historic minimum depth in the groundwater table in the area (feet)	#3 Bear Creek: 130 ft 03N07E21L003: 76.5 ft 02N07E03D001: 84 ft	**Date of measurement historic minimum depth of groundwater table**	#3 Bear Creek: 4/1/2021 03N07E21L003: 3/23/2000 02N07E03D001: 3/31/2022
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	#3 Bear Creek: 38.155200 03N07E21L003: 38.09090 02N07E03D001: 38.05780	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	#3 Bear Creek: -121.138000 03N07E21L003: -121.21530 02N07E03D001: -121.20170

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The Eastern San Joaquin Subbasin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the subbasin has significantly decreased. The water budget for the subbasin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)

The proposed changes in the use of the Eastern San Joaquin Subbasin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the subbasin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.

2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?
Yes
2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?
High – Critical Overdrafted Basin
2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?
Yes
2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?
Yes
2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?
Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin.
2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.
Yes- North San Joaquin Water Conservation District Groundwater Sustainability Agency

3.2. Stockton East Water District

1) Information of Groundwater Basin(s) SEWD - ASR Wells (including Beckman)

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,000 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	02N07E03D001: 107.50 ft	**Date of measurement of groundwater table depth**	02N07E03D001: 3/21/2024
Location of measurement depth of groundwater table (NAD 83) North:	02N07E03D001: 38.05780	**Location of measurement depth of groundwater table (NAD 83) East:**	02N07E03D001: -121.20170
Provide any historic maximum depth in the groundwater table in the area (feet)	02N07E03D001: 136 ft	**Date of measurement historic maximum depth of groundwater table**	02N07E03D001: 10/12/2016
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	02N07E03D001: 38.05780	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	02N07E03D001: -121.20170
Provide any historic minimum depth in the groundwater table in the area (feet)	02N07E03D001: 84 ft	**Date of measurement historic minimum depth of groundwater table**	02N07E03D001: 3/31/2022
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	02N07E03D001: 38.05780	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	02N07E03D001: -121.20170

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The Eastern San Joaquin Subbasin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the subbasin has significantly decreased. The water budget for the subbasin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)
The proposed changes in the use of the Eastern San Joaquin Subbasin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the basin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.
2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?
Yes
2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?
High – Critical Overdrafted Basin
2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?
Yes
2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?
Yes
2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?
Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin
2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.
Yes – Stockton East Water District Groundwater Sustainability Agency

1) Information of Groundwater Basin(s) SEWD - West Linden Project Flood-MAR & Wells

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,000 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	02N08E15M002: 154.60 ft 02N07E03D001: 107.50 ft	**Date of measurement of groundwater table depth**	02N08E15M002: 10/13/2016 02N07E03D001: 3/21/2024
Location of measurement depth of groundwater table (NAD 83) North:	02N08E15M002: 38.02060 02N07E03D001: 38.05780	**Location of measurement depth of groundwater table (NAD 83) East:**	02N08E15M002: -121.09430 02N07E03D001: -121.20170
Provide any historic maximum depth in the groundwater table in the area (feet)	02N08E15M002: 166.60 ft 02N07E03D001: 136 ft	**Date of measurement historic maximum depth of groundwater table**	02N08E15M002: 10/17/2000 02N07E03D001: 10/12/2016
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	02N08E15M002: 38.02060 02N07E03D001: 38.05780	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	02N08E15M002: -121.09430 02N07E03D001: -121.20170
Provide any historic minimum depth in the groundwater table in the area (feet)	02N08E15M002: 48.70 ft 02N07E03D001: 84 ft	**Date of measurement historic minimum depth of groundwater table**	02N08E15M002: 03/28/1957 02N07E03D001: 3/31/2022
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	02N08E15M002: 38.02060 02N07E03D001: 38.05780	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	02N08E15M002: -121.09430 02N07E03D001: -121.20170

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The East San Joaquin Sub-basin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the sub-basin has significantly decreased. The water budget for the sub-basin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)

The proposed changes in the use of the East San Joaquin Sub-basin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the basin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.

2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?
Yes
2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?
High – Critical Overdrafted Basin
2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?
Yes
2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?
Yes
2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?
Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin
2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.
Yes – Stockton East Water District Groundwater Sustainability Agency

1) Information of Groundwater Basin(s) SEWD - Mosher Creek

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,000 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	03N07E21L003: 108.5 ft 02N07E03D001: 107.50 ft	**Date of measurement of groundwater table depth**	03N07E21L003: 4/17/2023 02N07E03D001: 3/21/2024
Location of measurement depth of groundwater table (NAD 83) North:	03N07E21L003: 38.090900 02N07E03D001: 38.05780	**Location of measurement depth of groundwater table (NAD 83) East:**	03N07E21L003: -121.215000 02N07E03D001: -121.20170
Provide any historic maximum depth in the groundwater table in the area (feet)	03N07E21L003: 118.50 ft 02N07E03D001: 136 ft	**Date of measurement historic maximum depth of groundwater table**	03N07E21L003: 10/21/91 02N07E03D001: 10/12/2016
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	03N07E21L003: 38.090900 02N07E03D001: 38.05780	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	03N07E21L003: -121.215000 02N07E03D001: -121.20170
Provide any historic minimum depth in the groundwater table in the area (feet)	03N07E21L003: 76.5 ft 02N07E03D001: 84 ft	**Date of measurement historic minimum depth of groundwater table**	03N07E21L003: 3/23/2000 02N07E03D001: 3/31/2022
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	03N07E21L003: 38.090900 02N07E03D001: 38.05780	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	03N07E21L003: -121.215000 02N07E03D001: -121.20170

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The East San Joaquin Sub-basin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the sub-basin has significantly decreased. The water budget for the sub-basin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)
The proposed changes in the use of the East San Joaquin Sub-basin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the basin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.
2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?
Yes
2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?
High – Critical Overdrafted Basin
2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?
Yes
2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?
Yes
2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?
Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin
2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.
Yes – Stockton East Water District Groundwater Sustainability Agency

3.3. City of Stockton

1) Information of Groundwater Basin(s) – Proposed Recharge Basin + Existing Storm Retention Basins

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,00 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	Lodi City Well #2: 50 ft 03N06E05N003: 28 ft 02N0703D001: 107.5 ft	**Date of measurement of groundwater table depth**	Lodi City Well #2: 3/16/2023 03N06E05N003: 3/21/2024 02N0703D001: 3/21/2024
Location of measurement depth of groundwater table (NAD 83) North:	Lodi City Well #2: 38.1370 03N06E05N003: 38.13170 02N0703D001: 38.05780	**Location of measurement depth of groundwater table (NAD 83) East:**	Lodi City Well #2: -121.27400 03N06E05N003: -121.35240 02N0703D001: -121.20170
Provide any historic maximum depth in the groundwater table in the area (feet)	Lodi City Well #2: 63 ft 03N06E05N003: 97 ft 02N0703D001: 136 ft	**Date of measurement historic maximum depth of groundwater table**	Lodi City Well #2: 11/15/2022 03N06E05N003: 10/16/2000 02N0703D001: 10/12/2016
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	Lodi City Well #2: 38.1370 03N06E05N003: 38.13170 02N0703D001: 38.05780	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	Lodi City Well #2: -121.27400 03N06E05N003: -121.35240 02N0703D001: -121.20170
Provide any historic minimum depth in the groundwater table in the area (feet)	Lodi City Well #2: 21.36 ft 03N06E05N003: 23.5 ft 02N0703D001: 84 ft	**Date of measurement historic minimum depth of groundwater table**	Lodi City Well #2: 12/31/1942 03N06E05N003: 3/6/1997 02N0703D001: 3/31/22
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	Lodi City Well #2: 38.1370 03N06E05N003: 38.13170 02N0703D001: 38.05780	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	Lodi City Well #2: -121.27400 03N06E05N003: -121.35240 02N0703D001: -121.20170

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The Eastern San Joaquin Subbasin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the subbasin has significantly decreased. The water budget for the subbasin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)

The proposed changes in the use of the Eastern San Joaquin Subbasin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the basin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.

2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?

Yes

2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?

High – Critical Overdrafted Basin

2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?

Yes

2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?

Yes

2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?

Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin

2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.

Yes- City of Stockton Groundwater Sustainability Agency

1) Information of Groundwater Basin(s) City of Stockton DWTP Recharge Basins

Attribute	Value	Attribute	Value
Name of Basin (s) / Sub-Basin (s)	Eastern San Joaquin (5-022.01)	**Estimated Storage Capacity of underground reservoir(s)**	42,400,000 AF
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)	Swenson-3: 14 ft 02N07E29B001: 90.8 ft	**Date of measurement of groundwater table depth**	Swenson-3: 3/4/2024 02N07E29B001: 10/25/2022
Location of measurement depth of groundwater table (NAD 83) North:	Swenson-3: 38.00670 02N07E29B001: 37.99760	**Location of measurement depth of groundwater table (NAD 83) East:**	Swenson-3: -121.34580 02N07E29B001: -121.23080
Provide any historic maximum depth in the groundwater table in the area (feet)	Swenson-3: 23.30 ft 02N07E29B001: 130.50 ft	**Date of measurement historic maximum depth of groundwater table**	Swenson-3: 10/21/2015 02N07E29B001: 4/2/1991
Location of measurement of historic maximum depth of groundwater table (NAD 83) North:	Swenson-3: 38.00670 02N07E29B001: 37.99760	**Location of measurement of historic maximum depth of groundwater table (NAD 83) East:**	Swenson-3: -121.34580 02N07E29B001: -121.23080
Provide any historic minimum depth in the groundwater table in the area (feet)	Swenson-3: 13.80 ft 02N07E29B001: 69.9 ft	**Date of measurement historic minimum depth of groundwater table**	Swenson-3: 4/17/2023 02N07E29B001: 3/28/2000
Location of measurement of historic minimum depth of groundwater table (NAD 83) North:	Swenson-3: 38.00670 02N07E29B001: 37.99760	**Location of measurement of historic minimum depth of groundwater table (NAD 83) East:**	Swenson-3: -121.34580 02N07E29B001: -121.23080

2a) Describe existing use of groundwater basin(s) or sub-basin(s)

The Eastern San Joaquin Subbasin is currently experiencing critical overdraft conditions, with the central portion showing the greatest decline in groundwater levels. Over time, the total volume of groundwater in storage within the subbasin has significantly decreased. The water budget for the subbasin includes various inflows such as deep percolation from precipitation, applied water for agricultural lands, applied water for outdoor use in urban areas and for industrial purposes, stream seepage, and other recharge sources including unlined canals, reservoir seepage, local tributaries, and managed aquifer recharge (MAR) areas. Additionally, subsurface inflow contributes to the groundwater system. The outflows consist of groundwater outflow to streams, groundwater pumping, and surface outflow.

2b) Describe any proposed change in use of groundwater basin (s) or sub-basins(s)

The proposed changes in the use of the East San Joaquin Sub-basin aim to address the critical overdraft conditions and improve groundwater sustainability. The recharge areas under the MICUP initiative will contribute to the inflow portion of the water budget for the basin. These recharge areas are designed to offset the higher outflow rates and potentially allow for an increase in groundwater storage over time. Specifically, the MICUP recharge areas will enhance groundwater recharge through various methods, including Flood-MAR recharge areas, which involve directing excess surface water into the aquifer during wet years for use during dry periods. Additionally, MICUP proposes increasing the use of surface water in lieu of groundwater pumping, using recharge basins, using ASR Wells, and utilizing stormwater reuse. By balancing the inflows and outflows, these efforts aim to stabilize groundwater levels, improve water quality, and ensure a reliable water supply for agricultural, urban, and industrial uses in the region.

2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118?

Yes
2d) Identify your groundwater basin or sub-basin prioritization as defined in Bulletin 118?
High – Critical Overdrafted Basin
2e) Does your basin have or is your basin required to have a Groundwater Sustainability Plan or Groundwater Sustainability Plan Alternative?
Yes
2f) Are you a groundwater sustainability agency or local agency defined by the Sustainability Groundwater Management Act?
Yes
2g) Is your application for a project that is identified in a groundwater sustainability plan? If, yes what is the role of your application in the sustainability plan?
Yes- the project will divert high flows during the DD and RFS recharge windows to recharge the groundwater subbasin
2h) Has a groundwater sustainability agency been established? If yes, please provide the groundwater sustainability agency below.
Yes – City of Stockton Groundwater Sustainability Agency

4. Section 14.5

4.1. Method for Water Diversions and Use

Describe the method for measuring and accounting of the water diversions and use. Include the following as applicable:

- **Method for measuring and accounting extraction of groundwater from the underlying aquifer for beneficial use.**
    - The MICUP is a groundwater recharge project. There is no additional recovery of the recharged groundwater beyond the existing current uses of groundwater in the Basin, and no additional lands are being brought into production as a result of this project.
    - The Updated Water Availability Analysis for Application 29835 (Dotan Consulting, 2025) provides information regarding the availability of water for diversions from the Mokelumne River sought by water right Application 29835, filed by the Mokelumne River Water and Power Authority (MRWPA) in 1990. This information along with the sizing of the recharge areas described previously in this document represent the surface water diversions associated with the MICUP. The timeseries of the diversion data for each of the MICUP recharge areas is included in the groundwater model to evaluate the impacts (benefits) to groundwater conditions in the Basin.
    - The Eastern San Joaquin Water Resources Model (ESJWRM) that was developed as part of the 2024 GSP Amendment will be used. This model was accepted by all 16 GSA member agencies and was updated with additional and new information during the 2024 GSP Amendment development. The modeling analyses that were performed and documented through the GSP were also reviewed and approved by DWR as part of the formal GSP review process.
    - The ESJWRM includes various water budgets including:
        - **Land and Water Use Budget**- reports the urban and agricultural water demands for urban and agricultural lands, and sources of supply (surface water diversions and groundwater extraction) to meet these demands by model subregions and subbasin in total.
        - **Groundwater Budget** – reports the inflows and outflows, including groundwater storage, groundwater pumping, deep percolation to groundwater, recharge, and stream-groundwater interactions.
        - **Stream Budget** – reports stream flows and stream-groundwater interactions by each stream reach.
    - ESJWRM water budgets presented in the GSP are consistent with DWR water budget definition and comply with the requirements outlined in the GSP regulations.
- **Method for accounting of change in groundwater storage (net change in the volume of groundwater stored within the underlying aquifer of the water budget zone).**
    - The ESJWRM calculates the change in groundwater storage based on all inflow and outflow components for each timestep (monthly) for each model subregion (reflecting city, water agency, county, and subbasin boundaries) and the subbasin in total.

- **Explain whether the method of accounting is covered by a Groundwater Sustainability Plan or judgment of the court dictating an accounting method.**
    - The ESJWRM that was applied by the 2024 GSP Amendment will be used consistent with the methodology of water budget accounting developed by the GSP. ESJWRM water budgets account for the total groundwater and surface water entering and leaving the subbasin, including the change in the volume of water stored, as applicable, consistent with DWR water budget definition.
- **If other parties will extract and use water, describe the method for accounting of water extracted for beneficial use by persons other than the Applicant. Upload copy of written agreement between applicant and other parties in which other parties consent to extraction and use of stored water requested in this application.**
    - There is no increase in groundwater extractions due to the MICUP project because it is a groundwater recharge project. The net change in groundwater extraction (beneficial use) will be calculated for each recharge area proponent based on the difference between the ESJWRM baseline condition simulation and the ESJWRM baseline condition plus the MICUP project.
    - There is no change in the groundwater extraction resulting from the MICUP project because it only has a groundwater recharge element. Reductions in groundwater extraction are anticipated with the MICUP project resulting from in-lieu recharge activities associated with the MICUP project. No other changes to historical groundwater extraction patterns which meet agricultural and municipal, and domestic water uses are anticipated.
    - The project participants are working on various agreements for future operations of the project. These will be finalized after the water right is acquired, because they are not needed if there is no water right.
    - The actual project operations (releases of water from EBMUD through Camanche Reservoir or the Mokelumne Aqueduct) after meeting EBMUD's operational requirements.

4.2. Method for Inflow and Outflow

- **If purpose(s) of use are extractive, how quickly you plan to extract and use of stored water?**

Provide the following:

1. **Method for accounting of inflow to the groundwater basin by water source type including infiltration of precipitation, runoff, or subsurface groundwater inflow.**
    a. The ESJWRM calculates the change in groundwater storage for each timestep (monthly) for each model subregion and the subbasin in total. The ESJWRM calculates groundwater inflows through the infiltration of precipitation, runoff, and subsurface groundwater inflow from adjacent subbasins as part of its groundwater budgets.
    b. The ESJWRM also keeps track of the amount of stream flow that contributes to groundwater (e.g., loosing streams) and recharge to the subbasin (e.g., injection wells), as applicable.

2. **Method for accounting of outflow from groundwater system by water use sector, including but not limited to groundwater discharge to surface water sources and subsurface groundwater outflow.**
    a. The ESJWRM calculates the groundwater discharges by water use sector, including groundwater flow into stream (e.g., gaining stream) and outflow to adjacent subbasins as part of its groundwater budgets.

4.3. Groundwater Banking

Are you contemplating groundwater banking operation using water diverted under this application? If yes, please explain.

There is no additional groundwater recovery component to the MICUP project. The MICUP project does not plan to bring additional lands into production. Recovery of the recharged water through the MICUP project will be through existing wells (and potentially some new wells proposed in the future) as part of groundwater management activities for uses within the groundwater subbasin.

ASR wells are primarily being used as recharge elements of this project. At some point in time these ASR wells may be used to recover recharge water in place of the existing agricultural wells as they reach the end of their service life.

Appendix A Capacity Calculations

Planning assumptions were used in the calculations of capacities for each recharge area in the four districts. The Excel files with the calculations will be attached to this document. Figure 3, Figure 4, and Figure 5: City of Stockton Capacity show the overview of the capacity calculations for the four districts.

A.1. NSJWCD

Figure 3: NSJWCD Capacity

Month & Capacity		IRRI-DEMAND				ON FARM RECHARGE			DIRECT RECHARGE CAPACITY						PODs	ASR Wells
			INPUT	WET YEAR	CALC	CALC	INPUT	CALC	INPUT	CALC		CALC	CALC	CALC	CALC	
MONTH	SYSTEMS CAPACITY (ACRE-FT/DAY)	IRRIGATION APPLIED (IN.)	DAYS PER MONTH		FLOW (ACRE-FT/DAY)	AREA (ACRES)	SUITABLE MONTHS	FLOW (ACRE-FT/DAY)	SUITABLE MONTHS	FLOW (ACRE-FT/DAY)	ACRES - RECHARGE	FLOW (ACRE-FT/DAY)	FLOW (ACRE-FT/DAY)	FLOW (ACRE-FT/DAY)	TOTAL NUMBER OF DIVERSIONS	Single 20 CFS
MONTH	North & South System Capacity (130 CFS)	NOT 4 PLOT	NOT 4 PLOT	NOT 4 PLOT	In-Lieu (20,000 AFY)	NOT 4 PLOT	NOT 4 PLOT	Flood-Mar - Direct Recahrge (1,500 AFY)	NOT 4 PLOT	MICUP Water - Direct Recharge (65,200 AFY)	NOT 4 PLOT	Excess of System Capacity - MICUP Avaialable Direct Recahrge (25,400 AFY)	Non MICUP - Direct Recharge (0 AFY)	Excess of System Capacity - Non-MICUP Avaialable Direct Recahrge (0 AFY)	Existing POD Project (4,300 AFY)	Mok Aq Injection Wells (13,400 AFY)
Jan	130.0		31.0	0		120.0	1.0	6.0	1.0	124.0	983.7				24.0	20.0
Feb	130.0		28.3	0		120.0	1.0	6.0	1.0	124.0	983.7				24.0	20.0
Mar	130.0	0.26	31.0	1	2.4	120.0	1.0	3.0	1.0	124.6	988.9					20.0
Apr	130.0	1.98	30.0	1	18.6	120.0			1.0	111.4	884.3	13.2				20.0
May	130.0	5.18	31.0	1	47.1	120.0			1.0	82.9	657.6	41.7				20.0
Jun	130.0	6.72	30.0	1	63.1	120.0			1.0	66.9	530.6	57.7				20.0
Jul	130.0	7.30	31.0	1	66.4	120.0			1.0	63.6	505.0	61.0				20.0
Aug	130.0	6.74	31.0	1	61.3	120.0			1.0	68.7	545.3	55.9				20.0
Sep	130.0	5.11	30.0	1	48.1	120.0			1.0	81.9	650.4	42.7				20.0
Oct	130.0	2.46	31.0	1	22.4	120.0	0.5	6.0	1.0	104.6	830.2	20.0				20.0
Nov	130.0			0		120.0			1.0			130.0				
Dec	130.0		31.0	0		120.0	1.0	6.0	1.0	124.0	983.7				24.0	20.0
TOTAL		35.74108527	335.25	8			4.5		12.0		8,543.5					
VOLUME (AFY)					20,000			1,500		65,200		25,400	-		4,300	13,400
Dec-June					7,900			1,200		45,700					4,300	8,500
July-Oct					12,100			300		19,500					0	4,900

Note: Capacity values inside table are in CFS; Total and Subtotal Volumes are in AFY; Totals are rounded

A.2. SEWD

Figure 4: SEWD Capacity

MONTH	FLOW (ACRE-FT/DAY)	IRRIGATION APPLIED (IN.)	DAYS PER MONTH	FLOW (ACRE-FT/DAY)	TOTAL RECHARGE	Total Recharge				
MONTH	Planning Capacity (90 CFS)	NOT 4 PLOT	NOT 4 PLOT	NOT FOR PLOT	NOT FOR PLOT	Maximum Daily Recharge - (328 AFD)	West Linden Pipeline - Direct Recharge (43,200 AFY)	Mosher Creek at Tully Mosher Dam - Direct Recharge (35,700 AFY)	Mosher Creek Recharge at Messick Road - Direct Recharge (30,900 AFY)	Beckman ASR Well - Direct Recharge (500 AFY)
Jan	90.0		31		165.5	165.4	65	53.6	46.4	0.7
Feb	90.0		28.25		165.5	165.4	65	53.6	46.4	0.7
Mar	90.0	0.3	31	2.4	165.5	165.4	65	53.6	46.4	0.7
Apr	90.0	2.0	30	18.6	165.5	165.4	65	53.6	46.4	0.7
May	90.0	5.2	31	47.1	165.5	165.4	65	53.6	46.4	0.7
Jun	90.0	6.7	30	63.1	165.5	165.4	65	53.6	46.4	0.7
Jul	90.0	7.3	31	66.4	165.5	165.4	65	53.6	46.4	0.7
Aug	90.0	6.7	31	61.3	165.5	165.4	65	53.6	46.4	0.7
Sep	90.0	5.1	30	48.1	165.5	165.4	65	53.6	46.4	0.7
Oct	90.0	2.5	31	22.4	165.5	165.4	65	53.6	46.4	0.7
Nov	90.0					165.4				
Dec	90.0		31		165.5	165.4	65	53.6	46.4	0.7
TOTAL		**35.7**	**335.25**							
Dec - Jun							27,400	22,600	19,600	300
Jul - Oct							15,800	13,100	11,300	200
VOLUME (AFY)				20,000			43,200	35,700	30,900	500

Note: Capacity values inside table are in CFS; Total and Subtotal Volumes are in AFY; Totals are rounded

A.3. City of Stockton

Figure 5: City of Stockton Capacity

MONTH	Days per month	Storm Drain Facilities (2,700 AFY)	Recharge Basins (10,700 AFY)	City of Stockton DWTP Deliveries (8,800 AFY)	MICUP Montly Totals
Jan	31		18		18
Feb	28.25		18		18
Mar	31		18	30	18
Apr	30		18	31	18
May	31	8	18	30	26
Jun	30	8	18	29	26
Jul	31	8	18	7	26
Aug	31	8	18	13	26
Sep	30	8	18	6	26
Oct	31	4	18		22
Nov					
Dec	31		18		18
Dec - Jun		1,000	7,000	7,300	15,200
Jul - Oct		1,700	3,700	1,500	7,000
Volume (AFY)	335.25	2,700	10,700	8,800	22,200
Total Potential MICUP Water Use (22,200 AFY)					

Note: Capacity values inside table are in CFS; Total and Subtotal Volumes are in AFY; Totals are rounded

Appendix B Water Applied (Losses)

Losses were calculated for each recharge area. The calculations considered inflow, outflow, evaporation, and the root zone (for Flood-MAR). It is assumed that outflow will be zero for all recharge project components. The 1.05 modifier was used as a factor to convert the evapotranspiration values into evaporation. The evapotranspiration values were taken from CIMIS using the Monthly Average Reference Evapotranspiration by ETo Zone (inches/month) for Area 12.

B.1. Losses due to Evaporation

Equation 1: Losses due to Evaporation

$$Recharge = Inflow - Outflow - 1.05 * ET_o$$

Table 33: Monthly Evaporation

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Total
ETo (in)	1.24	1.96	3.41	5.10	6.82	7.89	8.06	7.13	5.40	3.72	-	0.93	51.66
ETo (ft)	0.10	0.16	0.28	0.43	0.57	0.66	0.67	0.59	0.45	0.31	-	0.08	4.31
1.05*ETo (ft)	0.11	0.17	0.30	0.45	0.60	0.69	0.71	0.62	0.47	0.33	-	0.08	4.52

Table 34: Evaporation Losses

Recharge Area Name	Inflow	Outflow	Recharge Time Period	ETo	Area	ETo	Recharge
	I (AFY)	*O (AFY)*		*(ft/year)*	*Acres*	*(AFY)*	*R (AFY)*
NSJWCD_No3_NS_RB	32,600	0	Dec - Oct	4.52	530	2,400	30,200
NSJWCD_No6_SS_RB	32,600	0	Dec - Oct	4.52	465	2,100	30,500
SEWD_No13_MC_RBDW	35,700	0	Dec - Oct	4.52	106	500	35,200
SEWD_No14_MC_RB	30,900	0	Dec - Oct	4.52	92	400	30,500
CoS_No15_DR_RB	10,700	0	Dec - Oct (1/2 Feb / Oct)	4.27	70	300	10,400
Cos_No16_DR_SD	2,700	0	May - Oct (1/2 Oct)	3.25	31	100	2,600
CoS_No17_DWTP_RBDW	8,800	0	Mar - Sep	3.83	43.5	200	8,600

Notes: Evaporation was prorated for recharge areas that only use part of a month; AFY = acre-feet per year; ft/year = feet per year; Some acres above use planning assumptions for calculations; Numbers were rounded

B.2. Losses due to Evapotranspiration & Root Zone

Flood-MAR is assumed to experience two forms of losses. The first being due to evaporation and the second being due to the root zone. It is assumed that the field is at 75% of field capacity at the beginning of applying the Flood-MAR waters. This would cause the losses to be the 25% of volume needed to bring the field to capacity. We are assuming the root zone is approximately 4 feet deep.

Equation 2: Evaporation and Root Zone Losses

$$Recharge = Inflow - Outflow - 1.05 * ET_o - Root\ Losses$$

The inflow will be the amount of conveyed to the area AFY for Flood-MAR. The outflow will be assumed to be zero. The Evaporation is calculated using the same method as described in the previous section.

Table 35: Flood-MAR Evaporation Losses

Recharge Area Name	Inflow (AFY)	Outflow (AFY)	Time Period ET (in)	Time Period ET (ft)	Acres	ET_o (AF)	1.05*ET_o	Recharge before Root Losses
NSJWCD_No1_NS_FM	800	0	7.695	0.64	60	38.5	40.4	760
NSJWCD_No4_SS_FM	800	0	7.695	0.64	60	38.5	40.4	760
NSJWCD_No7_A_FM	4,300	0	4.13	0.34	500	172.1	180.7	4,120
SEWD_No10_WL_FM	1,800	0	4.13	0.34	250	86.0	90.3	1,710

Notes: AFY = acre-feet per year; ET(in) = Evapotranspiration; ET(ft) = Evapotranspiration; ET_o (AF) = Evapotranspiration, Recharge is rounded

The previous table describes losses from Evaporation. The following table will add in the losses from crops (root zone). The losses from the root zone are calculated using the following formula.

Equation 3: Root Zone Losses

$$Root\ Losses = FC - [PWP + 0.75 * (FC - PWP)]$$

This formula assumes that the soil is at about 75% of available water between Field Capacity and Permanent Wilting Point when Flood-MAR starts. So, if we find the difference between the permanent wilting point and the field capacity and then take 75% of result added to the Permanent Wilting Point, we can subtract that value from the Field Capacity to find the volume that would be lost.

To calculate the field capacity and permanent wilting point we need the water content in-volume basis for the soil. Assuming that the soil is Medium Loam, the Data from McDole et al., Evans (1980), Ratliff et al. (1983) and Keller (1986) states that Field Capacity would be 26% and Permanent Wilting Point would be 12%. The percentage represents the percentage of the volume in the area that would be water.

Table 36: Soil Characteristics

Soil	Field Capacity	Permanent Wilting Point	Available Water	75% of Available Water
Texture Class	***FC %***	***PWP %***	***AW %***	***75% of AW***
Medium Loam	26	12	15	11.25

Table 37: Flood-MAR Root Zone Losses

Recharge Area Name	Area (acres)	Depth of Root Zone (ft)	Volume (AF)	Volume Field Capacity (AF) – 26%	Volume Permanent Wilting Point (AF) – 12%	Soil Moisture Volume at 75% Available Water (AF)	Losses (AF)	Final Recharge (ET and RL) (AF)
NSJWCD_No1_NS_FM	60	4	240	62	29	54	10	750
NSJWCD_No4_SS_FM	60	4	240	62	29	54	10	750
NSJWCD_No7_A_FM	500	4	2,000	520	240	450	70	4,050
SEWD_No10_WL_FM	250	4	1,000	260	120	225	35	1,675

Notes: Values are rounded

Appendix C Spatial Data for Crops

Table 38: MICUP FloodMAR Land Cover Type Summary

Land Cover Type	Acres
Cropland	1,220
Deciduous Orchard	17,931
Dryland Grain Crops	477
Evergreen Orchard	325
Irrigated Grain Crops	3,294
Irrigated Hayfield	6,609
Irrigated Row and Field Crops	532
Pasture	4,848
Rice	1
Vineyard	35,562
Total	70,800

Figure 6: MICUP Land Cover for FloodMAR

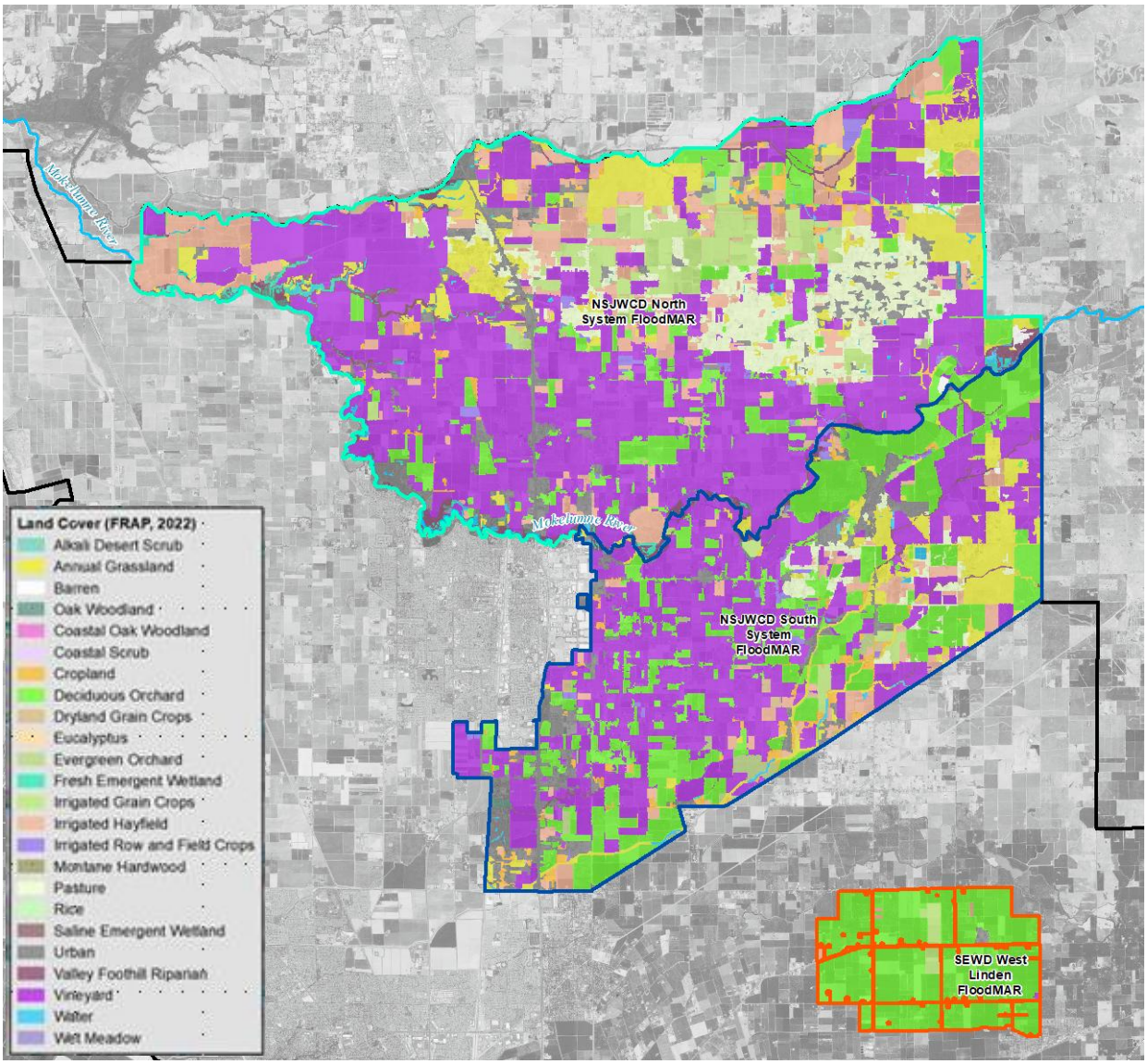


Figure 7: ESJ Subbasin Northern Area Land Cover

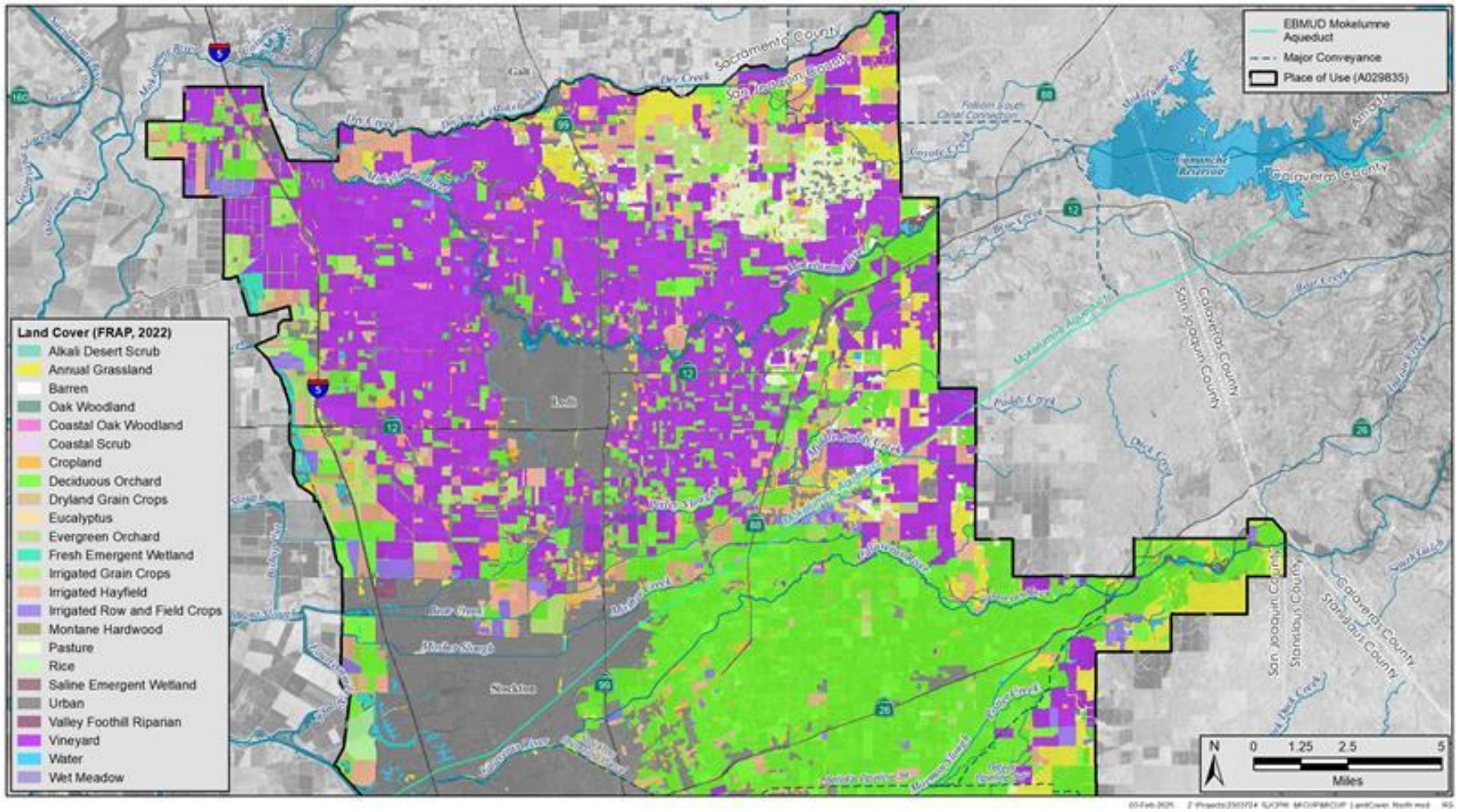
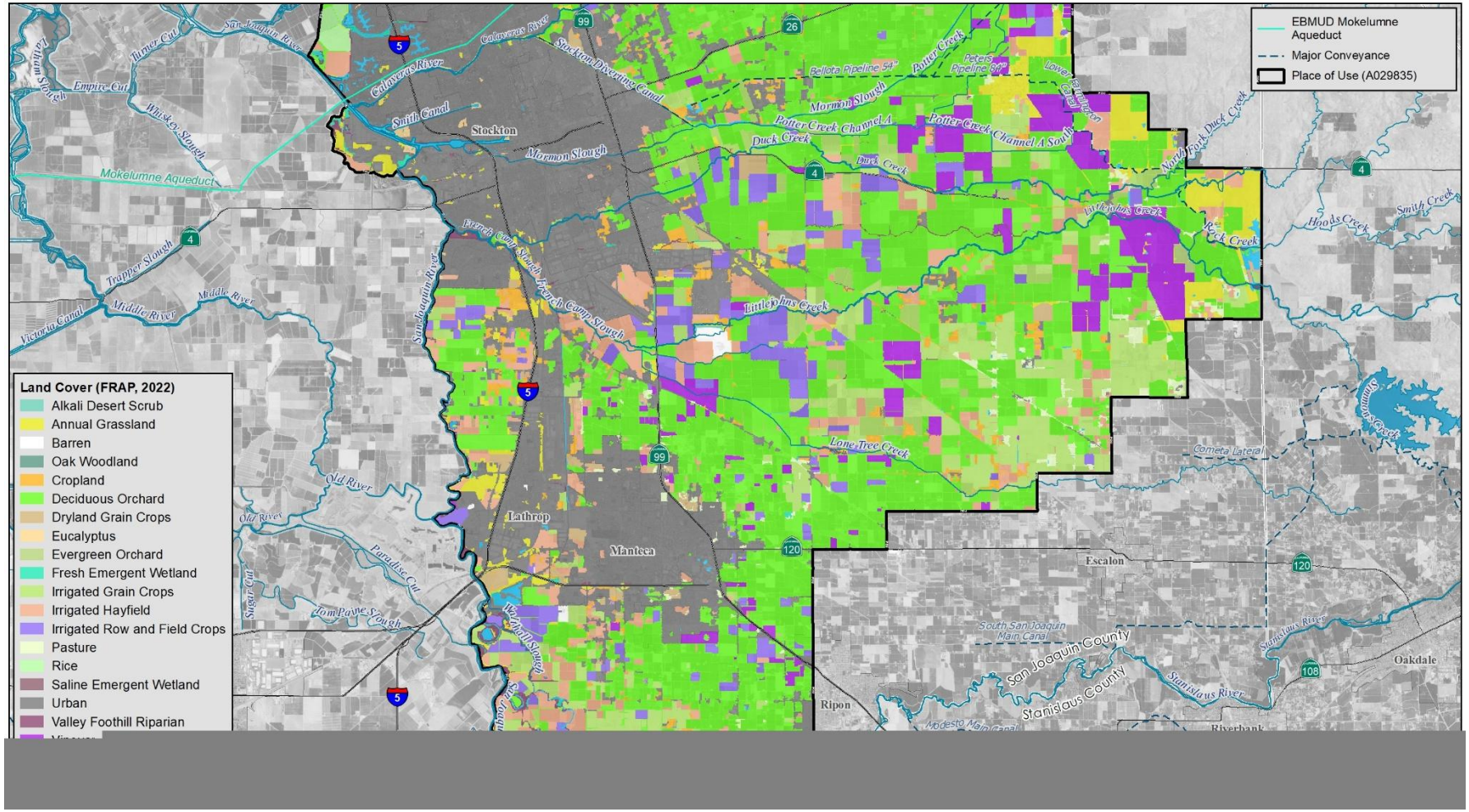


Figure 8: ESJ Subbasin Southern Area Land Cover



Appendix D Permitting

No permits have been obtained for new projects such as ASR wells, Dry Wells, or the Mokelumne River Turnout facilities. These components remain at a preliminary planning level, and no permit applications have been submitted to date. Development of these facilities would be contingent upon approval of the associated water rights actions; therefore, permits have not been pursued at this stage of project development.

SECTION 14.2: UNDERGROUND STORAGE SUPPLEMENT TO APPLICATION

Section 1: Owner Information

Section 2: Agent and Consultant

Section 3: Permit Type

Section 4: Map Requirements

Section 5: Project Description

Section 6: Purpose of Use

Section 7: Place of Use

Section 8: Point Locations

Section 9: Project Screening

Section 10: Point Details

Section 11: Additional Facilities

Section 12: Total Amount Requested

Section 13: Policy Exceptions

The purpose of this portion of the application is to collect information pertaining to your underground storage project ☑️ and to ensure your application submittal is complete. The underground storage supplement consists of three sections as follows:

Section 14.3 (Methods of Underground Storage and Associated Conveyance Infrastructure): In this section you will provide descriptions of the infrastructure used to convey water from your point of diversion to the location of groundwater recharge and the methods of groundwater recharge associated with your project.

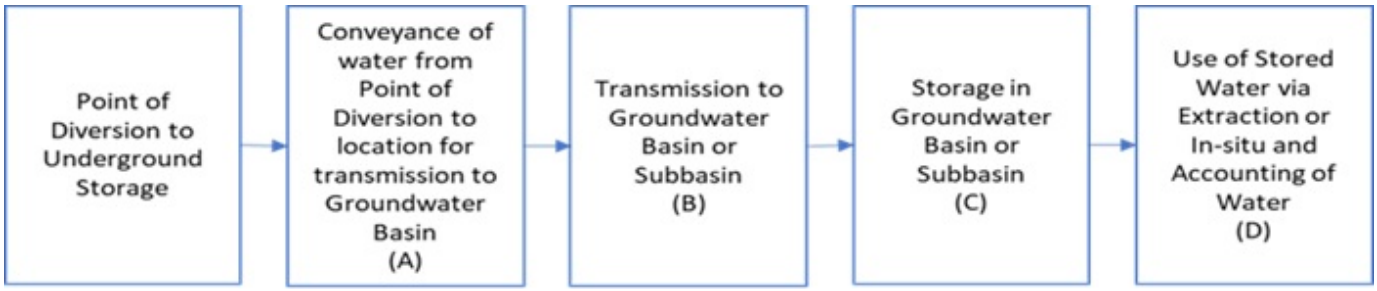
Section 14.4 (Information related to Groundwater Basins): In this section you will provide information related to the physical characteristics and status of your groundwater basin.

Section 14.5 (Water Budget Accounting Methodology): In this section you will provide a description of the accounting of water for tracking water diverted to underground storage and water extracted from underground storage for beneficial use.

Before you begin, please consider the details of your entire project including but not limited to method of diversion, amount, diversion rate, timing, quantity of water replenished by the project, purpose of use, and water budget accounting methodology. Prospective applicants are encouraged to consider methods to model the fate of water transmitted to underground storage in both the project planning and accounting development steps.

For selecting the purposes of use, don't forget to check out the Purposes of Use for Underground Storage Fact Sheet (https://www.waterboards.ca.gov/waterrights/water_issues/programs/applications/docs/purposes_of_use_fact_sheet_final.pdf). The fact sheet provides general information and guidance for choosing the uses applicable for your underground storage project. The fact sheet also provides a brief discussion on the six undesirable results pursuant to the Sustainable Groundwater Management Act.

The flowchart below represents the typical movement of water for underground storage projects. As you proceed through the underground storage supplement portion, some questions will have a notation at the end corresponding to the flowchart for reference. For example, letter (A) represents a question requesting information related to the conveyance of water.



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SECTION 14.3: METHODS OF GROUNDWATER RECHARGE AND ASSOCIATED INFRASTRUCTURE (A) (B)

Section 1: Owner Information

Section 2: Agent and Consultant

Section 3: Permit Type

Section 4: Map Requirements

Section 5: Project Description

Section 6: Purpose of Use

Section 7: Place of Use

Section 8: Point Locations

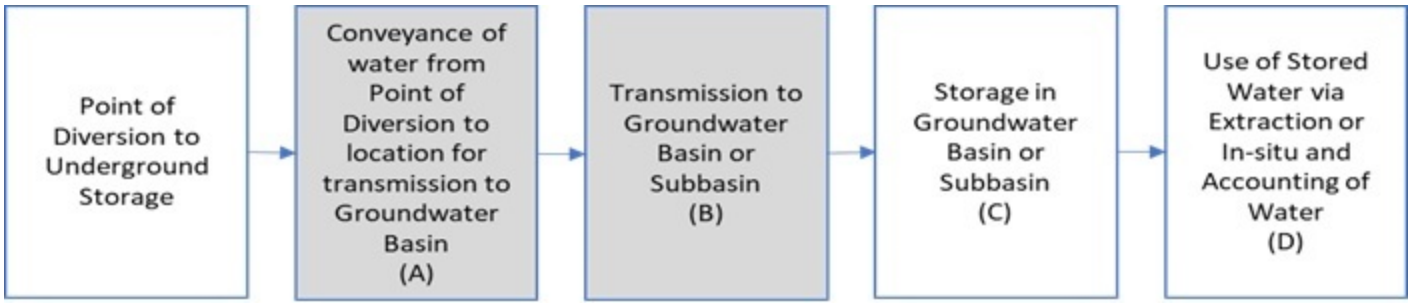
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Section 10: Point Details

Section 11: Additional Facilities

Section 12: Total Amount Requested

Section 13: Policy Exceptions



In this section, you will provide descriptions of the infrastructure used to convey water from your point of diversion to underground storage to the location of groundwater recharge and the methods of groundwater recharge associated with your project. Recharge of groundwater can be accomplished using a variety of methods. For the purposes of selecting method(s) of groundwater recharge, this section is grouped into four categories:

1. Flooding Agricultural Lands (i.e., on-farm groundwater recharge or flooding fallowed fields)
2. Recharge Basins (i.e., percolation pond)
3. Methods Involving Wells (including injection wells and dry wells)
4. Post-storage In-stream and Canal Replenishment

These methods are consistent with the methods identified in a report titled “Appendix D: Water Available for Replenishment - Methods of Replenishment Guidance" (https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Groundwater-Management/Data-and-Tools/Files/Statewide-Reports/WAFR/Final/Appendix-D-for-Water-Available-for-Replenishment---Final-Report.pdf) prepared by the Department of Water Resources.

You may select one or multiple methods of recharge, as applicable for your project. If a specific method of recharge for your project is not listed, please select “other method” and provide supporting information.

Flooding Lands

☑ Flooding Farmland (e.g. On-Farm Recharge)

If you plan to apply water to dormant crops or an area that will be planted with crops after infiltration of recharge water (e.g. pre-irrigation), please evaluate the potential for dormant or future crop water use and consider if incidental direct diversion for irrigation may occur. Incidental direct diversion for irrigation may be added to Section 6 (purpose of use) and also as a point type (direct diversion) in Section 8.

(1) Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area. This description should include information describing the location and capacity of the project headworks and conduits system and a description of any proposed or existing pretreatment facilities where applicable. (A)

(2) Describe the physical works and operations used to infiltrate the water into the groundwater basin. Description should include the surface area, depth, and capacities of the recharge area(s). (B)

(2b) Provide estimations showing the amount requested in your application can be reasonably transmitted into underground storage. These should include calculations or modeling results for estimating infiltration rates and potential losses (for example, via evaporation, via gradient to an adjacent aquifer, or return to a surface channel) and should take into account properties of the soil and the aquifer. Upload all documents at the bottom of the page. (B)

(3) Provide calculations for estimating the amount of water applied to pre-irrigation. For these calculations you may consider variables including soil storage capacity, root depth of crops in infiltration area, and size of infiltration area that is/may be planted to crops. Upload all documents at the bottom of the page. (A) or (B)

(4a) Identify crop types by acreage.

(4b) Upload spatial data for crops by type at the bottom of the page

☑ Flooding Undeveloped Lands

Note: future changes/development of undeveloped lands analyzed below may require changes to your application package or resulting water right. Applicants are encouraged to undertake careful consideration of future land use potential.

(1) Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area. This description should include information describing the location and capacity of the project headworks and conduits system and a description of any proposed or existing pretreatment facilities where applicable. (A)

(2) Describe the physical works and operations used to infiltrate the water into the groundwater basin. Description should include the surface area, depth, and capacities of the recharge area(s). (B)

(3) Provide estimations showing the amount requested in your application can be reasonably transmitted into underground storage. These should include calculations or modeling results for estimating infiltration rates and potential losses (for example, via evaporation, via gradient to an adjacent aquifer, or return to a surface channel) and should take into account properties of the soil and the aquifer. Upload all documents at the bottom of the page. (B)

Recharge Basins

7 ☑ Recharge Basins (Percolation Pond)

(1) Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area. This description should include information describing the location and capacity of the project headworks and conduits system and a description of any proposed or existing pretreatment facilities where applicable. (A)

(2) Describe the physical works and operations used to infiltrate the water into the groundwater basin. Description should include the surface area, depth, and capacities of the recharge area(s). (B)

(3) Provide estimations showing the amount requested in your application can be reasonably transmitted into underground storage. These should include calculations or modeling results for estimating infiltration rates and potential losses (for example, via evaporation, via gradient to an adjacent aquifer, or return to a surface channel) and should take into account properties of the soil and the aquifer. Upload all documents at the bottom of the page. (B)

Methods Involving Wells (Injection Wells, Aquifer Storage and Recovery, or Dry Wells)

☑ Methods Involving Wells (Injection Wells, Aquifer Storage and Recovery, or Dry Wells)

(1) Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the well(s). This description should include information describing the location and capacity of the project headworks and conduits system and a description of any proposed or existing pretreatment facilities where applicable. (A)

(2) Identify type of well(s) (e.g., Injection, Aquifer Storage and Recovery, or Dry well).

(3) Provide information on the physical works and operations used to transmit water into the groundwater basin including the number of wells, the location of wells, whether the wells are existing or unbuilt, the depth of well(s), screening interval information, and injection rates. Upload a copy of applicable well logs at the bottom of the page. (B)

(4) Upload copies of any other permitting or approval from other agencies for the wells associated with your project or documentation showing the status of any consultation activities you are engaged in as part of a permitting process. Upload all documents at the bottom of the page. (B)

(5) Provide estimations showing the amount requested in your application can be reasonably transmitted into underground storage. These should include calculations or modeling results for estimating infiltration rates and potential losses (for example, via evaporation, via gradient to an adjacent aquifer, or return to a surface channel) and should take into account properties of the soil and the aquifer. Upload all documents at the bottom of the page. (B)

Canal and Post Storage In-Stream Recharge

☑ Unlined Canals

(1) Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the infiltration location (e.g. stream or canal). This description should include information describing the location and capacity of the project headworks and conduits system and a description of any proposed or existing pretreatment facilities where applicable. (A)

(2) Describe any physical works and operations used to infiltrate the water into the groundwater basin. Include location and extent of canals. Upload all documents at the bottom of the page. (B)

(3) Provide estimations showing the amount requested in your application can be reasonably transmitted into underground storage. These should include calculations or modeling results for estimating infiltration rates and potential losses (for example, via evaporation, via gradient to an adjacent aquifer, or return to a surface channel) and should take into account properties of the soil and the aquifer. Upload all documents at the bottom of the page. (B)

☑ Stream Channel after Aboveground Storage

(1) Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the stream channel. This description should include information describing the location and capacity of the project headworks and conduits system and a description of any proposed or existing pretreatment facilities where applicable. (A)

(2) Describe any physical works and operations used to infiltrate the water into the groundwater basin. (B)

(3) Provide estimations showing the amount requested in your application can be reasonably transmitted into underground storage. These should include calculations or modeling results for estimating infiltration rates and potential losses (for example, via evaporation, via gradient to an adjacent aquifer, or return to a surface channel) and should take into account properties of the soil and the aquifer. Upload all documents at the bottom of the page. (B)

(4) Identify upstream and downstream limits of stream channel (NAD 83 Coordinates System). This will designate a upper and lower limit for rediversion to underground storage.

☑ Other

(1) Describe the physical works and operations used to convey the water from the point of diversion to underground storage to the above ground recharge area. This description should include information on the project headworks and conduits system and a description of any proposed or existing pretreatment facilities where applicable. (A)

(2) Describe the physical works and operations used to infiltrate the water into the groundwater basin. Description should include the surface area, depth, and capacities of the recharge area(s). (B)

(3) Provide estimations showing the amount requested in your application can be reasonably transmitted into underground storage. These should include calculations or modeling results for estimating infiltration rates and potential losses (for example, via evaporation, via gradient to an adjacent aquifer, or return to a surface channel) and should take into account properties of the soil and the aquifer. Upload all documents at the bottom of the page. (B)

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SECTION 14.4: INFORMATION RELATED TO GROUNDWATER BASIN (C)

Section 1: Owner Information

Section 2: Agent and Consultant

Section 3: Permit Type

Section 4: Map Requirements

Section 5: Project Description

Section 6: Purpose of Use

Section 7: Place of Use

Section 8: Point Locations

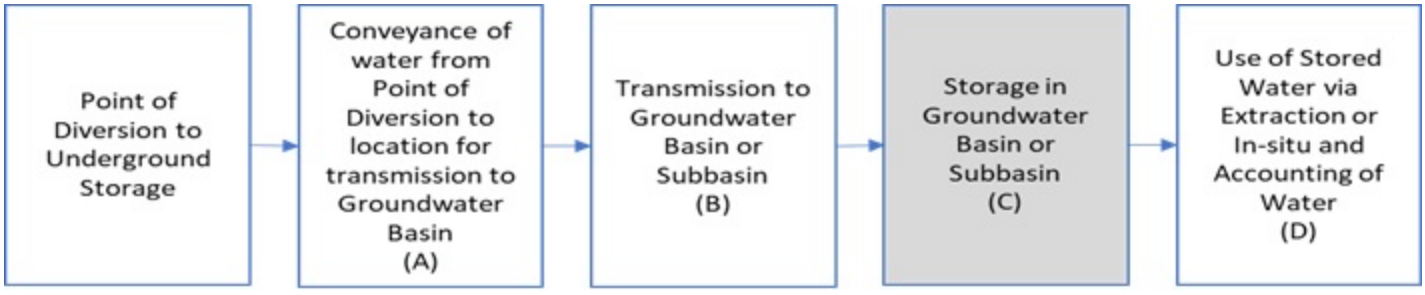
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In this section, you will be providing information related to your groundwater basin. Information may be found in groundwater sustainability plans (if available) or in the California Department of Water Resources Bulletin 118 (https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118). Prospective applicants are encouraged to consider methods to model the fate of water transmitted to underground storage in both the project planning and accounting development steps.

(1) Provide the requested information below.

INFORMATION OF GROUNDWATER BASIN(S)			
ATTRIBUTE	**VALUE**	**ATTRIBUTE**	**VALUE**
Name of Basin(s) / Sub-Basin(s)		Estimated Storage Capacity of underground reservoir(s) [groundwater basin(s) / sub-basin(s)] (acre-feet)	
State depth of groundwater table in spreading grounds or immediate vicinity below ground surface (feet)		Date of measurement groundwater table depth	
Location of measurement depth of groundwater table (NAD 83) North:		Location of measurement depth of groundwater table (NAD '83) East:	
Provide any historic maximum depth to the groundwater table in the area (feet)		Date of measurement historic maximum depth of the groundwater table	
Location of measurement historic maximum depth of groundwater table (NAD 83) North:		Location of measurement historic maximum depth of groundwater table (NAD '83) East:	
Provide any historic minimum depth to the groundwater table in the area (feet)		Date of measurement historic minimum depth of the groundwater table	
Location of measurement historic minimum depth of groundwater table (NAD 83) North:		Location of measurement historic minimum depth of groundwater table (NAD '83) East:	

(2) In the table above, you provided descriptive information for various parameters of your groundwater basin (including the name of your groundwater basin, capacity, and the depth of groundwater table, etc.,). Below you will provide additional information related to the uses and categorization of your groundwater basin. Information may be found in groundwater sustainability plans ⏬ (if available) or in the California Department of Water Resources Bulletin 118 (https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118). ⏬

(2a) Describe existing use of groundwater basin(s) or sub-basin(s).

(2b) Describe any proposed change in use of groundwater basin(s) or sub-basin(s).

(2c) Does your application propose diverting water to underground storage in a groundwater basin identified in Bulletin 118? If Yes, complete the remaining questions below. If No, move to next section.

◉ Yes ○ No

(2d) Identify your groundwater basin or sub basin prioritization as defined in Bulletin 118 (https://water.ca.gov/Programs/Groundwater-Management/Bulletin-118).

○ High ○ Medium ○ Low ○ Very Low

(2e) Does your basin have or is your basin required to have? (choose one)

○ Groundwater Sustainability Plan (complete remaining questions below)
○ Groundwater Sustainability Plan Alternative (complete remaining questions below)
○ Adjudication (move to the next section)
○ None (move to the next section)

(2f) Are you a groundwater sustainability agency or a local agency as defined by Sustainability Groundwater Management Act?

○ Yes | ◉ No

(2g) Is your application for a project that is identified in a groundwater sustainability plan?

○ Yes | ◉ No

If yes, what is the role of your application in the sustainability plan?

(2h) Has a groundwater sustainability agency been established?

○ Yes | ○ No

If yes, please provide the groundwater sustainability agency below.

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SECTION 14.5: DESCRIPTION OF WATER BUDGET (INCLUDING BENEFICIAL USE ACCOUNTING) (D)

Section 1: Owner Information

Section 2: Agent and Consultant

Section 3: Permit Type

Section 4: Map Requirements

Section 5: Project Description

Section 6: Purpose of Use

Section 7: Place of Use

Section 8: Point Locations

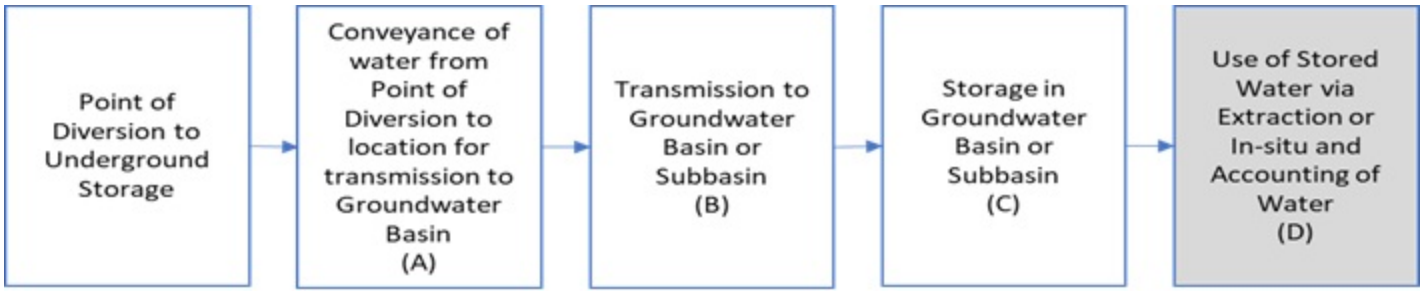
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Section 13: Policy Exceptions



The California Water Code, section 10721 defines a water budget as “an accounting of the total groundwater and surface water entering and leaving a basin including the changes in the amount of water stored.” The methodology used to prepare a water budget may consider the approach discussed in the Department of Water Resources – Water Budget Handbook or an accounting plan to be submitted to the State Water Resources Control Board and subject to the approval of the Deputy Director for Water Rights.

In this section you will describe your accounting for beneficial use. A water budget is important to help assure that water diverted to underground storage is used for the identified purpose(s) and to monitor injury to senior groundwater water rights or harm to environmental resources.

Describe the method for measuring and accounting of the water diversions and use. Include the following as applicable:

- Method for measuring and accounting extraction of groundwater from the underlying aquifer for beneficial use.
- Method for accounting of change in groundwater storage (net change in the volume of groundwater stored within the underlying aquifer of the water budget zone).
- Explain whether the method of accounting is covered by a Groundwater Sustainability Plan or judgment of the court dictating an accounting method.
- If other parties will extract and use water, describe the method for accounting of water extracted for beneficial use by persons other than the Applicant. Upload copy of written agreement between applicant and other parties in which other parties consent to extraction and use of stored water requested in this application.
- If purpose(s) of use are extractive, how quickly you plan to extract and use of stored water?
- Provide the following:
    1. Method for accounting of inflow to the groundwater basin by water source type including infiltration of precipitation, runoff, or subsurface groundwater inflow.
    2. Method for accounting of outflow from groundwater system by water use sector, including but not limited to groundwater discharge to surface water sources and subsurface groundwater outflow.
- Are you contemplating groundwater banking operation using water diverted under this application? If yes, please explain.

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UPDATED WATER AVAILABILITY ANALYSIS
for
APPLICATION 29835
of
MOKELUMNE RIVER WATER AND POWER AUTHORITY

March 30, 2026

Wagner & Bonsignore
Consulting Civil Engineers, A Corporation
2151 River Plaza Drive, Suite 100
Sacramento, CA 95833
Ph: (916) 441-6850

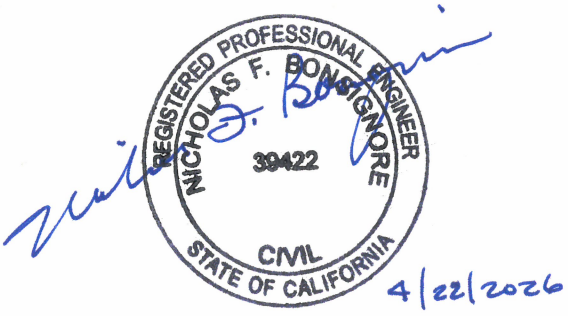


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UPDATED WATER AVAILABILITY ANALYSIS
for
WATER RIGHT APPLICATION 29835
of
MOKELUMNE RIVER WATER AND POWER AUTHORITY

1. INTRODUCTION

This report provides information regarding the availability of unappropriated water for diversions from the Mokelumne River sought by water right Application 29835, filed by the Mokelumne River Water and Power Authority (MRWPA) in 1990. The project to be supported by Application 29835 is the Mokelumne River Integrated Conjunctive Use Program (MICUP).[1] This analysis is an update to the Water Availability Analysis (WAA) submitted to the State Water Resources Control Board, Division of Water Rights (SWRCB) on June 13, 2011 (2011 WAA). The 2011 WAA was referenced in an Amended Application 29835 submitted to the SWRCB in 2014.[2, 3] This update to the 2011 WAA is necessitated by:

- Changes to the original Application.
- The availability of an additional 18 years of historical data to support updated modeling (the 2011 WAA ended with the year 2004).
- Regulatory and operational changes to the Mokelumne River system after 2004.

Solely for the purposes of this WAA, a two-step process was used to update the WAA. Step 1 and Step 2 are summarized below and discussed in greater detail later in this report.

- Step 1 employed the Mokelumne-Calaveras Rivers Simulation Model (MOCASIM) to determine water available for diversion based on East Bay Municipal Water District (EBMUD) operations including consideration of other existing rights held by Woodbridge Irrigation District (WID), North San Joaquin Water Conservation District (NSJWCD) and others, and instream flow requirements. In this report, the term "available for diversion" means water in excess of modeled demand by existing right holders and instream needs. Specific to WID, MOCASIM models WID demand based on WID's Permanent Regulated Base Supply (PRBS) as set forth in agreements with EBMUD, and does not account for additional water below Camanche Dam that may be available for WID to directly divert

[1] This project was historically called the Mokelumne River Regional Water Storage and Conjunctive Use Project, commonly referred to as the MORE Project.

[2] See Item 6a and Attachment 3 in the 2014 Amended Application.

[3] Letter from Neumiller and Beardsley Attorneys and Counselors to Ms. Kathy Mrowka, SWRCB, June 27, 2014.

pursuant to its rights. Thus, water determined to be "available for diversion" by MOCASIM includes some water available to WID in excess of the PRBS under WID's senior rights and which WID has diverted historically. To address this, modeling of water available for direct diversion by WID in excess of its PRBS is considered in Step 2 of the water availability analysis. **Section 6.7.1.2** of this report discusses modeling of WID rights in greater detail.

MOCASIM also makes certain assumptions with regard to how water rights held by NSJWCD are modeled in MOCASIM. **Section 6.7.1.1** of this report discusses modeling of NSJWCD rights in greater detail.

Details about the MOCASIM model are provided in **Section 6** of this report. Modeling cases are discussed in **Section 7**, and MOCASIM results are provided in **Section 8**.

- Step 2 of this WAA involved post-processing MOCASIM results to allocate water available for diversion to senior right-holders on the Mokelumne River (WID, EBMUD, and NSJWCD) and determine remaining water available for appropriation under A029835 for MICUP. Post-processing was accomplished using an Excel-based Water Availability Analysis Tool (WAAT).

- The WAAT assumes direct diversion of up to 10,000 acre-feet in the months of May and June (up to 20,000 acre-feet in total) by WID, above and beyond the PRBS allocated to WID in MOCASIM.

- The WAAT assumes diversion of up to 20 MGD by EBMUD under its existing rights to a groundwater banking project in NSJWCD. This diversion is not yet operational, but represents an existing concept described in the PDA[4] between NSJWCD, SEWD, San Joaquin County (County), and EBMUD related to pursuing a larger groundwater banking project. In reality, the EBMUD water that would be used for groundwater banking could come from EBMUD's direct diversion right or a rediversion from storage depending on the final project plans and party agreements. The 20 MGD diversion from the WAAT is a conservative assumption for modeling purposes only.

- Finally, any water remaining available for diversion after EBMUD's diversion for groundwater banking is considered to be water available for appropriation by MICUP, limited by the applied-for rate of diversion (620 cfs) and seasonal amount to underground storage (110,000 acre-feet) under A029835.

[4] The PDA refers to the 2014 Protest Dismissal Agreement between EBMUD, the County, NSJWCD and others, discussed in Section 4 below.

- The results of the WAAT analysis are presented in **Section 9**.

The MOCASIM model and WAAT postprocessor generated a significant amount of monthly tabular data for numerous input parameters and results for the 68-year study period considered. Some of these elements are presented in **Tables 2 through 10**, while others are provided in **Appendix D**.

2. ORIGINAL APPLICATION 29835

Application 29835 (A029835) was accepted by the SWRCB on October 4, 1990. A029835 was publicly noticed on September 27, 1996. A copy of the original application is provided in **Appendix A**. A029835 proposed the following:

- Diversions from Mokelumne River and from Duck Creek tributary to Calaveras River.
- Various points of diversion and/or rediversion on the Mokelumne River, Calaveras River, and Duck Creek.
- A proposed Middle Bar Dam and Reservoir located on the Mokelumne River above Pardee Reservoir (Alternative A), and a proposed Duck Creek Dam and Reservoir located on Duck Creek (Alternative B).
- A diversion season of December 1 to June 30 for the Mokelumne River and December 1 to April 30 for Duck Creek.
- Direct diversion of 620 cfs up to 110,000 acre-feet and diversion to storage of up to 434,000 acre-feet annually. A total amount of 544,000 acre-feet to be taken by direct diversion and storage during any one year. Conveyance capacity to Duck Creek Reservoir to be 620 cfs for Alternative A and 1,000 cfs for Alternative B.
- Use of water for municipal, industrial, irrigation and incidental hydroelectric power generation.

A029835 was protested by 16 entities. Most of the protests are unresolved.

3. 2014 AMENDED APPLICATION 29853 AND PROJECT DESCRIPTION

The Applicant submitted an Amended Application in 2014, which was not formally accepted by SWRCB staff and was not noticed. The most significant changes requested in the 2014 Amended Application were the replacement of the proposed 150,000-acre-foot Duck Creek

Dam and Reservoir with underground storage. Middle Bar Dam was also removed from A029835 prior to the 2014 Amendment.

4. 2014 PROTEST DISMISSAL AGREEMENT

The original A029835 was protested by EBMUD and others based on potential injury to its prior rights and public interest concerns. In 2000, EBMUD filed a Petition for Extension of Time of its Permit 10478 (A013156). San Joaquin County and NSJWCD protested EBMUD's Petition, as did several other regional water entities. EBMUD's protest of A029835 and protests of EBMUD's Petition were resolved in a Protest Dismissal Agreement (PDA) executed in late 2014.

The PDA includes provisions allowing San Joaquin County to store up to 48,000 acre-feet annually in EBMUD's Camanche or Pardee reservoirs, subject to EBMUD determining that storage is available. The PDA requires the release of any A029835 stored water from EBMUD's reservoirs by October 31 of each year and allows for the County to convey A029835 water through EBMUD's Mokelumne Aqueducts when there is unused capacity in the Aqueducts, as determined by EBMUD and subject to a (to be negotiated and executed) wheeling agreement.

The PDA also contemplates a groundwater banking project in the NSJWCD and/or Stockton East Water District (SEWD) services areas in the County utilizing EBMUD water under existing EBMUD water rights.

5. 2026 PETITION FOR CHANGE AND MOKELUMNE RIVER INTEGRATED CONJUNCTIVE USE PROGRAM (MICUP)

The Mokelumne River Integrated Conjunctive Use Program (MICUP) is a regionally coordinated effort to identify projects for putting the water available from a permit issued on A029835 to beneficial use in the Eastern San Joaquin Groundwater Subbasin. MICUP planning activities have been led by the County in partnership with other water agencies and municipalities in the County including NSJWCD, SEWD, the City of Stockton and others. The goals of the MICUP are:

- Develop a supplemental Mokelumne River water supply
- Use surface water and groundwater together to respond to drought and climate change impacts
- Improve groundwater levels in the Eastern San Joaquin Groundwater Subbasin

- Achieve integrated water supply and environmental benefits to the Lower Mokelumne watershed

Thus, the water available under A029835 is sometimes referred to as "MICUP Water" and the projects that will use this water are called MICUP project elements.

Water agencies considering implementation of projects under MICUP include NSJWCD, City of Stockton, and Stockton East Water District (SEWD). EBMUD and Cal Water are interested parties. MICUP project elements have been developed through engagement among these agencies and their consultants over the past several years, necessitating changes to the Application that are set forth in a Petition for Change that is being filed with the SWRCB. Because the 2014 Amended Application 29835 was never formally recognized by the SWRCB, the Petition for Change is based on changes relative to the original A029835 as publicly noticed.[5] A summary of changes to A029835 is provided below; reference is made to the Petition for details.

- The direct diversion rate of 620 cfs and seasonal direct diversion amount of 110,000 acre-feet proposed in the original application are maintained. The amount diverted to underground storage is constrained by the original application's limitation of 620 cfs by direct diversion, seasonally not to exceed 110,000 acre-feet.
- The original Application's total diversion amount of 544,000 acre-feet is reduced to 158,000 acre-feet. Of this amount, 110,000 acre-feet will be by combined direct diversion and diversion to underground storage, and 48,000 acre-feet will be by diversion to storage in EBMUD facilities (Camanche and/or Pardee reservoirs) pursuant to the PDA.
- As a practical matter, EBMUD is already diverting as much water as is physically and legally allowed to be stored in these facilities based on the facility sizes, downstream release requirements for senior water rights, fishery flow releases, flood control requirements, and other regulatory constraints. This existing condition of diversion to storage is within the scope of EBMUD's existing rights. Once the water is in storage by July 1, EBMUD assesses how much of the stored water it needs to meet its own needs and downstream obligations. If there is stored water in excess of EBMUD's needs and downstream obligations, some of that stored water is released for NSJWCD under Permit 10477 and consistent with the contract between NSJWCD and EBMUD. The operating agreement to be jointly developed by the County and EBMUD related to water storage under A029835 will be similar such that if there is stored water in excess of EBMUD needs, NSJWCD needs, and other downstream

[5] Personal communication with Amanda Montgomery, Permitting Section Environmental Program, Division of Water Rights, May 29, 2024.

obligations, then some of the water stored by July 1 may be released for rediversion under A029835 (subject to the terms of the EBMUD/County Operating Agreement). Consequently, the storage of up to 48,000 acre-feet in the EBMUD reservoirs for rediversion under A029835 will not result in a further draw on the water supply of the river during the December 1 through June 30 diversion season for this Application and is not further evaluated in this WAA.

- Duck Creek is removed as a source.
- Changes have been made to some of the Points of Diversion and Rediversion on the Mokelumne River as previously described in the original application:

- Point of Diversion at Duck Creek was eliminated.
- Points of Diversion and Rediversion within the Calaveras River system were eliminated.
- The original A029835 named various Points of Direct Diversion and Points of Rediversion along the Mokelumne River from Camanche Dam to the intersection of the River with Interstate Highway 5. The Petition identifies four Points named in other water rights held by NSJWCD or WID, and eight yet-to-be-identified Points within NSJWCD between Camanche Dam and Highway 99.
- The Petition adds a Point of Rediversion on Pixley Slough in NSJWCD. MICUP water diverted at NSJWCD's South System Pump Station would be conveyed through the South System and released into Pixley Slough. Such flows would be rediverted at the Pixley Pump Station located about 1.7 miles downstream of the point of release.
- The Petition adds a Point of Rediversion at the City of Stockton's Delta Pump Intake located on the San Joaquin River within the Legal Delta. The Delta Pump Intake is named in the City's water right Permit 21176 (A030531A). It is anticipated that the presence of Mokelumne River water at this location would be based on hydrodynamic analysis of in-Delta Channels.

6. MOKELUMNE-CALAVERAS RIVERS SIMULATION MODEL (MOCASIM)

6.1 MOCASIM Overview

MOCASIM is a hydrologic model of the Mokelumne River System that includes Pardee and Camanche reservoirs and accounts for rights, obligations, flood releases, instream flow requirements, historic hydrology, and future demands. The version of MOCASIM supporting the 2011 WAA was developed in 2007 by Mr. Avry Dotan of Dotan Consultants LLC. (formerly AD

Consultants). Mr. Dotan recently updated MOCASIM in consultation with regional stakeholders EBMUD, WID, NSJWCD, SEWD, Calaveras County Water District (CCWD), and Amador Water Agency (AWA). MOCASIM makes certain assumptions with regard to how water rights held by WID and NSJWCD are modeled; see **Section 6.7.1**.

The geographic scope of the water supply system encompassed by the model is shown in the **Exhibit 1** and consists of two primary components:

1. Mokelumne River System – Encompasses the Upper Mokelumne River, Pardee and Camanche Reservoirs, the Mokelumne Aqueducts which convey water from Pardee Reservoir to the EBMUD terminal reservoir area, the Lower Mokelumne River downstream of Camanche Reservoir, and the reach below Woodbridge Diversion Dam to the Interstate Highway 5. The division between the Upper Mokelumne and Lower Mokelumne elements in MOCASIM is the USGS gaging station #11319500 Mokelumne River Near Mokelumne Hill, CA (Mokelumne Hill gage), located immediately upstream of Pardee Reservoir at State Highway 49.
2. MICUP – Refers to proposed facilities in the Mokelumne River System that would a) directly divert water to the place of use for immediate beneficial uses, and b) divert water to underground storage for later extraction for beneficial uses.

A schematic representation of the MOCASIM model showing primary facilities and water demand elements is shown in **Exhibit 2**. Modeling elements shown in Exhibit 2 are discussed in more detail later herein.

MOCASIM operates on a monthly timestep. The simulation period selected for the updated MOCASIM is calendar years 1953 to 2021. 1953 was selected as the starting year because it is the first year for which complete records for storage conditions in the Upper Mokelumne River Basin are available. Storage conditions in PG&E's reservoirs within the Upper Mokelumne River Basin (Project 137), namely Salt Springs and Lower Bear River reservoirs, are important factors for the simulation as MOCASIM considers the available space in these two reservoirs when computing the required flood control space in the Pardee-Camanche reservoirs system per the U.S. Army Corps of Engineers flood control rules. Lower Bear River Reservoir, the more recently constructed of the two, was completed in 1952 and data for storage operations have been available since January 1953, thus defining the beginning year for the simulation period. The year 2021 is the last year for which complete hydrological data were compiled for the update to MOCASIM.

The 2011 WAA evaluated the period from 1953 to 2004. The results compared very well with the results of EBMUDSIM, a hydrologic/operational modeling tool developed by EBMUD.

Since then, EBMUD has developed an updated model called EBMUDSIM-RW. For this update Mr. Dotan conferred with EBMUD modeling staff on numerous occasions to compare inputs and results for the two updated modeling approaches.

Results of MOCASIM model runs are discussed below. All model runs were prepared by Dotan Consultants LLC under contract with San Joaquin County.

6.2 Modeling Period

For estimating water available pursuant to Application 29835, the MOCASIM model uses the recorded flow at USGS Gage #11319500 Mokelumne River Near Mokelumne Hill, CA (Mokelumne Hill gage), located immediately upstream of Pardee Reservoir (**Exhibit 1**), and data for calendar years 1953 to 2021. For this report, results are summarized and displayed on a water year (WY) basis for the 68-year period of WY 1954 to WY 2021. The suitability of using the WY 1954-2021 period as the basis for the analysis is discussed below.

A comparison between the long-term (i.e., 1929-2021) flow as measured at the Mokelumne Hill Gage and the MOCASIM simulation period (1954-2021) was completed to determine whether the model period is representative of long-term hydrologic conditions. Monthly and annual gaged flows for the Mokelumne Hill Gage are presented in **Table 1**. Information provided in Table 1 shows that the MOCASIM period is about 1.6% wetter than the long-term flow when considering the total runoff for the calendar year and about 0.4% wetter if considering the proposed diversion season of December 1 to June 30. The 68-year simulation period includes the severe drought periods of 1959-1962, 1976-1977, 1987-1992, 2012-2015, and 2020-2021, as well as several very wet water years. Therefore, the 68-year simulation period is representative of the long-term hydrologic conditions of supply and is suitable for estimating unimpaired Mokelumne River flow at Pardee Dam.

Certain parameters governing Mokelumne River operations are based on estimated Full Natural Flow (FNF) as reckoned at the Mokelumne Hill gage. FNF is the flow of the river in the absence of any man-made storage facilities or upstream diversions and is computed by the California Department of Water Resources (DWR) on a daily basis. Daily and monthly values of FNF are available on the CDEC database for station MKM (Mokelumne-Mokelumne Hill). Within MOCASIM, FNF is referred to as "True Natural Flow" (TNF). **Table 2** shows monthly values of TNF for the Mokelumne Hill gage over the 68-year modeling period. The average for this period is 744,600 acre-feet. The maximum year is approximately 1.9 million acre-feet (2017), and the minimum is 129,186 acre-feet (1977).

6.3 Modeling Cases

MOCASIM (Step 1 of the water availability analysis) considers two cases for modeling water demand by certain diverters:

- **Case 1:** 2050 Level of Demand (2050 LOD) – For this scenario the projected 2050 demand is used for the Amador and Calaveras county water suppliers and EBMUD. NSJWCD is modeled at the face value of its water right Permit 10477 (A012842) and WID is modeled at its Permanent Regulated Base Supply (PRBS). WID diversions in excess of its PRBS are considered in Step 2 of this water availability analysis utilizing the WAAT.

- **Case 2:** Full Water Right Entitlement (Max WR) – For this scenario the face value (maximum) water right entitlements are used for the Amador and Calaveras county water suppliers and EBMUD. NSJWCD and WID are modeled the same as Case 1.

The 2050 LOD and Max WR entitlements for these entities and others downstream of Camanche Dam are described in more detail in **Section 6.7.1** and summarized in **Figure 7-1** of this report.

6.4 Upper Watershed - Estimated Flow and Water Rights of Record

In MOCASIM, the Upper Mokelumne Watershed is defined as the portion of the Mokelumne River basin upstream of the Mokelumne Hill gage (**Exhibit 1**). The flow regime in this area is governed by the operation of Pacific Gas & Electric Company (PG&E) Project 137 and diversions by water supply entities within Amador and Calaveras counties.

6.4.1 PG&E System (Project 137)

PG&E's system consists of seven reservoirs having a combined capacity of about 220 thousand acre-feet (TAF), tunnels, stream diversions, canals, regulating reservoirs, and four powerhouses with a total capacity of about 194 megawatts (MW). The operation of the PG&E system is not explicitly simulated in MOCASIM. Instead, flow regulated by this system is implicit in the assumptions used by the model, in two ways:

1. MOCASIM uses flows at the Mokelumne Hill gage, downstream of PG&E's system, for computing inflow to Pardee Reservoir. The gaged flow at the Mokelumne Hill gage already reflects regulation by PG&E's upstream reservoirs in accordance with the Lodi Decrees.

2. MOCASIM uses the historic available space in PG&E's reservoirs to compute the portion of EBMUD flood control space that can be "transferred" to PG&E's system. This "transferable" amount temporarily reduces the flood control storage requirements in Pardee and Camanche, thus increasing allowable storage amounts in EBMUD's system.

6.4.2 Upper Watershed Diversions and Inflow to Pardee Reservoir

Water purveyors within Amador and Calaveras counties upstream of Pardee Reservoir hold prior rights to water, as follows:

- Prior rights in Amador County total 20,000 acre-feet for Amador Water Agency (formerly Amador County Water Agency) for the Amador Water System and Central Amador Water Project, and Jackson Valley Irrigation District;
- Prior rights in Calaveras County total 27,000 acre-feet for Calaveras Public Utility District and Calaveras County Water District (CCWD).

These annual entitlements, totaling 47,000 acre-feet combined, are based on reservations for use in the two counties set forth in the Department of Water Resources' (DWR) Release From Priority on State-filed Applications 5647 and 5648 in favor of EBMUD's Applications 13156 and 15201, dated March 5, 1959, and on agreements between EBMUD and Amador and Calaveras entities, and this value was used for modeling the Max WR Case. The reserved amounts greatly exceed the current level of diversions within both counties as well as the estimated 2050 level of demand. For modeling the 2050 LOD Case, a combined annual entitlement of 17,823 acre-feet was used, based projected demand of 11,456 acre-feet in Amador County and 6,367 acre-feet in Calaveras County. [6, 7]

To model the effects of diversions by the upstream water agencies, estimated historical diversions by the Amador and Calaveras agencies are added to the Mokelumne Hill gage data to create an input dataset of estimated historical PG&E-regulated inflow to Pardee. MOCASIM then deducts projected future diversions by the upstream entities from the estimated regulated flow to model monthly inflow to Pardee. Annual demand for the various agencies within each county is

[6] The estimated 2050 demand for Amador County is based on linear extrapolation of 2040 demand set forth in the Amador Water Agency's Water Master Plan Study dated January 2021 (7,606 acre-feet), plus Jackson Valley Irrigation District (JVID)'s maximum entitlement of 3,850 acre-feet under water right Permit 12167 (A005648B).

[7] The estimated 2050 demand for Calaveras County is based on interpolation of projected demand shown in Table 5 (page 31) of the DRAFT Calaveras County Mokelumne River Long-Term Water Needs Study, September 2017, ECORP (6,117 acre-feet under Calaveras Public Utility District), plus linear extrapolation of estimated 2040 demand for water diverted from Bear Creek by CCWD for the West Point system (250 acre-feet); personal communication with Brad Arnold, CCWD District Manager, December 2, 2022.

distributed monthly on a percentage basis as shown in **Figure 6-1**. Modeled monthly Amador and Calaveras diversions are subject to available flow.

Figure 6-1 *- Percent Distribution of Annual Diversion to Upstream Users*

MOCASIM - Upstream demand distribution (assumed the same for both Amador and Calaveras counties)

County	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Amador*	5.84%	5.55%	6.15%	6.84%	8.92%	10.41%	11.68%	11.99%	10.41%	8.61%	7.14%	6.46%	100.00%
Calaveras	5.84%	5.55%	6.15%	6.84%	8.92%	10.41%	11.68%	11.99%	10.41%	8.61%	7.14%	6.46%	100.00%

* Including JVID

The modeled monthly demand for the upper watershed is provided in **Appendix D – Table D1** for the 2050 LOD Case and provided in **Table D2** for the Max WR Case.

For the 2050 LOD Case, over the 68-year modeling period the combined maximum annual demand for the two counties is 17,823 acre-feet. Based on the percentages in Figure 6-1, over the 7-month diversion season proposed in A029835 the combined demand is 8,942 acre-feet.

For the Max WR Case, over the 68-year modeling period the full combined annual entitlement of 47,000 acre-feet is used for the demand. Based on the percentages in Figure 6-1, over the 7-month diversion season proposed in A029835 the combined demand is 23,580 acre-feet. Over the 68-year modeling period the entitled amounts during the 7-month season are available to the counties every year for both cases.

Modeled Mokelumne River inflow to Pardee Reservoir after the projected upstream diversions are deducted are provided in **Table 3A** for the 2050 LOD Case and **Table 3B** for the Max WR Case. After accounting for upstream diversions, average seasonal Mokelumne River inflow to Pardee (December to June) is estimated to be approximately 541,100 acre-feet for the 2050 LOD Case and approximately 526,500 acre-feet for the Max WR Case.

The Mokelumne River inflow to Pardee is augmented by local runoff and precipitation on Pardee Reservoir. **Table 4A** (2050 LOD Case) and **Table 4B** (Max WR Case) show the estimated total inflow to Pardee over the 7-month diversion season after accounting for diversions by Upper Watershed entities, and local runoff to and precipitation on Pardee Reservoir. The estimated average total inflow to Pardee during the 7-month season is approximately 546,100 acre-feet for the 2050 LOD Case, and approximately 531,400 acre-feet for the Max WR Case.

6.5 EBMUD Water System

EBMUD operates its facilities on the Mokelumne River, including Pardee and Camanche Reservoirs, as an integrated system to deliver municipal water supply benefits of up to 325 MGD from Pardee Reservoir to the EBMUD service area, while meeting all other operating goals, objectives, and requirements. These other operating goals, objectives, and requirements include bypassing/releasing water from Pardee and/or Camanche Reservoirs for downstream senior water rights users, meeting downstream fishery flow requirements, regulating streamflow, using best efforts to manage water temperatures to protect fishery/public trust interests, and meeting U.S. Army Corps of Engineers flood control requirements. Consistent with all other operating objectives and obligations, releases from the two reservoirs also are planned to provide hydropower benefits.

To accomplish this tandem operation, EBMUD operates Pardee and Camanche Reservoirs to fill by the end of spring, hydrology permitting, and strives to hold Pardee Reservoir elevation high throughout the summer while drawing down Camanche Reservoir. Operating in this manner improves reliability, allows EBMUD to deliver water through the Mokelumne Aqueducts under gravity flow (thereby minimizing energy consumption), and preserves a cold water pool in Pardee Reservoir for release to Camanche Reservoir during late summer/early fall to benefit the lower Mokelumne River anadromous fishery.

MOCASIM simulates the operation of the EBMUD system as follows:

6.5.1 Pardee Reservoir

Pardee Reservoir has a gross storage capacity of 203,795 acre-feet.[8] MOCASIM uses a maximum flood storage rule curve based on the prior reckoning of Pardee storage, 197,950 acre-feet.[9] Pardee Reservoir fills up and draws down to target storage levels using forecasting procedures that minimize reservoir spills. This mode of operation considers delivery of water to EBMUD customers via the Mokelumne Aqueducts and releases to Camanche Reservoir to supply Lower Mokelumne flow requirements.

6.5.2 Camanche Reservoir

Camanche Reservoir has a gross storage capacity of about 417 TAF. It provides releases

[8] Based on most recent bathymetric survey. (Personal communication from Ana Ulloa, EBMUD, October 18, 2024.)

[9] Personal communication from Avry Dotan, Dotan Consultants LLC, October 24, 2024.

to maintain flood control space in the system and to meet flow requirements for the Lower Mokelumne River, including water demands by downstream diverters, releases to offset channel depletion (loss), and fish flows.

6.5.3 EBMUD Water Rights

EBMUD holds water right License 11109 (A004228), which allows for diversion of water from the Mokelumne River at Pardee Dam, as follows:[10]

- Direct diversion of 310 cfs from January 1 to December 31 of each year;
- Diversion of 209,950 acre-feet to storage to be collected from October 1 of each year to July 15 of the succeeding year;
- The total amount of water to be taken from the source (direct diversion plus collection to storage) shall not exceed 316,250 acre-feet per year. The total amount of water to be placed to beneficial use (direct diversion plus withdrawal from storage) shall not exceed 224,037 acre-feet per year;
- Water may be used for municipal use within the boundaries of EBMUD and for recreation at Pardee Reservoir.

EBMUD also holds water right Permit 10478 (A013156), which allows for diversion of water from the Mokelumne River at Pardee Reservoir and Camanche Reservoir, as follows:

- Direct diversion of 194 cfs and collection to storage of 353,000 acre-feet from December 1 of each year to July 1 of the succeeding year;
- The total amount of water to be placed to beneficial use (direct diversion plus withdrawal from storage) shall not exceed 140,000 acre-feet per year;
- The allowed purposes of use are municipal and industrial within EBMUD's service area and other nearby lands as specified, recreation at the reservoirs, and fish and wildlife enhancement at the reservoirs and Mokelumne River Fish Hatchery.
- Special term: "In order for any water diverted at Pardee Reservoir into the Mokelumne Aqueducts in excess of the 310 cubic feet per second authorized under License 11109 (Application 4228) to be accounted for as withdrawal from storage under Permit 10478 (Application 13156), there must be an equivalent corresponding net depletion (drawdown in storage level) from the combined storage of Pardee and Camanche Reservoirs during the same diversion period. This net depletion calculation shall

[10] EBMUD also holds other appropriative rights and claims of rights for hydropower generation and other nonconsumptive uses. Because these rights and claims are nonconsumptive, they are not modeled in MOCASIM.

exclude the loss to surface evaporation."

- A term referring to a 1965 Agreement and 1983, 2003, and 2009 Supplementary Agreements with Woodbridge Irrigation District (WID) (hereinafter referred to as the EBMUD/WID Agreements), which provide the basis for the WID's "Permanent Regulated Base Supply" (PRBS) discussed later herein.[11]
- Terms requiring releases from Camanche Dam for instream resources per State Water Board Decision 1641 and a 1998 Joint Settlement Agreement (JSA) among EBMUD, California Department of Fish & Game (now Wildlife), and U.S. Fish & Wildlife Service; details about the JSA are discussed later herein.
- Terms regarding adaptive management, cold water temperature management, and additional flows below WID Dam, for the protection of fish.

SWRCB Order WR 2016-0019-EXEC granted an extension of time for Permit 10478 for complete application of the water to the authorized use to December 31, 2040.

6.5.4 Mokelumne Aqueduct Draft and Early Deficiency Rules

EBMUD demand is expressed in the model as average annual daily demand in units of million gallons per day (MGD) and percent distribution by month. EBMUD demand is delivered from Pardee Reservoir to terminal reservoirs in the Bay Area via the Mokelumne Aqueducts. The maximum capacity of the Mokelumne Aqueducts is assumed to equal 325 MGD (approximately 503 cfs) which is EBMUD's full allocation under its water rights. The terminal reservoirs in the Bay Area are represented in MOCASIM by a single reservoir called Terminal Reservoir Area (TRA) with a combined gross capacity of 151 TAF.[12] For the 2050 LOD Case, MOCASIM used EBMUD's estimated 2050 Planning Level of Demand of 218 MGD (about 244,200 acre-feet annually).[13] For the Max WR Case, MOCASIM used 275 MGD as reported by EBMUD to be its annual demand. At 275 MGD, EBMUD would divert up to its fully permitted allocation of 325 MGD when it is hydrologically available to meet its service area demand.[14]

The TRA has target storage levels which MOCASIM tries to maintain during the

[11] There is also a 1974 Supplementary Agreement between EBMUD and WID, which is not referenced in Permit 10478. (Personal communication from Andy Christensen, WID, September 5, 2024.) EBMUD indicates the 1983 Agreement expressly superseded the 1974 Agreement in full.

[12] MOCASIM operates the TRA based on a maximum target storage of 141 TAF. (Personal communication, Avry Dotan, Dotan Consultants LLC, October 24, 2024.)

[13] Table 3-1 in EBMUD Urban Water Management Plan 2020, June 2021.

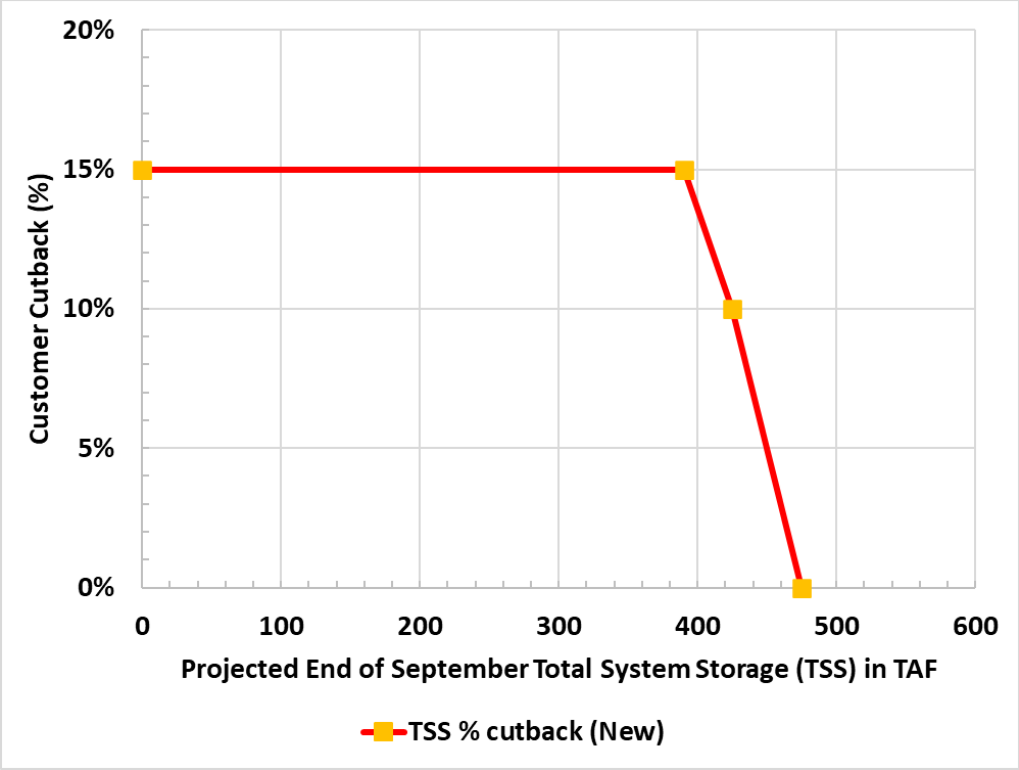
[14] Per Section 6.1 of EBMUD's 2013 Draft EIR for Permit 10478 Time Extension Project.

simulation. Water is withdrawn from the TRA only when there is a shortage in supply from the Mokelumne Aqueducts (Pardee Reservoir).

In dry years when shortages in supply occur, EBMUD imposes rationing on its customers called "Early Deficiency Rules". In MOCASIM these rules impose a cutback of deliveries to EBMUD whenever total system storage (TSS) at the end of September is projected to fall below 500 TAF. TSS is defined as the combined storage in Pardee, Camanche, and the TRA.

The Early Deficiency Rules result in a sliding scale of reduction to EBMUD demand, depending on projected end-of-September total system storage levels, as shown in **Figure 6-2**.

Figure 6-2 *– EBMUD Customer Demand Cutback per Early Deficiency Rules*



MOCASIM mimics hydrologic forecasting by employing an iterative process of decision making. Accordingly, the model operates the system first without cutback until the end of September. If system storage falls below 500 TAF, MOCASIM defines the percent cutback based on the Early Deficiency Rules, resets the simulation clock to January, and reoperates the system again imposing cutback on EBMUD demand. MOCASIM does not consider supplemental

supplies that EBMUD may have access to in times of shortage, such as the American River and groundwater in storage, which results in a conservative evaluation of water available for MICUP.

Another provision in MOCASIM is to assume that in the first year of a drought the computed cutback is reduced by 50%. The logic is that, in the first year of the drought, it could take up to six months before customers respond to the imposed conservation measures. This concept is also compatible with EBMUDSIM modeling assumptions.

6.5.5 EBMUD Modeled Demand

The modeled monthly demand for EBMUD is provided in **Appendix D – Table D3** for the 2050 LOD Case and provided in **Table D4** for the Max WR Case.

For the 2050 LOD Case, over the 68-year modeling period the maximum annual modeled demand is 244,817 acre-feet. For the 7-month diversion season proposed in A029835 the maximum demand is 131,819 acre-feet.

For the Max WR Case, over the 68-year modeling period the maximum annual demand is 308,829 acre-feet. For the 7-month diversion season proposed in A029835 the maximum demand is 166,285 acre-feet.

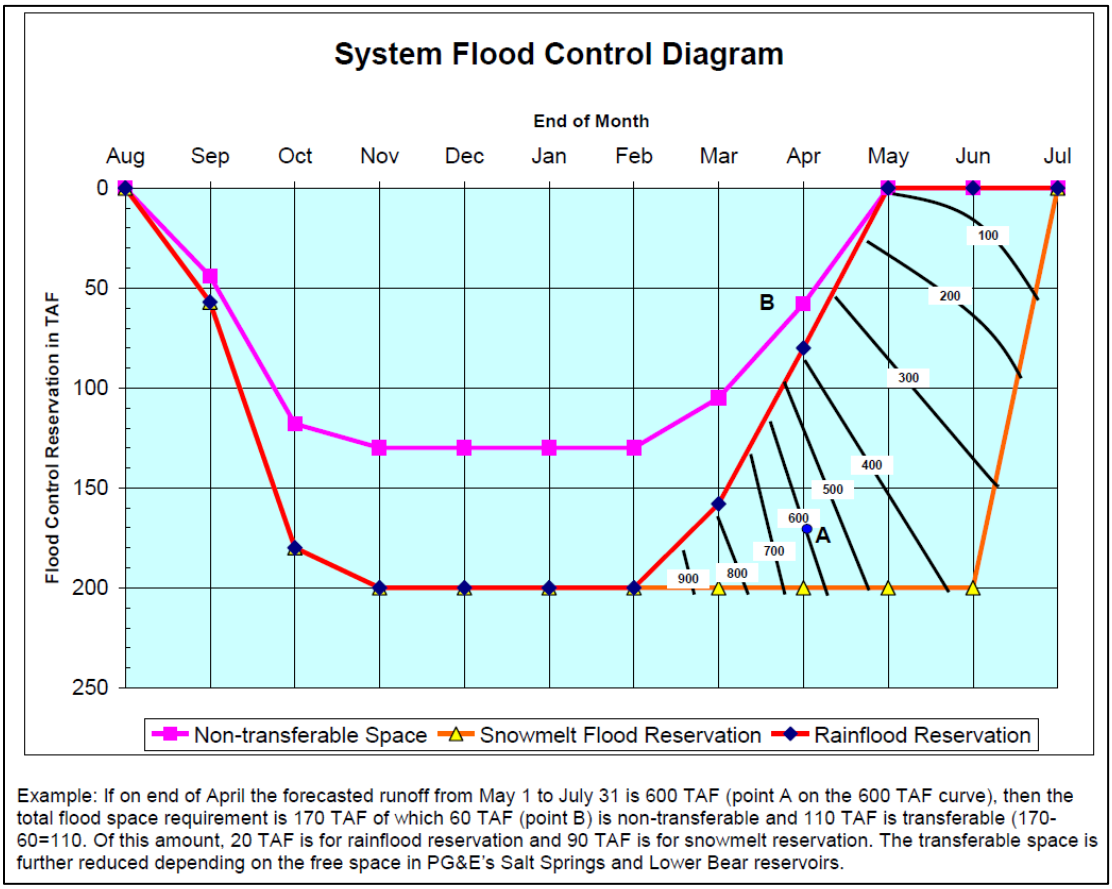
6.6 Flood Control Operations

Flood control operation is one of the most important factors in estimating the available water for MICUP. The flood control operation must be done in accordance with the U.S. Army Corps of Engineers (USACE) Flood Control Manual for the Mokelumne River Basin and can be summarized as follows:

- The system's flood control requirement is 200 TAF from November 15 to March 15.
- Up to 70 TAF is transferable to PG&E's Salt Springs and Lower Bear River reservoirs based on USACE guidelines (only a portion of the free space in PG&E's reservoirs can be used to offset flood space requirements in Pardee and Camanche reservoirs).
- Flood control space can be divided in any proportion between Pardee and Camanche reservoirs.
- After March 15, flood storage space requirements are based on rainfall and snowpack estimates.

The system flood control diagram is presented in **Figure 6-3**.

Figure 6-3 *– USACE Mandated Flood Control Reservation in the Combined Pardee and Camanche Reservoirs*



MOCASIM simulates the flood control operation rules with some approximation, subject to the model's time-step resolution.

6.7 Lower Watershed - Estimated Flow and Water Rights of Record

Input parameters for modeling the Lower Mokelumne River system consist of diversions by senior right holders, channel losses, and minimum flows for fish. Each of these elements is discussed below.

6.7.1 Senior Rights Below Camanche Dam

Estimated water demand by diverters downstream of Camanche Dam (which for MOCASIM purposes is the amount that EBMUD must release from Camanche for these diverters)

is included in MOCASIM and is comprised of demands for North San Joaquin Water Conservation District, Woodbridge Irrigation District, City of Lodi pursuant to the Lodi Decree, and other senior water right appropriators and riparian claimants.

Provided below are summaries of water rights held by each of these entities.

6.7.1.1 North San Joaquin Water Conservation District (NSJWCD)

NSJWCD holds a water right Permit 10477 (A012842), amended March 30, 2015, which allows diversion from the Mokelumne River at Camanche Dam and several locations on the River downstream of Camanche Dam, as follows:

- Direct diversion of up to 80 cfs, limited to no more than 40 cfs at any pumping facility, and 20,000 acre-feet by storage from December 1 of each year to July 1 of the succeeding year.
- Water may be directly diverted and rediverted at five locations downstream of Camanche Dam, including Woodbridge Irrigation District's diversion dam.
- The place of surface storage is Camanche Reservoir. Existing groundwater recharge locations are Tracy Lake, CalFed Project, Lakso On Farm Recharge, Reynolds On Farm Recharge, and Tecklenburg Recharge Basin, as well as Flood-Managed Aquifer Recharge field locations that vary from year to year along the NSJWCD North and South distribution systems.
- Diversion to underground storage is limited to a combined total of 17,000 are-feet at a maximum diversion rate of 10 cfs at each of the PODs below Camanche Dam. The combined rate of direct diversion and diversion to underground storage shall not exceed 80 cfs.
- The total amount of water to be taken from the source shall not exceed 20,000 acre-feet per water year from October 1 to September 30.
- Water may be used for irrigation, domestic, municipal, industrial, water quality, and fish and wildlife preservation and enhancement within NSJWCD's service area, and for recreational uses at Camanche Reservoir.

Agreements dated October 11, 1963 and May 27, 1969 between NSJWCD and EBMUD pertain to storage of a portion of NSJWCD's Permit 10477 water in Camanche Reservoir. Under the terms of the agreements EBMUD temporarily stores up to 20,000 acre-feet per annum in its Camanche Reservoir during the season December 1 to July 1, and releases that water for NSJWCD July 2 to November 5. If NSJWCD directly diverts water under

Permit 10477 prior to July 1 of a given year, then the amount that NSJWCD can store in Camanche under Permit 10477 is correspondingly reduced to stay within the 20,000 acre-foot per annum Permit 10477 maximum.

For modeling purposes only, MOCASIM assumes that NSJWCD does not directly divert under Permit 10477 between December 1 and July 1, and rather, that all Permit 10477 use is rediversion from storage. MOCASIM uses an iterative approach to determine when there is sufficient storage in Camanche Reservoir in the spring to allow releases for rediversion by NSJWCD during the May through October period, up to 20,000 acre-feet allowed under Permit 10477. **Tables D5 and D6** respectively show modeled amounts released to meet NSJWCD demand for the 2050 LOD Case and the Max WR Case for 68-year study period.

Under the 2014 PDA, NSJWCD may receive EBMUD-entitled water released from EBMUD's reservoirs as part of a groundwater banking program if the program proceeds through permitting and environmental review. This program involves NSJWCD's diversion of EBMUD water for direct or in-lieu recharge in the NSJWCD service area. In exchange, EBMUD receives a credit for a portion of the delivered water as banked groundwater in NSJWCD that can be extracted later and conveyed to the EBMUD service area for beneficial use. NSJWCD may use the balance of the delivered water to meet demands in NSJWCD. Because such PDA releases would be made under EBMUD's existing rights, for modeling purposes they are considered part of EBMUD's groundwater banking demand in the WAAT post processor, discussed later herein.

6.7.1.2 Woodbridge Irrigation District (WID)

WID diverts water from the Mokelumne River under two appropriative licenses and a pre-1914 claim of right, as follows:

- WID's Licenses 5945 and 8214 (A005807 and A010240, respectively) collectively allow for the direct diversion of up to 414.4 cfs. The season of diversion for A005807 (300 cfs) is February 1 to October 31. The season of diversion for A010240 (114.4 cfs) is May 1 to August 31 and November 1 to January 31. The places of use are within the boundaries of WID. WID also claims a pre-1914 right of up to 420 cfs under Statement of Water Diversion and Use 15557 (S015557). For modeling purposes, the pre-1914 right and two licenses are treated as overlapping and a maximum rate of 414.4 cfs was assumed for consistency with

the maximum combined diversion rate under WID's licenses.[15]

- The EBMUD/WID Agreements quantify EBMUD's obligation to make regulated releases of water downstream of Camanche to WID. These Agreements define WID's "Permanent Regulated Base Supply" (PRBS) as 60 thousand acre-feet (TAF) to be diverted from March 1 to October 31 of each year, with provision for reduction in dry years to 39 TAF based on inflow to Pardee Reservoir. WID's actual demand may exceed 60 TAF. When water in excess of the PRBS is available in the Mokelumne River for diversion WID may and has diverted quantities in excess of the PRBS pursuant to its licenses and pre-1914 claim of right.
- WID's Licenses 5945 and 8214 overlap WID's pre-1914 water right (S015557) of 414.4 cfs and water released by EBMUD under the 1965 agreement and the four supplemental agreements. Water surplus to EBMUD's needs that spills or that cannot be stored in EBMUD reservoirs and spills over Camanche Dam is first subject to WID's pre-1914 rights, License 5945, and License 8214 up to 414.4 cfs annually.
- Based on discussions with WID during development of this WAA and MICUP, and review of recent maximum WID diversions, this WAA assumes up to 10,000 acre-feet may be directly diverted by WID in each of May and June (20,000 acre-feet total), over and above the PRBS that is released for WID from Camanche, if water is available for direct diversion below Camanche. WID has historically also diverted some water in excess of PRBS after July 1 in years when EBMUD makes releases from Camanche in excess of required instream flows, NSJWCD Permit 10477 stored water, PRBS, and riparian rights requirements. This water availability analysis does not include analysis of water available for direct diversion outside of the diversion season proposed by A029835 (December 1 to June 30).

Tables D7 and D8 respectively show modeled amounts for WID's PRBS diversions for the 2050 LOD Case and the Max WR Case for 68-year study period.

6.7.1.3 City of Lodi

The Lodi Decree is a 1938 judicial decision related to prior litigation between the City of Lodi and EBMUD. Pursuant to the Lodi Decree, EBMUD must not interfere with the City of Lodi's right to pump 3,600 acre-feet annually from wells supplied by the Mokelumne River to serve

[15] The original Statement 15557 was filed by WID in 2003 and indicates a diversion rate of 420 cfs. The Statement also indicates that the average annual volume of water used includes water diverted pursuant to the licenses.

a specified historic place of use, as specified in the decree. MOCASIM conservatively allocates 3,600 acre-feet to the City of Lodi every year. In reality, however, EBMUD has never made a release of this water for the City of Lodi.

6.7.1.4 Other senior water right appropriators and riparian claimants

For other Lower Mokelumne right holders and claimants (senior riparian and appropriative rights), MOCASIM assumes the same diversion amounts that EBMUD used for its modeling studies, including recent evaluation of flows for a Voluntary Agreement for fishery flows (see **Section 6.7.4**). Per communication with EBMUD, when TNF is greater than 250 TAF during the October to June period, annual diversions by other water right holders and claimants is assumed to be 20,618 AF. If the TNF is less than or equal to 250 TAF during the October to June period, diversion amounts in July, August and September are reduced by a factor of 50-percent (based on assumed water conservation practices) and the annual amount is reduced to 16,068 acre-feet.[16]

Tables D9 and D10 respectively show modeled diversion by other senior right holders for the 2050 LOD Case and the Max WR Case for 68-year study period.

6.7.1.5 Distribution of Lower Watershed Diversions

The reach-by-reach distribution of diversions by other right holders and claimants between model nodes is shown schematically in **Figure 6-4**. MOCASIM uses the term "riparians" to characterize downstream senior right holders and claimants (other than NSJWCD and WID), regardless of the basis of the right or claim. The node identifiers in Figure 6-4 are defined as follows:

LM – Mokelumne River immediately below Camanche Dam

H99 - Mokelumne River at US Highway 99

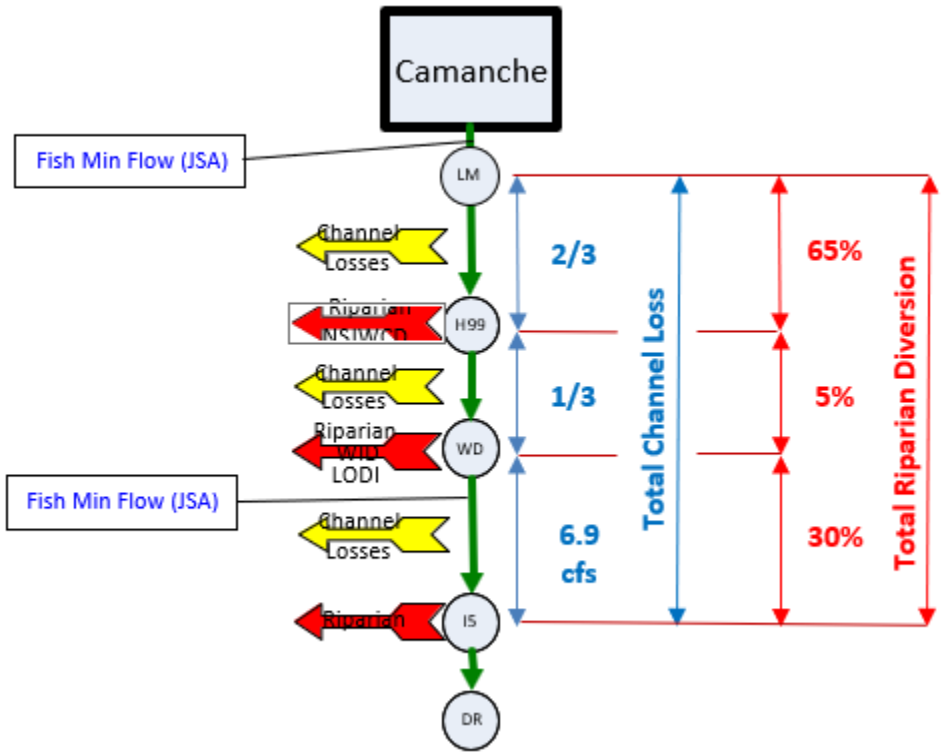
WD - Mokelumne River at Woodbridge Diversion Dam

I5 - Mokelumne River at Interstate Highway 5

DR - Delta Region

[16] The values for downstream water users were also stated in the testimony of John W. Sinner dated June 1998 titled *EBMUDSIM Model Description, Assumptions, Verification, and Output*, in connection with SWRCB Bay-Delta Water Rights Hearing (EBMUD Exhibit No. 4 at page 22).

Figure 6-4 *- Distribution of Channel Loss, Riparian Diversion and Compliance Points for Fish Flow in Lower Mokelumne*



MOCASIM assumes that the annual allocation to downstream users is distributed monthly in accordance with the percentages shown in **Figure 6-5**.[17] Percentages shown for WID pertain to PRBS. Diversions by WID in excess of the PRBS are considered in Step 2 of this water availability analysis using the Water Availability Analysis Tool (WAAT).

Figure 6-5 *– MOCASIM Percent Distribution of Annual Diversion to Downstream Users*

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Riparian												
Dry Year	0.9%	0.8%	2.5%	8.1%	20.6%	29.3%	14.3%	9.3%	4.7%	4.4%	1.8%	3.4%
Wet Year	0.7%	0.6%	1.9%	6.3%	16.0%	22.8%	22.3%	14.6%	7.3%	3.4%	1.4%	2.6%
WID*												
Dry Year	0.0%	0.0%	0.7%	5.3%	12.9%	18.4%	22.8%	21.1%	12.5%	6.3%	0.0%	0.0%
Wet Year	0.0%	0.0%	0.9%	8.4%	14.8%	19.2%	21.9%	18.9%	12.1%	3.6%	0.0%	0.0%
NSJWCD												
All Years	0.0%	0.0%	0.0%	0.0%	17.0%	23.0%	27.0%	17.0%	10.0%	6.0%	0.0%	0.0%
Lodi**												
All Years	0.0%	0.0%	3.4%	14.9%	18.4%	17.8%	17.4%	16.6%	8.9%	2.5%	0.0%	0.0%

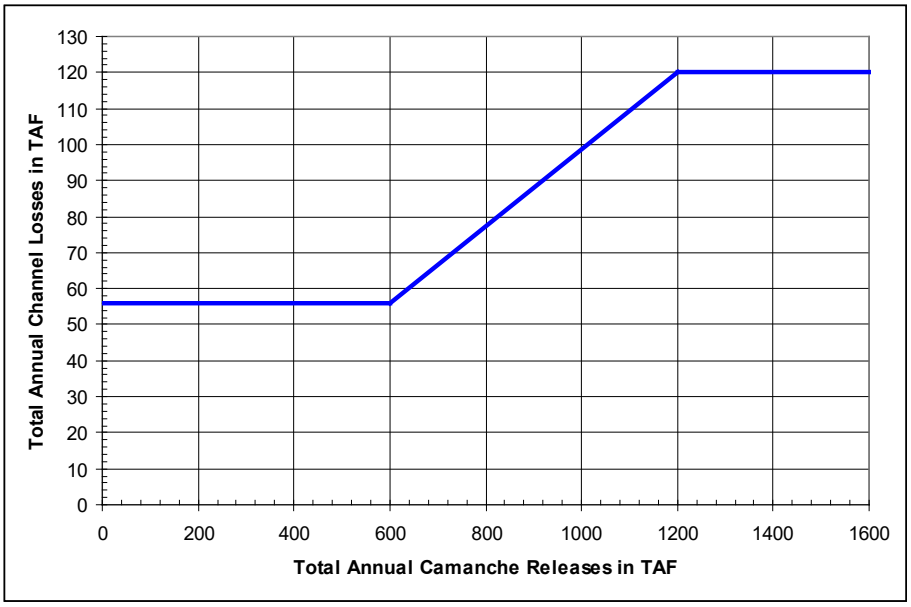
* Excluding Lodi Decree
** Per Lodi Decree

[17] Table 3-4 from 2007 MOCASIM User's Manual.

6.7.2 Channel Losses

Channel losses to the groundwater basin occur in the Lower Mokelumne River. EBMUD, under water rights agreements with other water users on the river, is obligated to release sufficient water to ensure that entitlements are delivered to the users at their points of diversion. Channel losses deplete the amount of water in the river, thus requiring EBMUD to increase the releases from Camanche Dam to compensate for the losses. MOCASIM incorporates the same methodology used in the original EBMUDSIM for modeling channel losses. Channel losses in the model depend on the total annual release from Camanche Dam as illustrated in **Figure 6-6.**

Figure 6-6 *– Lower Mokelumne Channel Losses*



The reach-by-reach distribution of channel losses between model nodes is shown schematically in **Figure 6-4**. As shown, channel loss below "WD" (Woodbridge Diversion Dam) is assumed to be a constant 6.9 cfs under all conditions. This value is subtracted from the Total Channel Loss and the remainder is divided 2/3 for the reach from "LM" to "H99" (below Camanche Dam to Highway 99) and 1/3 to the reach from H99 to WD.

6.7.3 Fish Flows under 1998 Joint Settlement Agreement

MOCASIM accounts for minimum flow releases from Camanche Dam as set forth in the 1998 Joint Settlement Agreement (JSA) to protect fish and wildlife resources in the Mokelumne

River for FERC licensing purposes (a copy of the JSA is provided in **Appendix B**).[18] In 1999 Decision 1641, the State Water Resources Control Board (SWRCB) amended EBMUD's Mokelumne River water rights to require EBMUD to provide specified JSA flow requirements at Camanche Dam and made corresponding changes to the water rights of WID to ensure a specified portion of the Camanche Dam releases passed below Woodbridge Dam. These releases points are depicted schematically in **Figure 6-4**.

SWRCB Decision 1641 adopted the JSA flows as the Mokelumne River's contribution to meet the Bay-Delta flow dependent objectives and found that *"it would not be in the public interest to require more water from the Mokelumne River system than will be provided under the JSA."*[19] **Figure 6-7** summarizes annual JSA fish flows release requirements based on Attachment 1 to the JSA.

***Figure 6-7** – JSA Fish Release Requirements in cubic feet per second (cfs)*

Year Type	Requirements	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (TAF)
Normal & Above	Minimum Camanche Release	325	325	325	325	325	325	325	325	325	100	100	100	194
Below Normal		250	250	250	250	250	250	250	250	250	100	100	100	154
Dry		220	220	220	220	220	220	220	220	100	100	100	100	130
Critically Dry		115	130	130	130	130	130	130	100	100	100	100	100	80
Normal & Above	Expected Flow below Woodbridge Diversion Dam	100	100	100	100	100	100	150	300	300	25	25	25	86
Below Normal		100	100	100	100	100	100	150	200	200	20	20	20	73
Dry		80	80	80	80	80	80	150	150	20	20	20	20	52
Critically Dry		45	75	75	75	75	75	75	15	15	15	15	15	34

The Year Type determination shown in Figure 6-7 is subject to change during the diversion season per page 5 of Attachment 1 of the JSA. MOCASIM accounts for this potential change.

It is noted that the MOCASIM does not include additional releases up to 200 cfs in the months of April, May, and June in Normal and Above, and Below Normal years as described in Footnote 5 on pages 1 and 2 of Attachment 1 to the JSA. A sensitivity analysis conducted on the results from MOCASIM indicated that the additional releases per Footnote 5 did not have a substantial effect on the amount of water available for MICUP. In actual operations, diversions under A029835 would occur only after all senior obligations and required fishery releases are met, including JSA Footnote 5 releases.

[18] Lower Mokelumne River Project, FERC Project No. 2916-004, Joint Settlement Agreement among U.S. Fish & Wildlife Service, California Department of Fish & Game, and EBMUD, March 23, 1998.

[19] D-1641 at page 63.

6.7.4 Healthy Rivers and Landscapes Flow Contribution (Voluntary Agreement Flows)

San Joaquin County coordinated with EBMUD to update the MOCASIM model to account for the Mokelumne River flow measures being considered in the Draft Strategic Plan for the Proposed Agreements to Support Heathy Rivers and Landscapes (Draft HRL Plan) as an implementation pathway for an updated Bay-Delta Plan.[20] The Draft HRL Plan was formerly referred to as the Draft Voluntary Agreement (VA) Plan and the terms "Voluntary Agreement" and VA are used in MOCASIM to describe the additional fish flows now under consideration for the Mokelumne River. The Mokelumne River VA flow assets are a volume of minimum Mokelumne River flows to be released by EBMUD from Camanche Dam in excess of the volume of water that EBMUD is presently obligated to release from Camanche Dam to meet existing release requirements. Existing release requirements are comprised of (1) releases needed to satisfy demands of senior downstream water users, (2) releases required to meet instream flow requirements imposed by the 1998 Lower Mokelumne River Joint Settlement Agreement (JSA), and (3) additional instream flows required by Water Right Order 2016-0019-EXEC. The State Water Board incorporated the minimum release requirements of the JSA into D-1641 and thereby also into the applicable water rights of EBMUD and WID. These first two components of existing release requirements are not necessarily additive in all circumstances. Under certain circumstances, a given amount of flow may properly be accounted for as simultaneously satisfying JSA minimum instream flow requirements and the rights of downstream water users.

EBMUD would operate to provide VA releases from Camanche Dam, above existing minimum release flow requirements, of 10 thousand acre-feet (TAF), 20 TAF, and 45 TAF in "Dry," "Below Normal" (BN), and "Normal and Above" (AN) modified JSA year-types, respectively. EBMUD's Draft Quantitative Flow Accounting Procedures are discussed in the draft Appendix E to the Draft Strategic Plan. A copy of draft Appendix E is provided in **Appendix E** of this WAA report; see pages 31 to 46 therein. **Figure 6-8** summarizes EBMUD's monthly distribution of VA flows:[21]

[20] https://resources.ca.gov/-/media/CNRA-Website/Files/Initiatives/Support-Healthy-Rivers-and-Landscape/Draft_StrategicPlan_2024_10_29.pdf

[21] Email from EBMUD's Ana Ulloa, May 2, 2023.

Figure 6-8 *– EBMUD's monthly distribution of VA flows*

		Mokelmne VA Proposal Monthly Flow Addition [cfs]			Mokelmne VA Proposal Monthly Volume Addition [AF]		
		Normal and Above	Below Normal	Dry	Normal and Above	Below Normal	Dry
31	Jan	0.0	0.0	0.0	0	0	0
28	Feb	0.0	0.0	0.0	0	0	0
31	Mar	54.9	54.6	24.4	3378	3359	1500
30	Apr	327.2	108.5	56.7	19469	6454	3375
31	May	266.0	81.4	42.7	16357	5005	2625
30	Jun	0.0	0.0	0.0	0	0	0
31	Jul	0.0	0.0	0.0	0	0	0
31	Aug	0.0	0.0	0.0	0	0	0
30	Sep	0.0	0.0	0.0	0	0	0
31	Oct	94.3	84.3	40.7	5796	5183	2500
30	Nov	0.0	0.0	0.0	0	0	0
31	Dec	0.0	0.0	0.0	0	0	0

The derivation of VA flows incorporated into MOCASIM is presented **Exhibit 4**. For modeling fish flows MOCASIM maintains JSA flows below Camanche Dam and combines the JSA and VA flows below the WID Diversion Dam. **Figure 6-9** shows monthly input to MOCASIM for the combined JSA and proposed VA flows.

Figure 6-9 – *Monthly input to MOCASIM for the combined JSA and proposed VA flows.*

Input to MOCASIM - Combined Fish Flow (JSA) and Proposed VA

Below Camanche - no change

(cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Type
JSA (only)	130	130	130	130	100	100	100	100	100	115	130	130	Critical
JSA (only)	220	220	220	220	220	100	100	100	100	220	220	220	Dry
JSA (only)	250	250	250	250	250	250	100	100	100	250	250	250	Below Normal
JSA (only)	325	325	325	325	325	325	100	100	100	325	325	325	Normal and Above

Below WD - the entire VA is added (values are rounded to the nearest cfs)

(cfs)

JSA+VA	75	75	75	75	15	15	15	15	15	45	75	75	Critical
JSA+VA	80	80	104	207	193	20	20	20	20	121	80	80	Dry
JSA+VA	100	100	155	258	281	200	20	20	20	184	100	100	Below Normal
JSA+VA	100	100	155	477	566	300	25	25	25	194	100	100	Normal and Above

6.7.5 Bay-Delta - Standard Term 91

The SWRCB's Standard Term 91 requires permits and licenses granted after 1965 in the Delta watershed to cease diverting when the SWRCB gives notice that water is not available for diversion under those permits and licenses. This occurs at times when the Central Valley Project and the State Water Project (CVP-SWP Projects) are releasing previously stored water to meet water quality and flow requirements in the Delta and the Delta is termed to be in "balanced conditions." The SWRCB will also give notice when Term 91 is no longer in effect.[22] When the CVP-SWP Projects are not releasing previously stored water to meet water quality and flow requirements, the Delta is termed to be in "excess conditions". MICUP will not be allowed to divert water when the SWRCB issues Term 91 curtailment notices.

Per the SWRCB, "balanced conditions" generally occur during the summer and fall. The U.S. Bureau of Reclamation has posted CVP-SWP Coordinated Operation calculations from January 1998 to September 2019.[23] Based on this data, **Appendix C** summarizes the total number of days each year, and the number of days during the proposed diversion season (December 1 through June 30), that the Delta was in "excess" for Water Years 2001 through 2019. Appendix C also indicates the periods during this 20-year period when the SWRCB invoked Term 91 curtailments. A comparison of MOCASIM results with the historical dates of Term 91 implementation show that if the MICUP project had been permitted during this period, no water would have been available for MICUP during anytime that Term 91 was in effect.

6.7.6 Total Lower Mokelumne Needs

Collectively, the combined amount of diversions by senior right holders, channel losses, minimum flows for fish, and VA flows is identified in MOCASIM as "Lower Mokelumne Needs". **Table 5A** (2050 LOD Case) and **Table 5B** (Max WR Case) show monthly Lower Mokelumne Needs by water year over the 68-year study period. For the 7-month MICUP diversion season Lower Mokelumne Needs average approximately 159,100 acre-feet for the 2050 LOD Case, and approximately 147,500 acre-feet for the Max WR Case.

[22] From SWRCB Bay-Delta - Standard Term 91 website https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/term_91/

[23] From U.S. Bureau of Reclamation - Central Valley Operations https://www.usbr.gov/mp/cvo/pmdoc.html. The U.S. Bureau of Reclamation is currently working on updating these calculations for the period of October 2019 to present time in accordance with the December 2018 COA Addendum.

7. RECAP OF MOCASIM MODELING CASES AND INPUT ASSUMPTIONS

This WAA evaluates water available to MICUP for two future scenarios: 2050 planning level of demand (2050 LOD Case), and full entitlement of water rights (Max WR Case). This WAA is a two-step process that involves two modeling tools:

Step 1. MOCASIM Runs – Identifies water available for diversion using specified assumptions. In this report, the term "available for diversion" means water in excess of modeled demand by existing right holders and instream needs for the case being evaluated. Specific to WID, MOCASIM input is limited to the PRBS. The results of MOCASIM, i.e., water "available for diversion", are presented in **Section 8**. "Water available for diversion" in MOCASIM results includes some water potentially available to WID in excess of the PRBS under its senior rights and potentially available to EBMUD for groundwater banking. Step 2 (the WAAT) is used to further distribute the water that MOCASIM found "available for diversion" to WID and to EBMUD for groundwater banking, based on the assumptions discussed above, before determining the amount of water available for MICUP.

Step 2. Water Allocation Analysis Tool (WAAT) – This is an Excel-based post processor that distributes the water available for diversion from Step 1 (MOCASIM) to various water right holders in order of priority and computes remaining water available for appropriation by MICUP. Step 2 focuses on the MICUP diversion window only (December 1 to June 30); see **Section 9**.

Figure 7-1 summarizes annual diversions assumed for existing diverters for the Step 1 MOCASIM analysis.

Figure 7-1 *– Summary of MOCASIM modeling assumptions for Step 1.*

Step 1 - MOCASIM Runs

Input Assumptions

Note: all values are in acre-feet (af) unless indicated otherwise

Diversion (af) for 2050 LOD Case	
Upstream	
Amador (including JVID)	11,456
Calaveras	6,367
Total	**17,823**
Pardee (Mok. Aq.)	
EBMUD	244,191
(MGD)	*218*
Downstream	
NSJWCD (under Permit 10477)	20,000
WID, PRBS only	
(wet)	60,000
(dry)	39,000
Riparian and Senior WR	
(wet)	20,618
(dry)	16,068
City of Lodi	3,600
Fish flow	
JSA+VA	included
Diversion Capacity (cfs)	
Mok. Aq. (EBMUD)	503
LM (MICUP)	620
H99 (NSJWCD)	98
WD (WID)	414

Diversion (af) for MAX WR Case	
Upstream	
Amador (including JVID)	20,000
Calaveras	27,000
Total	**47,000**
Pardee (Mok. Aq.)	
EBMUD	308,244
(MGD)	*275*
Downstream	
NSJWCD (under Permit 10477)	20,000
WID, PRBS only	
(wet)	60,000
(dry)	39,000
Riparian and Senior WR	
(wet)	20,618
(dry)	16,068
City of Lodi	3,600
Fish flow	
JSA+VA	included
Diversion Capacity (cfs)	
Mok. Aq. (EBMUD)	503
LM (MICUP)	620
H99 (NSJWCD)	98
WD (WID)	414

8. STEP 1 MOCASIM RESULTS

Monthly modeled water demand for existing rights upstream of and at Camanche Dam (Upper Watershed, EBMUD, and NSJWCD), as well as monthly modeled demand downstream of Camanche (WID, riparians) and other parameters are evaluated under MOCASIM (Step 1). Results are provided over the 68-year study period for the two modeling scenarios: the 2050 LOD Case and the Max WR Case.

Table 6A shows monthly total releases from Camanche Dam including flood control requirements and to satisfy Lower Mokelumne Needs over the 68-year study period for the 2050

LOD Case. During the 7-month diversion season Camanche release averages about 325 TAF annually.

Table 6B shows monthly releases from Camanche Dam for flood control requirements and to satisfy Lower Mokelumne Needs over the 68-year study period for the Max WR Case. During the 7-month diversion season, Camanche releases average about 277 TAF annually.

Table 7A shows monthly water available for diversion below Camanche Dam after accounting for all upstream and downstream operations and demands for the 2050 LOD Case. During the 7-month diversion season, water is available for diversion in 38 of the 68 years in the study period. The amount of water available for diversion averages approximately 166 TAF, and ranges from a low of 0 to a high of approximately 1.03 million acre-feet.

Table 7B shows monthly water available for diversion below Camanche Dam after accounting for all upstream and downstream operations and demands for the Max WR Case. During the 7-month diversion season, water is available for diversion in 28 of the 68 years in the study period. The amount of water available for diversion averages approximately 129 TAF, and ranges from a low of 0 to a high of approximately 895 TAF.

Figure 8-1 provides a summary of MOCASIM results showing the seasonal amounts of water available for diversion below Camanche Dam for the 2050 LOD and Max WR cases for the 68-year study period.

Figure 8-1 *– Summary of MOCASIM results.*

Step 1 - MOCASIM

Water Available for Diversion

Summary Results (af)

LOD Case>>	2050	MAX
Average - all years	165,953	129,416
Average - non-zero years	296,969	314,295
Max - non-zero years	1,029,837	895,376
Min - non-zero years	510	9,845
Number of years when water is available for diversion	38	28
Number of zero consecutive years	6	8

In addition to **Appendix D** tables referenced earlier herein, Appendix D includes the following tables for MOCASIM results:

Table D11 MOCASIM - Mokelumne Outflow 2050 LOD Case
Table D12 MOCASIM - Mokelumne Outflow Max WR Case
Table D13 MOCASIM - EBMUD's Mokelumne Aqueducts Diversion 2050 LOD Case
Table D14 MOCASIM - EBMUD's Mokelumne Aqueducts Diversion Max WR Case

9. STEP 2 WAAT RESULTS - WATER AVAILABLE FOR APPROPRIATION BY MICUP

Step 2 of this analysis uses an Excel-based postprocessor called the Water Availability Analysis Tool (WAAT) to model additional diversions by WID and by EBMUD for groundwater banking[24] as follows:

- For WID: direct diversion of up to 20,000 acre-feet, assumed to be diverted in the months of May and June (10,000 acre-feet each month), when available, and for both scenarios, 2050 LOD Case and Max WR Case;

[24] This step in the model removes this water from the system before determining MICUP water availability for modeling purposes only. It does not reflect an agreement between WID and EBMUD, or any other party, that these prospective diversions are consistent with water right priorities.

- For EBMUD groundwater banking: diversion of up to 20 MGD for the 2050 LOD Case and 50 MGD for the Max WR Case for groundwater banking operations in NSJWCD, year-round when water is available and there is available capacity in the Mokelumne Aqueduct or at NSJWCD's diversion facilities.

Water available after accounting for diversions by WID and EBMUD is considered water available for appropriation by MICUP under A029835. The following sections summarize WAAT results for WID, EBMUD, and MICUP.

9.1 Diversion by WID

Diversion by WID in excess of its PRBS is assumed to be 10,000 acre-feet in each of the months of May and June (20,000 acre-feet total) when water is available and for both scenarios, 2050 LOD Case and Max WR Case.[25]

Table D15 shows the monthly amount of water available for diversion by WID under the 2050 LOD Case. The maximum seasonal amount of 20,000 acre-feet is available in 28 years (41 percent). On average, approximately 8.7 TAF is available annually for diversion by WID under the 2050 LOD Case scenario. **Table D16** shows the monthly amount of water available for diversion by WID under the Max WR Case. The maximum seasonal amount of 20,000 acre-feet is available in 21 years (31 percent). On average, approximately 6.9 TAF is available annually for diversion by WID under the Max WR Case scenario.

9.2 Diversion by EBMUD for Groundwater Banking

Table D17 shows the monthly amount of water available for diversion by EBMUD for Groundwater Banking under the 2050 LOD Case. On average, approximately 4.2 TAF is available annually for diversion by EBMUD under the 2050 LOD Case scenario, with a maximum year amount of approximately 13 TAF. **Table D18** shows the monthly amount of water available for diversion by EBMUD under the Max WR Case. On average, approximately 7.7 TAF is available annually for diversion by EBMUD under the Max WR Case scenario, with a maximum year amount of approximately 32.5 TAF.

[25] Under existing rights WID may divert water in excess of the PRBS. The assumption that WID would divert such water in May and June is based on discussions with WID management during the development of this analysis. The assumption of up to 10,000 acre-feet in each month is likely conservative for quantifying water available in these months for A029835.

9.3 Appropriation by MICUP

Table 8A shows the monthly amount of water available for diversion by MICUP under the 2050 LOD Case based on a rate of diversion limit of 620 cfs and a seasonal diversion limit of 110,000 acre-feet, and after accounting for diversions by WID and EBMUD. Water is available for diversion in 35 of the 68 years in the study period, or about 51 percent of years. The maximum seasonal amount of 110,000 acre-feet is available in 21 years (31 percent). On average, approximately 43.3 TAF is available annually for diversion by MICUP under the 2050 LOD Case scenario.

Table 8B shows the monthly amount of water available for diversion by MICUP under the Max WR Case based on a rate of diversion limit of 620 cfs and a seasonal diversion limit of 110,000 acre-feet, and after accounting for diversions by WID and EBMUD. Water is available for diversion in 27 of the 68 years in the study period, or about 40 percent of years. The maximum seasonal amount of 110,000 acre-feet is available in 16 years (24 percent). On average, approximately 34.6 TAF is available annually for diversion by MICUP under the Max WR Case scenario.

Results shown in Tables 8A and 8B assume that water is diverted by MICUP as soon as it becomes available for diversion and continuing until the maximum amount of 110,000 acre-feet is reached or the end of the diversion season, whichever occurs first. Under actual conditions there may be operational constraints that preclude diversions early in the diversion season or on a continuous basis. Under such conditions, diversions may occur in later months within the diversion season. **Tables 9A** and **9B** show the monthly amounts of water available for diversion by MICUP based on the maximum diversion rate of 620 cfs in any month during the diversion season. These tables show the monthly amount of water that could be diverted in later months if the 110,000 acre-foot limit is not achieved by diversions earlier in the diversion season.

The results of MOCASIM showing water available for diversion were summarized in **Figure 8-1** above. **Figure 9-1** provides a summary of WAAT results showing the amounts of water that could be diverted by WID and EBMUD/NSJWCD under existing rights, and water available for appropriation by MICUP for the 2050 LOD and Max WR cases for the 68-year study period.

Figure 9-1 *- Summary of WAAT results*

Step 2 - Summary Results (af)		
EBMUD's NTE MGD >>	20	50
Average - all year		
LOD Case>>	2050	MAX
WID	8,708	6,901
EBMUD/NSJWCD	4,234	7,694
MICUP	43,300	34,574
Average - non-zero years		
LOD Case>>	2050	MAX
WID	17,945	18,772
EBMUD/NSJWCD	7,997	19,378
MICUP	84,127	87,074
Number of non-zero years		
LOD Case>>	2050	MAX
WID	33	25
EBMUD/NSJWCD	36	27
MICUP	35	27
Max - non-zero years		
LOD Case>>	2050	MAX
WID	20,000	20,000
EBMUD/NSJWCD	13,012	32,530
MICUP	110,000	110,000
Min - non-zero years		
LOD Case>>	2050	MAX
WID	487	5,042
EBMUD/NSJWCD	510	4,603
MICUP	811	6,364
Number of zero consecutive years		
LOD Case>>	2050	MAX
WID	6	8
EBMUD/NSJWCD	6	8
MICUP	6	8

Remaining Mokelumne outflow to the Bay-Delta after all diversions are provided in **Table 10A** (2050 LOD Case) and **Table 10B** (Max WR Case) during the diversion season for the 68-year study period. During the 7-month diversion season, Mokelumne outflow to the Delta averages approximately 192,000 acre-feet for the 2050 LOD Case and ranges from about 20 TAF to about 989 TAF. For the Max WR Case, during the 7-month diversion season, Mokelumne outflow averages approximately 154,000 acre-feet and ranges from about 15 TAF to about 849 TAF.

Exhibit 3 provides stacked bar charts for the 2050 LOD Case and the Max WR case showing annual diversions from the Mokelumne River system during the diversion season by Upper Watershed diverters, EBMUD, WID, NSJWCD, other Lower Mokelumne River diverters, channel loss below Camanche Dam, and the MICUP program, as well as remaining Mokelumne Outflow (gray bars in Exhibit 3). Exhibit 3 shows that in some years there is insufficient flow for diversion by MICUP, but flow remains for the Bay-Delta; the Mokelumne outflows include JSA and VA flows. In years when water is available for diversion by MICUP, the project does not eliminate flows to the Bay-Delta.

* * * * *

EXHIBIT 1

MOCASIM Geographical Coverage

MOCASIM Geographical Coverage

For MICUP, only Lower Mokelumne was modeled with input data from Upper Mokelumne

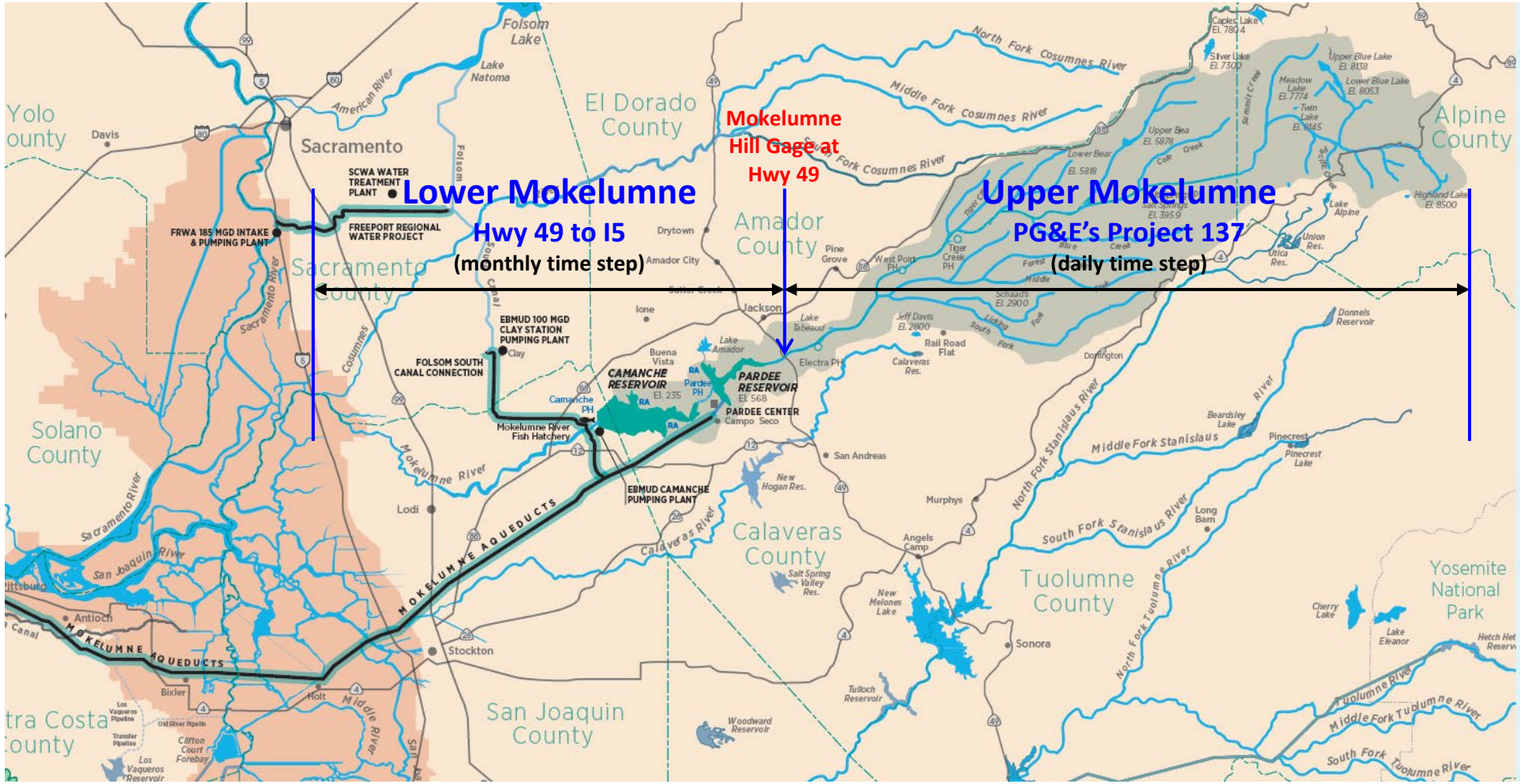


EXHIBIT 2

MOCASIM System Schematic of Lower Mokelumne

MOCASIM - System Schematic of Lower Mokelumne
(showing multiple diversion points of 'unappropriated water')

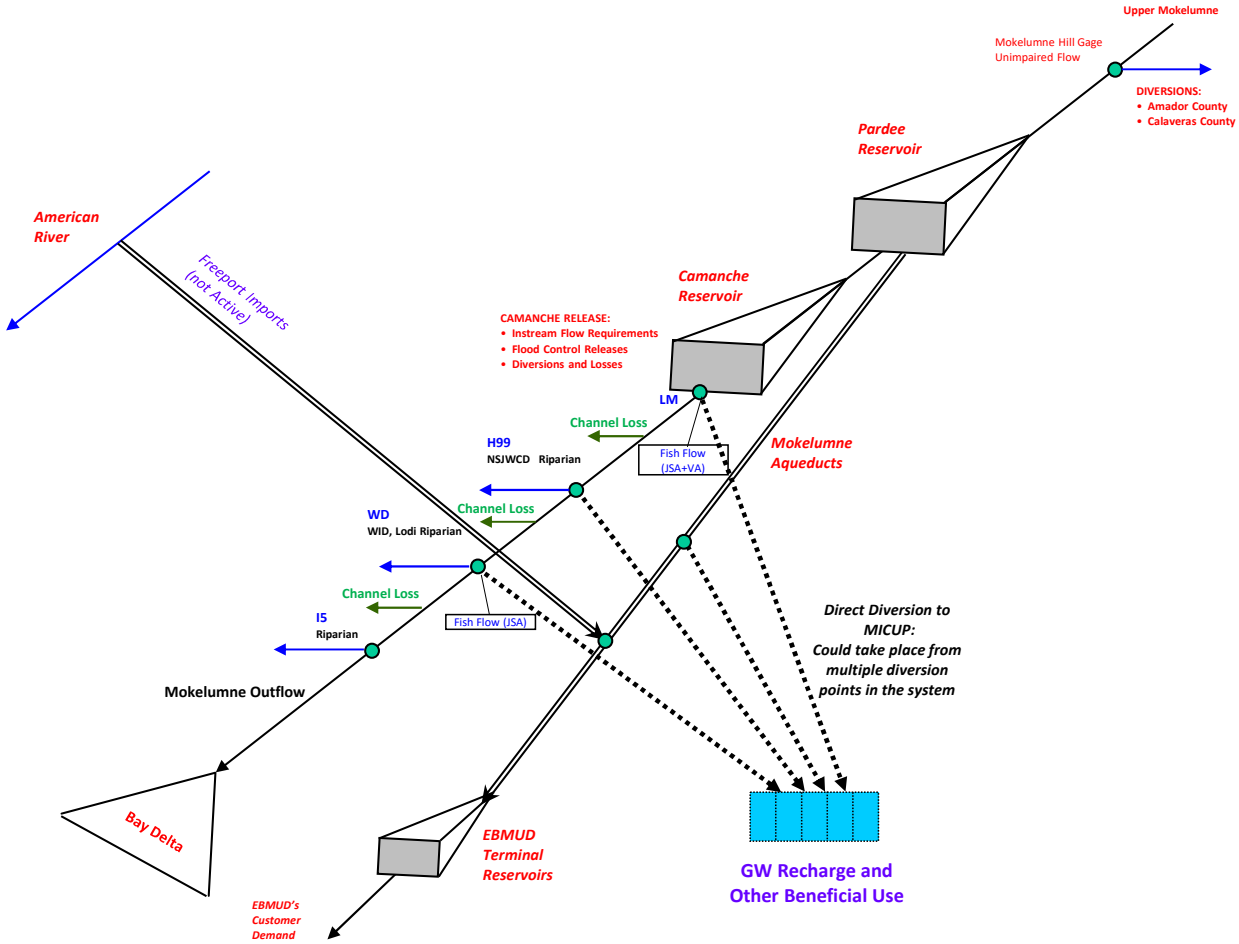
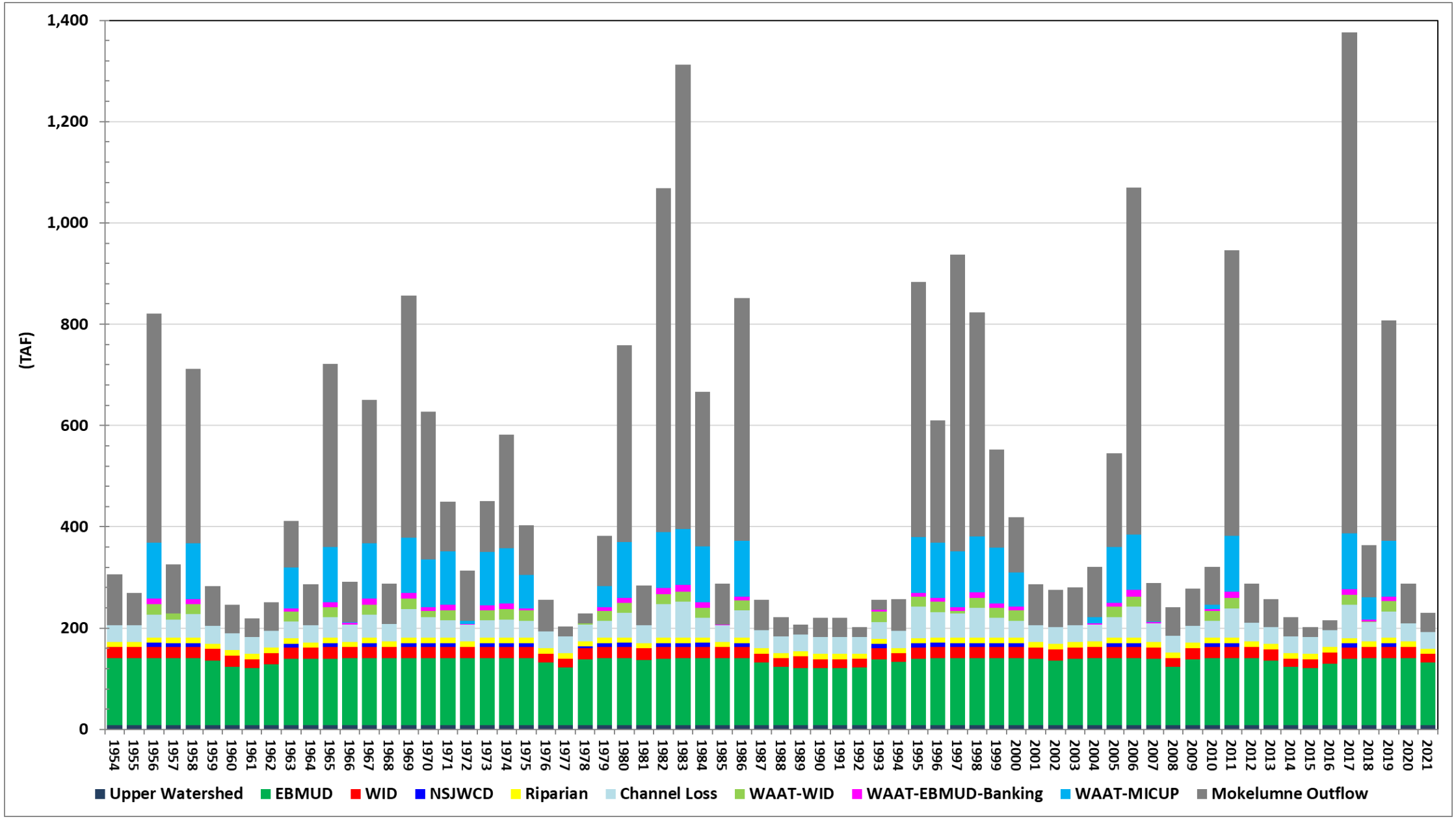


EXHIBIT 3

Results: Mokelumne River Diversion to All Users and Remaining Mokelumne Outflow, 2050 LOD Case and Max WR Case

Results:

Mokelumne River Diversion to All Users and Remaining Mokelumne Outflow 2050 LOD Case



Results:

Mokelumne River Diversion to All Users and Remaining Mokelumne Outflow Max WR Case

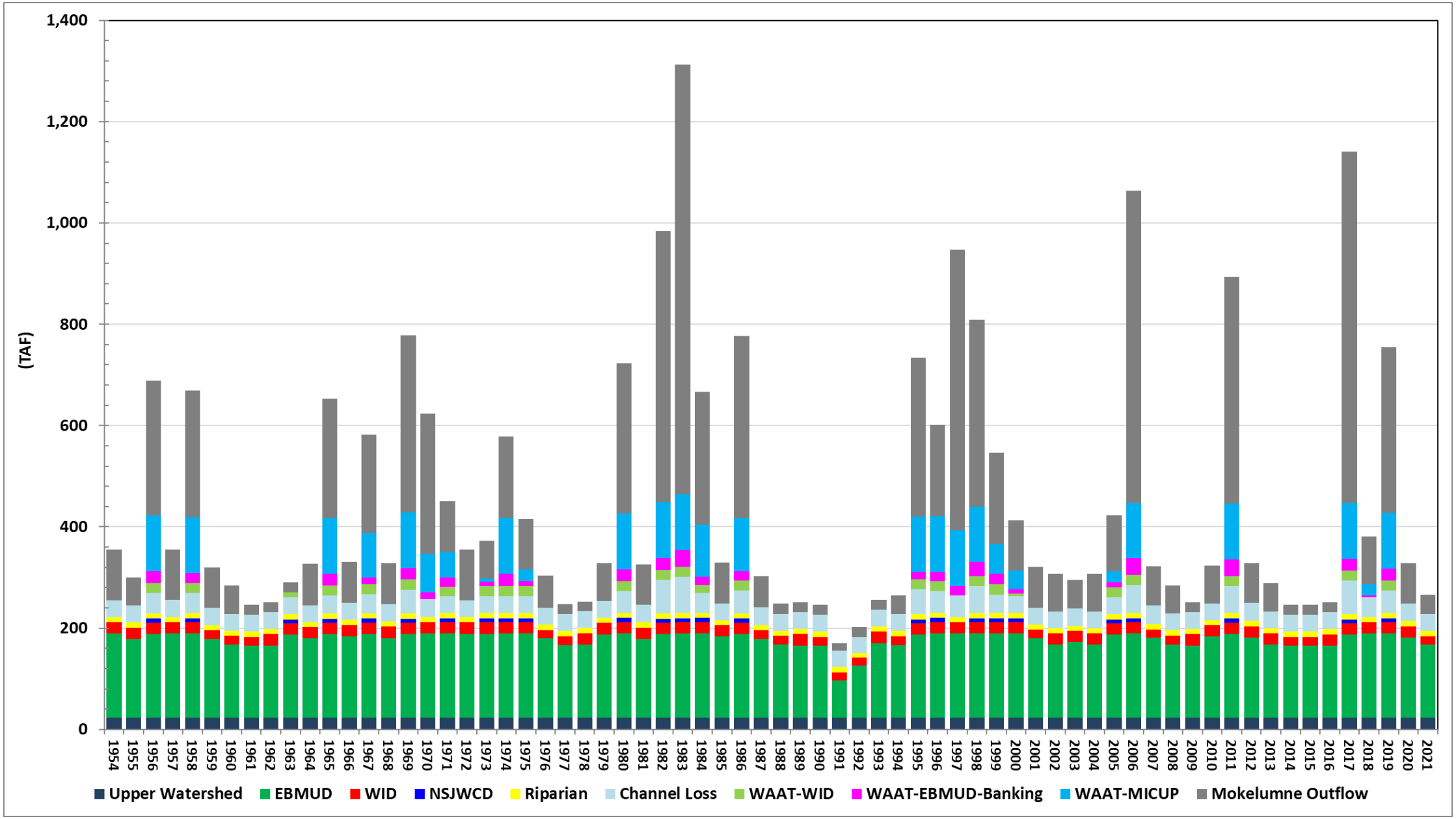


EXHIBIT 4

Derivation of VA Flows for Modeling in MOCASIM

DERIVATION OF VA FLOWS FOR MODELING IN MOCASIM (per Dotan Consultants LLC, 2/2/2024)

Fish Flow as Originally Coded in MOCASIM (not including JSA Footnote 5)

Below Camanche

(cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Type
JSA	130	130	130	130	100	100	100	100	100	115	130	130	Critical
JSA	220	220	220	220	220	100	100	100	100	220	220	220	Dry
JSA	250	250	250	250	250	250	100	100	100	250	250	250	Below Normal
JSA	325	325	325	325	325	325	100	100	100	325	325	325	Normal and Above

Below WD

(cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Type
JSA	75	75	75	75	15	15	15	15	15	45	75	75	Critical
JSA	80	80	80	150	150	20	20	20	20	80	80	80	Dry
JSA	100	100	100	150	200	200	20	20	20	100	100	100	Below Normal
JSA	100	100	100	150	300	300	25	25	25	100	100	100	Normal and Above

Proposed VA

From EBMUD

(af)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Type
VA	0	0	0	0	0	0	0	0	0	0	0	0	Critical
VA	0	0	1,500	3,375	2,625	0	0	0	0	2,500	0	0	Dry
VA	0	0	3,359	6,454	5,005	0	0	0	0	5,183	0	0	Below Normal
VA	0	0	3,378	19,469	16,357	0	0	0	0	5,796	0	0	Normal and Above

(cfs)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Type
VA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Critical
VA	0.0	0.0	24.4	56.7	42.7	0.0	0.0	0.0	0.0	40.7	0.0	0.0	Dry
VA	0.0	0.0	54.6	108.5	81.4	0.0	0.0	0.0	0.0	84.3	0.0	0.0	Below Normal
VA	0.0	0.0	54.9	327.2	266.0	0.0	0.0	0.0	0.0	94.3	0.0	0.0	Normal and Above

Input to MOCASIM - Combined Fish Flow (JSA) and Proposed VA

Below Camanche - no change

(cfs)	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year Type**
JSA (only)	130	130	130	130	100	100	100	100	100	115	130	130	Critical
JSA (only)	220	220	220	220	220	100	100	100	100	220	220	220	Dry
JSA (only)	250	250	250	250	250	250	100	100	100	250	250	250	Below Normal
JSA (only)	325	325	325	325	325	325	100	100	100	325	325	325	Normal and Above

Below WD - the entire VA is added (values are rounded to the nearest cfs)

(cfs)

JSA+VA	75	75	75	75	15	15	15	15	15	45	75	75	Critical
JSA+VA	80	80	104	207	193	20	20	20	20	121	80	80	Dry
JSA+VA	100	100	155	258	281	200	20	20	20	184	100	100	Below Normal
JSA+VA	100	100	155	477	566	300	25	25	25	194	100	100	Normal and Above

TABLES 1 through 10

TABLE 1

Water Availability Analysis for Application 29835

USGS Gage #11319500 Mokelumne River Near Mokelumne Hill, CA

MONTHLY STREAM FLOW (ACRE-FEET)

Source: US Geological Survey, Water Resources Data

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Diversion Window Dec-June
1928	21,958	28,508	177,456	133,291	166,388	28,003	6,549	7,004	7,075	4,280	4,165	6,426	591,101	-
1929	6,069	12,018	27,701	60,457	137,980	59,481	7,735	5,208	4,243	3,339	1,505	14,351	340,088	310,132
1930	17,782	29,263	63,641	112,762	111,786	72,537	7,034	4,765	4,028	5,233	7,039	4,310	440,181	422,122
1931	6,112	13,934	13,300	23,475	18,121	16,798	29,435	29,355	16,037	10,687	9,134	19,074	205,460	96,050
1932	26,612	56,049	48,379	62,004	167,249	176,016	41,738	32,177	31,984	32,294	17,191	13,017	704,710	555,383
1933	13,355	10,163	25,395	34,644	59,263	111,393	35,940	33,659	410	32,989	18,274	27,350	402,835	267,230
1934	32,165	32,579	39,562	24,933	18,662	18,536	22,228	17,555	16,572	16,663	19,220	24,706	283,380	193,785
1935	31,169	33,762	34,489	133,351	150,093	132,577	32,128	29,957	29,616	31,101	20,726	14,936	673,903	540,146
1936	42,433	120,968	72,126	152,928	192,275	134,779	33,776	30,621	30,550	30,683	24,153	16,774	882,065	730,444
1937	14,659	58,981	62,841	81,641	197,993	107,704	33,278	29,576	28,533	29,865	22,505	67,453	735,028	540,593
1938	37,471	90,138	166,695	210,707	256,776	207,018	52,831	32,982	29,758	33,228	34,138	34,839	1,186,583	1,036,259
1939	25,628	14,923	29,717	48,485	35,048	20,256	17,309	17,192	17,155	19,689	20,107	30,160	295,669	208,897
1940	60,480	84,442	130,786	148,227	198,977	88,543	34,673	30,431	29,639	26,170	14,626	31,193	878,187	741,615
1941	50,113	76,476	94,877	69,799	201,805	137,219	42,132	32,601	29,860	32,171	31,103	42,882	841,038	661,482
1942	86,145	106,800	65,977	111,096	192,398	182,621	60,757	34,704	30,990	31,642	42,481	46,977	992,587	787,918
1943	92,356	64,757	166,265	168,102	168,356	111,869	34,680	32,288	30,788	32,989	30,925	17,869	951,241	818,682
1944	22,566	22,071	40,201	50,311	85,039	58,214	30,621	30,615	29,253	30,744	41,493	46,504	487,632	296,271
1945	37,606	93,970	48,066	83,247	143,207	129,899	39,445	33,923	30,365	33,038	35,661	106,006	814,435	582,500
1946	78,398	34,645	55,038	81,284	147,941	79,023	33,019	29,496	29,110	31,759	27,319	32,294	659,325	582,335
1947	22,025	27,314	38,781	41,594	45,754	30,294	30,320	29,558	28,670	32,189	29,413	21,859	377,770	238,055
1948	31,310	20,443	22,499	63,611	117,505	164,115	29,373	31,759	30,205	32,411	29,991	27,651	600,871	441,341
1949	15,858	11,613	44,893	105,978	93,032	72,894	29,662	30,369	28,878	30,437	23,671	13,564	500,849	371,919
1950	36,733	54,138	63,026	100,682	169,708	143,348	32,183	30,701	29,919	33,505	194,879	269,012	1,157,835	581,200
1951	110,495	91,638	101,640	91,340	119,103	55,304	32,202	29,982	29,157	29,656	36,381	63,887	790,785	838,533
1952	86,084	79,495	92,048	193,213	313,099	225,762	86,699	41,056	34,888	35,989	37,708	44,450	1,270,491	1,053,588
1953	59,945	40,060	43,989	61,231	75,016	123,413	53,968	36,278	36,929	41,185	38,410	37,145	647,570	448,104
1954	37,373	37,044	55,770	72,418	87,621	41,469	31,291	33,696	35,697	37,084	40,035	33,683	543,181	368,840
1955	28,930	26,170	36,168	28,878	47,654	52,228	32,447	33,185	31,526	32,663	32,888	162,576	545,312	253,710
1956	178,501	98,189	94,754	96,696	191,291	195,890	50,322	35,811	33,347	39,070	42,266	44,395	1,100,531	1,017,896
1957	35,626	40,332	47,936	41,160	92,540	128,352	32,601	30,283	31,216	38,676	42,510	42,482	603,716	430,341
1958	47,076	79,253	93,094	141,860	200,207	214,158	60,695	43,552	34,727	38,799	37,316	32,927	1,023,664	818,129
1959	38,596	43,847	39,592	22,975	25,395	29,128	30,775	30,793	29,616	31,501	29,461	31,273	382,952	232,460
1960	19,996	33,368	30,117	30,217	56,840	52,811	29,588	30,529	29,431	30,185	29,247	31,021	403,349	254,622

TABLE 1

Water Availability Analysis for Application 29835

USGS Gage #11319500 Mokelumne River Near Mokelumne Hill, CA

MONTHLY STREAM FLOW (ACRE-FEET)

Source: US Geological Survey, Water Resources Data

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Diversion Window Dec-June
1961	22,665	14,573	16,731	17,655	21,091	29,038	29,785	29,115	29,312	30,142	18,214	18,170	276,491	152,774
1962	19,978	53,883	49,806	86,401	68,314	130,375	38,123	35,958	33,239	39,291	36,869	36,905	629,143	426,927
1963	45,649	82,307	45,268	103,836	214,103	138,766	40,828	37,619	35,423	37,145	40,844	42,870	864,659	666,834
1964	46,209	36,354	33,069	30,907	31,790	32,859	35,473	34,046	33,525	35,620	41,897	201,867	593,614	254,056
1965	161,284	85,862	73,110	109,608	134,721	160,783	56,164	44,149	54,977	55,075	56,149	45,594	1,037,475	927,235
1966	40,201	22,626	41,400	50,627	45,249	26,135	31,986	32,288	35,060	32,232	39,351	70,958	468,113	271,832
1967	67,145	53,933	95,369	108,597	161,715	249,385	127,527	39,144	37,316	38,492	38,928	39,150	1,056,700	807,102
1968	38,252	45,074	44,647	36,655	28,820	36,655	29,668	30,351	31,193	31,550	39,059	43,589	435,512	269,252
1969	161,407	102,801	96,475	147,929	281,617	219,216	70,281	48,422	45,289	47,254	38,595	53,778	1,313,066	1,053,036
1970	161,407	83,640	98,751	66,586	114,430	118,950	44,136	33,862	32,621	35,196	51,275	73,233	914,088	697,543
1971	63,887	60,314	76,246	72,001	65,424	127,638	58,199	52,763	39,952	42,944	32,037	40,379	731,784	538,742
1972	35,553	28,692	56,139	47,931	38,338	70,037	36,702	32,644	32,490	36,211	38,464	44,880	498,082	317,070
1973	75,446	77,975	78,029	76,107	136,566	100,920	45,305	33,062	33,281	37,379	53,662	74,401	822,134	589,924
1974	89,712	62,369	116,705	113,417	139,210	139,658	61,138	55,149	43,546	34,870	29,895	32,048	917,717	735,472
1975	27,547	36,550	74,278	72,656	107,974	177,265	66,592	54,633	51,906	44,942	40,904	38,258	793,504	528,317
1976	27,578	12,862	15,575	16,185	17,610	15,953	16,178	16,946	16,382	11,504	11,556	8,473	186,802	144,022
1977	10,533	5,576	7,047	13,139	17,813	15,572	16,282	15,821	16,989	552	2,255	23,089	144,668	78,153
1978	71,757	65,257	96,537	113,357	112,708	190,178	66,469	52,118	39,904	36,143	33,579	30,972	908,979	672,884
1979	48,644	48,768	80,980	85,747	117,873	91,102	38,393	34,962	31,133	33,899	38,184	47,684	697,370	504,086
1980	167,003	153,410	113,569	86,520	132,385	170,006	77,721	35,639	33,513	34,587	32,686	37,367	1,074,406	870,577
1981	41,290	34,245	34,071	40,719	31,101	31,187	33,290	27,645	29,294	34,329	44,373	82,886	464,430	249,978
1982	109,142	165,948	156,058	244,804	286,659	181,074	77,844	54,067	42,100	46,799	82,890	121,501	1,568,886	1,226,571
1983	118,673	150,508	242,880	139,777	209,922	371,490	208,077	68,683	56,476	55,235	115,559	178,932	1,916,210	1,354,750
1984	114,000	87,720	95,861	79,499	144,498	108,478	57,320	48,490	34,126	38,252	45,688	42,544	896,474	808,986
1985	23,894	34,817	50,703	61,350	31,660	29,372	30,129	33,351	33,109	36,309	38,910	39,002	442,607	274,340
1986	52,327	265,916	191,967	124,544	193,381	132,161	44,512	37,262	36,167	37,053	36,863	32,484	1,184,637	999,298
1987	24,964	17,278	24,718	21,582	16,793	21,124	32,158	31,193	27,592	14,179	12,913	17,543	262,038	158,944
1988	21,324	13,943	16,313	18,310	22,560	26,581	27,805	23,144	20,065	13,355	12,496	12,906	228,803	136,574
1989	12,827	14,162	60,437	80,391	105,637	69,680	34,218	30,910	32,704	23,132	35,929	34,593	534,622	356,041
1990	32,601	22,204	32,552	23,374	32,220	33,644	32,029	28,561	27,955	31,513	8,527	11,461	316,643	211,188
1991	4,027	7,359	21,970	25,432	29,773	43,147	32,792	28,795	28,711	32,398	33,329	30,720	318,453	143,170
1992	22,529	28,651	39,057	23,558	20,365	17,322	29,668	28,770	19,196	18,981	14,519	23,839	286,458	182,203
1993	75,385	73,144	119,903	103,122	175,980	176,432	52,105	52,689	34,031	39,408	31,204	31,494	964,898	747,805

TABLE 1

Water Availability Analysis for Application 29835

USGS Gage #11319500 Mokelumne River Near Mokelumne Hill, CA

MONTHLY STREAM FLOW (ACRE-FEET)

Source: US Geological Survey, Water Resources Data

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	Diversion Window Dec-June
1994	19,935	15,590	17,795	16,465	21,263	28,080	22,695	25,259	32,228	32,497	13,597	32,042	277,445	150,621
1995	109,204	72,588	203,342	163,460	249,705	301,690	181,453	49,541	46,104	49,646	33,001	35,922	1,495,657	1,132,031
1996	43,817	113,605	129,249	118,355	226,893	112,583	44,210	43,011	33,412	32,146	52,358	140,563	1,090,203	780,424
1997	347,963	111,742	94,016	94,137	147,019	80,332	37,994	39,820	35,584	38,725	40,767	27,178	1,095,277	1,015,772
1998	61,734	122,961	126,543	123,056	160,546	281,875	133,737	57,178	48,610	41,529	41,112	48,545	1,247,429	903,895
1999	68,375	119,129	90,019	86,223	122,178	153,404	58,113	39,845	36,096	34,169	38,738	33,653	879,940	687,873
2000	49,984	81,623	93,155	66,884	127,158	81,700	49,886	41,861	31,734	33,683	35,626	34,009	727,304	534,157
2001	18,951	17,389	36,905	53,013	43,226	30,925	32,927	30,584	26,795	24,565	19,393	36,475	371,148	234,419
2002	53,335	35,789	69,052	65,039	52,493	60,041	30,431	30,191	28,735	31,003	33,281	40,115	529,503	372,223
2003	56,502	48,862	47,377	59,088	104,838	122,402	34,452	31,580	33,602	34,747	31,341	46,504	651,296	479,184
2004	51,220	49,279	77,906	46,485	27,209	46,348	31,046	32,681	29,735	16,719	32,341	44,671	485,639	344,951
2005	83,317	77,587	123,161	121,509	180,223	168,578	72,065	47,770	39,803	31,845	36,619	104,162	1,086,638	799,046
2006	109,265	79,086	158,948	291,336	292,624	189,464	68,990	51,853	30,526	33,480	36,286	45,083	1,386,943	1,224,885
2007	32,183	34,983	45,852	28,277	34,507	27,438	31,328	30,338	29,134	20,599	32,168	24,675	371,483	248,324
2008	29,428	30,251	46,024	28,437	39,894	34,828	23,655	28,192	20,131	30,689	32,014	28,469	372,012	233,538
2009	41,695	37,949	79,443	69,442	159,317	57,119	39,217	34,181	24,885	26,292	27,961	34,157	631,660	473,435
2010	45,403	42,098	58,937	81,284	116,521	132,399	48,072	27,990	20,339	38,387	38,565	128,695	778,689	510,798
2011	102,563	78,142	178,440	171,493	173,705	244,506	145,174	34,335	23,969	36,069	35,179	35,571	1,259,147	1,077,544
2012	39,088	14,501	38,842	58,202	80,550	36,613	29,496	27,356	26,141	26,987	32,954	66,285	477,015	303,368
2013	47,758	41,204	47,979	38,202	31,728	25,766	26,950	26,840	22,975	29,668	25,629	13,380	378,079	298,922
2014	4,273	17,028	17,463	16,316	24,940	29,288	19,553	27,891	23,296	28,211	26,777	32,761	267,798	122,688
2015	18,496	26,397	15,157	14,460	27,461	27,146	17,063	16,922	15,364	8,381	10,407	27,553	224,807	161,878
2016	41,800	49,388	114,061	79,261	117,505	81,700	27,276	28,322	25,754	36,776	34,810	65,055	701,708	511,268
2017	267,168	384,878	199,776	243,197	276,145	237,365	81,780	39,101	33,501	34,151	52,953	49,006	1,899,021	1,673,584
2018	35,405	19,133	85,162	122,699	78,705	45,974	28,930	24,872	34,251	26,889	23,433	31,556	557,009	436,084
2019	49,959	106,966	168,417	202,317	199,284	247,481	90,757	47,924	37,726	28,395	32,811	39,617	1,251,656	1,005,981
2020	39,937	18,142	26,950	63,730	47,414	41,594	28,205	32,238	29,330	29,656	30,359	34,901	422,457	277,384
2021	15,286	15,223	26,003	13,942	21,343	19,256	18,490	21,804	16,560	20,457	20,607	40,724	249,694	145,954

Average Long-term (1929-2021)	**716,552**	**539,962**
Average MOCASIM modeling period (1954-2021)	**728,218**	**542,234**
MOCASIM as percent of Long-term	**101.6%**	**100.4%**

TABLE 2
MOCASIM - Mokelumne River True Natural Flow
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	5,215	9,484	10,723	18,757	33,220	84,022	158,488	166,814	42,430	12,867	0	490	542,510
1955	1,315	5,251	19,331	20,874	24,355	37,504	65,909	167,007	92,037	9,345	2,707	1,091	446,726
1956	1,906	4,880	238,732	186,667	77,131	85,319	124,722	275,732	207,094	43,097	7,055	4,920	1,257,255
1957	8,045	9,689	12,043	13,300	54,443	86,120	91,347	181,028	135,870	14,567	2,773	2,856	612,081
1958	5,362	9,292	17,685	25,721	84,386	97,263	179,201	353,504	223,444	57,518	13,565	5,240	1,072,181
1959	6,220	7,242	6,217	30,883	39,513	55,570	99,843	93,660	36,681	6,214	3,330	5,244	390,617
1960	3,591	2,453	3,350	7,638	47,108	74,751	106,785	124,507	43,748	4,990	1,071	2,568	422,560
1961	196	4,489	8,711	7,521	19,109	28,906	72,793	104,886	34,643	3,387	162	2,089	286,892
1962	1,857	3,162	10,335	8,645	65,238	49,255	178,556	166,281	140,331	18,683	4,201	1,631	648,175
1963	19,827	8,298	18,684	44,416	169,640	47,060	125,416	268,397	146,066	27,889	3,755	4,589	884,037
1964	6,471	40,785	19,619	17,703	18,765	27,629	82,244	142,924	66,997	7,286	1,911	2,110	434,444
1965	4,264	15,209	293,754	150,881	68,505	57,315	162,280	205,135	169,033	47,906	22,437	9,971	1,206,690
1966	8,538	28,875	21,724	22,853	21,485	71,074	139,474	128,368	15,738	3,732	1,525	3,138	466,524
1967	2,448	17,929	72,438	50,870	56,102	123,833	102,712	294,857	292,487	124,680	11,728	2,650	1,152,734
1968	4,604	4,629	9,554	15,408	68,547	59,358	87,380	114,748	35,617	4,265	3,576	2,286	409,972
1969	5,487	35,016	22,534	191,969	88,331	87,188	205,082	385,181	239,289	64,239	9,913	4,768	1,338,997
1970	12,189	12,173	64,123	238,089	81,186	82,449	78,760	193,266	125,434	20,738	3,794	985	913,186
1971	3,936	31,031	51,723	60,623	52,569	71,767	110,111	172,030	184,484	32,363	6,121	3,323	780,081
1972	6,185	12,408	27,827	22,051	31,779	104,131	81,186	159,367	69,687	9,735	2,209	2,942	529,507
1973	6,914	13,482	41,560	73,202	63,983	64,507	128,259	283,746	104,962	11,125	2,821	1,041	795,602
1974	7,067	85,206	68,033	105,447	39,745	117,735	136,421	246,346	146,051	37,925	4,177	8,149	1,002,302
1975	3,953	5,642	10,225	20,209	38,642	79,895	72,089	257,350	234,524	44,088	8,222	4,204	779,043
1976	22,886	24,355	13,600	10,499	13,731	28,228	44,283	71,716	7,877	1,675	4,551	2,489	245,890
1977	2,508	2,341	2,155	4,046	6,434	8,841	34,314	42,189	24,589	485	710	574	129,186
1978	1,019	3,472	28,335	76,538	57,279	124,220	147,234	236,730	213,457	51,682	5,708	13,514	959,188
1979	3,338	5,768	9,507	44,848	39,397	90,859	122,108	259,770	95,551	13,422	4,217	1,345	690,130
1980	10,089	17,149	18,809	243,378	156,679	96,375	134,049	201,723	177,159	70,288	7,416	2,648	1,135,762
1981	1,839	3,624	6,421	15,196	26,497	43,914	110,676	125,783	34,018	965	379	350	369,662
1982	6,020	76,794	128,089	89,265	202,484	149,102	292,511	306,367	191,932	66,494	18,139	20,264	1,547,461
1983	66,087	62,554	103,191	92,294	135,022	247,557	137,117	315,407	400,945	222,956	41,404	23,857	1,848,391
1984	16,670	161,577	194,151	90,964	63,124	90,224	94,713	228,586	109,725	22,786	4,926	2,740	1,080,186
1985	8,901	34,784	20,928	19,408	27,986	46,476	138,419	141,660	34,321	4,124	2,171	4,872	484,050
1986	6,002	14,137	29,275	70,831	340,205	237,479	142,872	207,460	147,827	24,115	6,385	5,725	1,232,313
1987	7,980	4,003	4,799	7,861	18,562	37,923	84,995	79,668	11,143	3,452	1,454	1,436	263,276
1988	1,916	5,549	10,310	17,570	19,195	41,048	65,979	67,393	21,987	1,948	0	0	252,895
1989	130	8,372	9,173	10,173	24,069	141,974	157,362	131,546	67,683	5,809	1,665	5,493	563,449
1990	12,032	15,947	11,974	17,319	15,899	57,461	96,518	72,503	33,326	4,096	1,284	0	338,359
1991	0	624	2,623	2,873	2,481	41,735	64,946	132,276	79,693	8,778	1,093	0	337,122
1992	3,779	7,258	7,721	8,285	35,498	51,284	105,644	53,742	8,336	8,340	0	0	289,887
1993	2,297	3,773	15,603	88,926	62,849	154,131	151,818	275,635	190,821	45,996	6,628	2,630	1,001,107
1994	4,548	3,893	5,899	7,794	13,882	41,909	74,164	91,283	26,099	433	0	0	269,904
1995	1,066	13,696	17,598	131,401	74,972	245,317	199,288	329,545	312,955	193,108	29,060	4,345	1,552,351
1996	3,302	3,308	28,591	50,709	163,967	133,526	159,932	274,525	123,511	23,175	5,444	1,629	971,619
1997	3,341	40,408	161,991	440,597	91,141	86,598	128,005	177,331	73,433	11,675	3,687	2,787	1,220,994
1998	4,752	9,475	12,498	73,277	125,657	159,047	151,973	214,822	347,745	142,004	16,768	9,807	1,267,825
1999	8,193	19,410	30,529	63,506	121,341	87,721	118,134	251,295	173,818	28,179	7,108	3,652	912,886
2000	4,229	10,700	9,200	59,427	102,052	99,588	139,823	212,282	73,750	16,030	7,400	6,541	741,022
2001	8,250	9,276	8,381	13,007	18,724	63,296	92,456	142,138	13,338	4,383	2,733	4,320	380,302
2002	120	14,397	31,744	46,302	38,086	67,461	137,833	163,607	64,657	10,364	4,226	1,697	580,494
2003	1,811	19,394	20,124	43,187	35,994	60,008	99,485	223,279	144,974	18,574	2,440	2,405	671,675
2004	2,818	6,085	30,171	23,409	45,058	109,863	122,467	117,506	33,680	6,452	2,495	1,920	501,924
2005	10,417	11,876	27,251	68,816	66,181	119,304	130,440	326,911	205,636	53,016	7,695	3,874	1,031,417
2006	7,503	10,644	139,305	144,666	94,168	138,785	311,065	358,706	203,655	35,205	8,202	5,916	1,457,820
2007	6,492	14,795	20,482	19,481	51,375	76,323	99,816	96,813	18,356	7,748	2,338	4,237	418,256
2008	1,908	5,148	8,791	20,275	27,658	53,051	84,827	145,887	53,169	4,813	2,140	3,740	411,407
2009	1,317	14,268	9,205	33,071	44,533	104,261	118,271	246,812	54,906	10,560	4,050	2,139	643,393
2010	10,510	4,980	12,677	27,120	32,310	60,378	106,850	175,026	235,415	34,112	5,601	4,333	709,312
2011	33,909	27,268	127,703	71,840	52,219	171,437	200,259	222,415	319,502	148,321	17,358	7,011	1,399,242
2012	12,069	8,138	6,471	24,582	16,037	60,623	146,087	110,288	23,332	5,434	3,020	2,000	418,081
2013	4,095	15,724	87,769	34,212	25,440	51,826	98,133	78,383	19,920	1,881	0	910	418,293
2014	1,178	2,730	1,887	4,909	33,062	46,198	78,737	76,570	13,538	2,850	1,995	576	264,230
2015	534	2,809	27,273	12,016	65,251	30,010	29,868	34,128	8,551	2,426	0	0	212,866
2016	1,332	6,671	30,172	59,090	65,820	160,723	145,533	151,124	69,327	4,177	1,182	0	695,151
2017	38,406	22,028	99,793	264,238	407,384	176,441	222,662	322,710	266,185	58,884	17,256	5,381	1,901,368
2018	3,659	45,413	15,695	41,240	18,090	126,655	204,985	109,771	28,802	3,794	230	0	598,334
2019	2,113	6,776	13,203	47,970	127,655	164,873	235,097	254,791	293,004	60,023	8,890	5,105	1,219,500
2020	4,266	3,990	28,977	18,586	18,903	38,698	122,263	143,730	32,443	3,115	242	389	415,602
2021	846	3,549	5,008	9,115	18,483	26,279	68,344	67,020	8,483	0	0	0	207,127
Ave	7,089	17,288	39,470	60,262	65,980	88,848	125,609	184,617	115,871	30,217	5,687	3,661	744,600
Max	66,087	161,577	293,754	440,597	407,384	247,557	311,065	385,181	400,945	222,956	41,404	23,857	1,901,368
Min	0	624	1,887	2,873	2,481	8,841	29,868	34,128	7,877	0	0	0	129,186

TABLE 3A
MOCASIM - Modeled Mokelumne River Inflow to Pardee Reservoir 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	40,591	38,046	36,856	37,217	36,914	55,565	72,228	87,067	40,632	30,438	32,729	34,920	543,203
1955	36,599	39,754	33,500	28,868	25,954	36,053	28,682	47,107	51,521	31,690	32,294	30,755	422,777
1956	32,155	32,517	162,117	177,948	97,807	94,478	96,364	190,643	195,159	49,492	34,876	32,512	1,196,068
1957	38,544	41,775	44,089	35,413	39,809	47,914	40,987	91,985	127,609	31,863	29,383	30,529	599,900
1958	38,275	42,301	42,401	47,024	79,093	93,074	141,484	199,723	213,495	59,904	42,781	34,014	1,033,569
1959	38,480	37,071	32,692	38,391	43,800	39,604	22,839	25,234	29,129	30,812	30,594	29,055	397,701
1960	31,077	29,316	31,062	19,490	33,213	30,009	29,988	56,337	52,230	29,391	29,674	28,904	400,691
1961	29,585	28,859	30,739	22,286	14,225	16,524	17,285	20,540	28,478	29,163	27,985	28,294	293,963
1962	29,451	17,821	17,624	19,702	53,739	49,714	86,148	67,752	129,700	37,343	35,132	32,408	576,534
1963	38,791	36,527	36,743	45,945	81,649	45,165	103,676	213,427	138,025	40,081	36,742	34,717	851,488
1964	36,636	40,400	42,532	46,031	36,157	32,914	30,683	31,041	32,019	34,533	33,154	32,794	428,894
1965	35,189	41,585	201,589	160,693	85,458	72,729	112,668	133,305	160,046	55,302	43,242	54,244	1,156,050
1966	54,576	55,718	45,317	40,067	22,429	41,184	50,509	44,913	25,486	31,306	31,455	34,390	477,350
1967	31,850	38,982	70,614	66,962	53,772	98,734	108,206	161,068	248,630	126,810	38,389	36,673	1,080,690
1968	38,103	38,652	39,073	38,192	45,028	44,670	36,583	28,501	36,118	29,045	29,508	30,537	434,010
1969	31,223	38,804	43,410	161,192	102,591	96,347	147,681	281,263	218,724	69,841	47,882	44,891	1,283,849
1970	46,946	38,438	53,695	161,190	83,603	98,951	66,547	114,142	118,400	43,647	33,374	32,354	891,287
1971	35,095	51,213	73,365	64,146	60,512	76,383	72,074	65,089	127,214	57,830	52,386	39,625	774,932
1972	42,817	31,981	40,320	35,680	28,821	56,397	47,876	38,128	69,669	36,271	32,019	31,995	491,974
1973	35,948	38,426	44,910	75,827	78,285	78,378	76,414	136,456	100,665	44,819	32,514	32,895	775,537
1974	37,217	53,626	74,824	90,246	62,622	116,877	113,371	138,783	138,972	60,144	54,309	42,761	983,752
1975	34,288	29,403	31,803	27,293	36,185	73,993	72,137	107,182	176,230	65,565	53,611	51,064	758,754
1976	44,249	40,332	37,861	27,168	12,517	15,259	15,660	16,967	15,118	15,067	15,663	15,342	271,203
1977	10,800	10,959	7,933	10,043	5,040	6,413	12,442	16,725	14,352	14,828	14,308	15,683	139,526
1978	0	1,650	22,529	71,221	64,634	95,942	112,747	111,836	189,388	65,554	50,874	38,850	825,224
1979	35,312	33,092	30,472	48,082	48,190	80,545	85,240	116,971	90,350	37,395	33,971	30,172	669,792
1980	33,314	37,640	47,281	166,406	152,813	113,130	86,051	131,770	169,042	76,770	34,678	32,751	1,081,646
1981	33,772	31,993	36,773	40,939	33,765	33,650	40,385	30,456	30,465	32,399	26,487	28,241	399,325
1982	33,508	43,727	82,280	108,449	165,273	155,504	243,985	285,755	180,133	76,820	53,266	41,199	1,469,899
1983	45,932	82,183	120,861	118,297	149,925	242,205	139,118	209,124	370,590	207,070	67,894	55,790	1,808,989
1984	54,585	114,905	178,380	113,371	87,325	95,671	78,926	143,805	107,978	56,789	48,017	33,530	1,113,282
1985	37,493	45,003	42,010	23,597	34,376	50,088	60,973	31,284	28,778	29,199	32,405	32,199	447,405
1986	35,592	38,338	38,600	51,828	265,366	191,283	123,844	192,527	131,372	43,767	36,517	35,364	1,184,398
1987	36,410	36,520	32,129	24,626	16,956	24,207	21,212	16,257	20,295	31,088	30,167	26,764	316,631
1988	13,576	12,528	17,063	21,102	13,901	16,453	18,105	21,915	25,685	26,842	22,107	19,250	228,527
1989	12,739	12,017	12,529	12,905	14,082	59,855	80,289	105,073	68,884	33,356	30,096	31,897	473,722
1990	22,600	35,627	34,428	32,265	21,803	32,194	23,195	31,824	32,826	31,270	27,556	27,045	352,633
1991	30,897	8,024	11,152	3,832	7,205	21,800	25,208	29,267	42,305	32,007	27,713	27,951	267,361
1992	31,800	32,833	30,257	22,314	28,297	38,778	23,378	20,152	16,815	28,837	28,039	18,486	319,986
1993	18,504	14,086	23,448	74,957	72,839	119,566	102,757	175,532	175,916	51,628	52,094	33,551	914,878
1994	39,063	30,829	31,251	19,774	15,259	17,735	16,483	20,713	27,590	21,970	24,409	31,486	296,562
1995	31,899	13,195	31,775	108,907	72,415	202,913	163,135	248,981	300,943	180,788	48,890	45,493	1,449,334
1996	49,214	32,744	35,448	43,577	113,241	128,884	117,886	226,457	112,163	43,665	42,539	32,961	978,779
1997	31,784	51,993	140,355	347,766	111,611	93,724	93,982	146,623	80,094	37,716	39,390	35,133	1,210,171
1998	38,261	40,625	26,979	61,525	122,700	126,149	122,745	160,052	280,948	133,325	56,694	48,264	1,218,267
1999	41,232	40,657	48,235	68,131	118,890	89,619	86,019	122,231	153,274	57,824	39,493	35,983	901,588
2000	33,935	38,521	33,445	49,984	81,811	93,023	67,015	126,903	81,526	49,462	41,364	31,402	728,391
2001	33,152	35,164	33,668	18,714	17,194	37,066	52,798	43,109	30,633	32,395	29,926	26,264	390,083
2002	24,196	19,005	36,022	53,033	35,498	68,673	64,904	51,984	59,566	29,934	29,407	28,139	500,361
2003	30,453	32,917	39,668	56,121	48,720	47,080	58,551	104,313	121,955	34,051	30,930	33,290	638,049
2004	34,308	30,830	46,022	50,745	49,129	77,630	46,125	26,912	45,956	30,578	32,110	29,132	499,477
2005	16,090	31,708	44,132	82,858	77,355	122,718	120,903	179,515	167,849	71,407	47,137	39,172	1,000,845
2006	31,160	36,166	103,726	108,885	78,870	158,598	290,744	292,059	189,112	68,520	51,307	30,066	1,439,211
2007	32,913	35,795	44,540	31,729	34,756	45,582	27,785	33,968	26,585	30,140	29,040	28,010	400,843
2008	19,631	31,521	24,117	28,715	29,872	45,363	27,664	38,895	33,671	22,232	26,675	18,795	347,150
2009	29,496	31,025	27,660	40,912	37,476	78,731	68,605	158,267	55,888	37,772	32,776	23,607	622,214
2010	25,131	27,130	33,352	45,854	42,779	60,463	82,622	117,530	133,956	49,967	28,590	19,725	667,098
2011	37,736	37,895	127,688	103,128	80,105	185,007	180,523	185,301	252,319	152,870	35,418	23,499	1,401,489
2012	35,477	34,683	34,522	39,095	14,926	40,189	59,583	80,742	37,567	29,224	26,956	25,449	458,413
2013	25,977	32,680	66,651	47,150	41,030	47,119	39,891	33,568	25,486	26,896	26,585	22,935	435,968
2014	29,609	26,300	13,255	4,807	18,610	19,929	18,833	27,185	27,595	18,500	25,470	22,275	252,368
2015	27,514	25,847	33,248	19,281	27,448	15,523	29,922	27,060	26,458	15,847	15,567	13,965	277,680
2016	7,924	9,111	27,048	43,655	51,721	118,412	80,880	116,576	84,398	27,893	27,452	24,960	620,030
2017	37,416	34,747	66,579	257,399	365,154	200,458	240,754	283,860	246,671	82,180	40,102	33,993	1,889,313
2018	34,852	54,585	50,946	37,292	19,610	83,592	129,014	82,640	47,772	29,522	11,867	35,296	616,988
2019	27,803	24,992	33,005	52,983	104,447	159,083	191,992	199,407	250,058	89,797	45,467	35,745	1,214,779
2020	27,424	30,659	38,314	38,559	18,867	26,367	62,288	45,310	41,354	27,938	32,046	28,793	417,919
2021	28,995	29,505	34,156	15,284	15,665	26,928	16,037	20,857	17,991	17,267	20,954	16,402	260,041
Ave	32,459	34,905	49,133	63,045	62,369	76,541	79,789	105,411	104,821	49,495	35,065	31,538	724,571
Max	54,585	114,905	201,589	347,766	365,154	242,205	290,744	292,059	370,590	207,070	67,894	55,790	1,889,313
Min	0	1,650	7,933	3,832	5,040	6,413	12,442	16,257	14,352	14,828	11,867	13,965	139,526

TABLE 3B
MOCASIM - Modeled Mokelumne River Inflow to Pardee Reservoir Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	38,079	35,963	34,971	35,513	35,295	53,771	70,232	84,465	37,594	27,030	29,231	31,882	514,026
1955	34,087	37,671	31,615	27,164	24,335	34,259	26,686	44,505	48,483	28,282	28,796	27,717	393,600
1956	29,643	30,434	160,232	176,244	96,188	92,684	94,368	188,041	192,121	46,084	31,378	29,474	1,166,891
1957	36,032	39,692	42,204	33,709	38,190	46,120	38,991	89,383	124,571	28,455	25,885	27,491	570,723
1958	35,763	40,218	40,516	45,320	77,474	91,280	139,488	197,121	210,457	56,496	39,283	30,976	1,004,392
1959	35,968	34,988	30,807	36,687	42,181	37,810	20,843	22,632	26,091	27,404	27,096	26,017	368,524
1960	28,565	27,233	29,177	17,786	31,594	28,215	27,992	53,735	49,192	25,983	26,176	25,866	371,514
1961	27,073	26,776	28,854	20,582	12,606	14,730	15,289	17,938	25,440	25,755	24,487	25,256	264,786
1962	26,939	15,738	15,739	17,998	52,120	47,920	84,152	65,150	126,662	33,935	31,634	29,370	547,357
1963	36,279	34,444	34,858	44,241	80,030	43,371	101,680	210,825	134,987	36,673	33,244	31,679	822,311
1964	34,124	38,317	40,647	44,327	34,538	31,120	28,687	28,439	28,981	31,125	29,656	29,756	399,717
1965	32,677	39,502	199,704	158,989	83,839	70,935	110,672	130,703	157,008	51,894	39,744	51,206	1,126,873
1966	52,064	53,635	43,432	38,363	20,810	39,390	48,513	42,311	22,448	27,898	27,957	31,352	448,173
1967	29,338	36,899	68,729	65,258	52,153	96,940	106,210	158,466	245,592	123,402	34,891	33,635	1,051,513
1968	35,591	36,569	37,188	36,488	43,409	42,876	34,587	25,899	33,080	25,637	26,010	27,499	404,833
1969	28,711	36,721	41,525	159,488	100,972	94,553	145,685	278,661	215,686	66,433	44,384	41,853	1,254,672
1970	44,434	36,355	51,810	159,486	81,984	97,157	64,551	111,540	115,362	40,239	29,876	29,316	862,110
1971	32,583	49,130	71,480	62,442	58,893	74,589	70,078	62,487	124,176	54,422	48,888	36,587	745,755
1972	40,305	29,898	38,435	33,976	27,202	54,603	45,880	35,526	66,631	32,863	28,521	28,957	462,797
1973	33,436	36,343	43,025	74,123	76,666	76,584	74,418	133,854	97,627	41,411	29,016	29,857	746,360
1974	34,705	51,543	72,939	88,542	61,003	115,083	111,375	136,181	135,934	56,736	50,811	39,723	954,575
1975	31,776	27,320	29,918	25,589	34,566	72,199	70,141	104,580	173,192	62,157	50,113	48,026	729,577
1976	41,737	38,249	35,976	25,464	10,898	13,465	13,664	14,365	12,080	11,659	12,165	12,304	242,026
1977	8,288	8,876	6,048	8,339	3,421	4,619	10,446	14,123	11,314	11,420	10,810	12,645	110,349
1978	0	0	20,644	69,517	63,015	94,148	110,751	109,234	186,350	62,146	47,376	35,812	798,993
1979	32,800	31,009	28,587	46,378	46,571	78,751	83,244	114,369	87,312	33,987	30,473	27,134	640,615
1980	30,802	35,557	45,396	164,702	151,194	111,336	84,055	129,168	166,004	73,362	31,180	29,713	1,052,469
1981	31,260	29,910	34,888	39,235	32,146	31,856	38,389	27,854	27,427	28,991	22,989	25,203	370,148
1982	30,996	41,644	80,395	106,745	163,654	153,710	241,989	283,153	177,095	73,412	49,768	38,161	1,440,722
1983	43,420	80,100	118,976	116,593	148,306	240,411	137,122	206,522	367,552	203,662	64,396	52,752	1,779,812
1984	52,073	112,822	176,495	111,667	85,706	93,877	76,930	141,203	104,940	53,381	44,519	30,492	1,084,105
1985	34,981	42,920	40,125	21,893	32,757	48,294	58,977	28,682	25,740	25,791	28,907	29,161	418,228
1986	33,080	36,255	36,715	50,124	263,747	189,489	121,848	189,925	128,334	40,359	33,019	32,326	1,155,221
1987	33,898	34,437	30,244	22,922	15,337	22,413	19,216	13,655	17,257	27,680	26,669	23,726	287,454
1988	11,064	10,445	15,178	19,398	12,282	14,659	16,109	19,313	22,647	23,434	18,609	16,212	199,350
1989	10,227	9,934	10,644	11,201	12,463	58,061	78,293	102,471	65,846	29,948	26,598	28,859	444,545
1990	20,088	33,544	32,543	30,561	20,184	30,400	21,199	29,222	29,788	27,862	24,058	24,007	323,456
1991	28,385	5,941	9,267	2,128	5,586	20,006	23,212	26,665	39,267	28,599	24,215	24,913	238,184
1992	29,288	30,750	28,372	20,610	26,678	36,984	21,382	17,550	13,777	25,429	24,541	15,448	290,809
1993	15,992	12,003	21,563	73,253	71,220	117,772	100,761	172,930	172,878	48,220	48,596	30,513	885,701
1994	36,551	28,746	29,366	18,070	13,640	15,941	14,487	18,111	24,552	18,562	20,911	28,448	267,385
1995	29,387	11,112	29,890	107,203	70,796	201,119	161,139	246,379	297,905	177,380	45,392	42,455	1,420,157
1996	46,702	30,661	33,563	41,873	111,622	127,090	115,890	223,855	109,125	40,257	39,041	29,923	949,602
1997	29,272	49,910	138,470	346,062	109,992	91,930	91,986	144,021	77,056	34,308	35,892	32,095	1,180,994
1998	35,749	38,542	25,094	59,821	121,081	124,355	120,749	157,450	277,910	129,917	53,196	45,226	1,189,090
1999	38,720	38,574	46,350	66,427	117,271	87,825	84,023	119,629	150,236	54,416	35,995	32,945	872,411
2000	31,423	36,438	31,560	48,280	80,192	91,229	65,019	124,301	78,488	46,054	37,866	28,364	699,214
2001	30,640	33,081	31,783	17,010	15,575	35,272	50,802	40,507	27,595	28,987	26,428	23,226	360,906
2002	21,684	16,922	34,137	51,329	33,879	66,879	62,908	49,382	56,528	26,526	25,909	25,101	471,184
2003	27,941	30,834	37,783	54,417	47,101	45,286	56,555	101,711	118,917	30,643	27,432	30,252	608,872
2004	31,796	28,747	44,137	49,041	47,510	75,835	44,130	24,309	42,918	27,170	28,612	26,095	470,300
2005	13,577	29,624	42,247	81,154	75,736	120,924	118,908	176,912	164,812	67,999	43,639	36,135	971,669
2006	28,648	34,082	101,841	107,181	77,251	156,803	288,748	289,457	186,074	65,112	47,808	27,029	1,410,034
2007	30,401	33,712	42,655	30,025	33,137	43,788	25,789	31,365	23,547	26,732	25,542	24,973	371,666
2008	17,119	29,437	22,232	27,011	28,253	43,568	25,668	36,292	30,633	18,824	23,177	15,758	317,973
2009	26,984	28,941	25,775	39,208	35,857	76,937	66,609	155,664	52,851	34,364	29,278	20,570	593,038
2010	22,618	25,047	31,467	44,150	41,160	58,669	80,626	114,928	130,918	46,559	25,092	16,687	637,921
2011	35,224	35,812	125,803	101,424	78,486	183,213	178,527	182,699	249,281	149,462	31,920	20,461	1,372,312
2012	32,965	32,600	32,637	37,391	13,307	38,395	57,587	78,140	34,529	25,816	23,458	22,411	429,236
2013	23,465	30,597	64,766	45,446	39,411	45,325	37,895	30,966	22,448	23,488	23,087	19,897	406,791
2014	27,097	24,217	11,370	3,103	16,991	18,135	16,837	24,583	24,557	15,092	21,972	19,237	223,191
2015	25,002	23,764	31,363	17,577	25,829	13,729	27,926	24,458	23,420	12,439	12,069	10,927	248,503
2016	5,412	7,028	25,163	41,951	50,102	116,618	78,884	113,974	81,360	24,485	23,954	21,922	590,853
2017	34,904	32,664	64,694	255,695	363,535	198,664	238,758	281,258	243,633	78,772	36,604	30,955	1,860,136
2018	32,340	52,502	49,061	35,588	17,991	81,798	127,018	80,038	44,734	26,114	8,369	32,258	587,811
2019	25,291	22,909	31,120	51,279	102,828	157,289	189,996	196,805	247,020	86,389	41,969	32,707	1,185,602
2020	24,912	28,576	36,429	36,855	17,248	24,573	60,292	42,708	38,316	24,530	28,548	25,755	388,742
2021	26,483	27,422	32,271	13,580	14,046	25,134	14,041	18,255	14,953	13,859	17,456	13,364	230,864
Ave	29,984	32,828	47,248	61,341	60,750	74,746	77,793	102,809	101,783	46,087	31,567	28,501	695,437
Max	52,073	112,822	199,704	346,062	363,535	240,411	288,748	289,457	367,552	203,662	64,396	52,752	1,860,136
Min	0	0	6,048	2,128	3,421	4,619	10,446	13,655	11,314	11,420	8,369	10,927	110,349

TABLE 4A
MOCASIM - Inflow to Pardee Reservoir (Mokelumne River + Local Inflow) 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	40,591	38,046	36,856	37,586	37,747	56,795	72,525	87,067	40,632	30,438	32,729	34,920	545,932
1955	36,599	39,754	35,590	34,033	26,676	36,299	28,860	47,169	51,521	31,690	32,294	30,755	431,240
1956	32,155	32,517	169,126	187,786	99,130	94,908	96,483	190,705	195,159	49,492	34,876	32,512	1,214,849
1957	38,544	41,775	44,089	35,413	40,087	51,480	41,046	92,047	127,609	31,863	29,383	30,529	603,865
1958	38,275	42,301	42,401	48,992	85,924	99,961	150,826	199,846	213,495	59,904	42,781	34,014	1,058,719
1959	38,480	37,071	32,692	38,637	47,743	39,788	22,898	25,234	29,129	30,812	30,594	29,055	402,134
1960	31,077	29,316	31,062	19,490	33,673	30,624	29,988	56,337	52,230	29,391	29,674	28,904	401,766
1961	29,585	28,859	30,739	22,286	14,336	16,647	17,285	20,540	28,478	29,163	27,985	28,294	294,197
1962	29,451	17,821	17,624	19,702	58,015	51,743	86,207	67,752	129,700	37,343	35,132	32,408	582,899
1963	38,853	36,527	37,050	46,499	84,592	46,456	107,127	213,612	138,025	40,081	36,742	34,717	860,281
1964	36,636	40,698	42,655	47,876	36,329	32,975	30,742	31,041	32,019	34,533	33,154	32,794	431,453
1965	35,189	42,002	209,152	163,153	86,346	74,881	115,346	133,305	160,046	55,302	43,242	54,244	1,172,207
1966	54,638	57,504	48,207	41,420	23,706	41,368	50,568	44,913	25,486	31,306	31,455	34,390	484,961
1967	31,850	38,982	72,274	75,202	54,383	104,391	114,394	161,253	248,689	126,810	38,389	36,673	1,103,290
1968	38,165	39,902	41,102	39,176	46,811	45,592	36,642	28,501	36,118	29,045	29,508	30,537	441,099
1969	31,223	38,864	43,410	169,124	111,588	97,823	151,965	281,325	218,724	69,841	47,882	44,891	1,306,659
1970	46,946	38,438	55,724	167,277	84,547	100,550	66,547	114,142	118,400	43,647	33,374	32,354	901,946
1971	35,095	54,903	78,776	66,790	60,512	79,457	72,074	65,089	127,214	57,830	52,386	39,625	789,750
1972	42,817	31,981	42,656	36,725	29,166	56,397	47,876	38,128	69,669	36,271	32,019	31,995	495,701
1973	35,948	38,486	45,586	82,529	85,949	81,575	76,414	136,456	100,665	44,819	32,514	32,895	793,836
1974	37,217	55,293	80,112	94,058	63,233	120,505	115,275	138,845	138,972	60,144	54,309	42,761	1,000,723
1975	34,288	29,403	31,803	27,293	39,739	79,158	72,137	107,244	176,230	65,565	53,611	51,064	767,535
1976	44,249	40,332	37,861	27,168	13,782	15,259	15,660	16,967	15,118	15,067	15,663	15,342	272,468
1977	10,800	10,959	7,933	10,043	5,040	6,413	12,442	16,725	14,352	14,828	14,308	15,683	139,526
1978	0	1,650	23,267	78,477	67,522	99,324	115,901	112,021	189,388	65,554	50,874	38,850	842,826
1979	35,312	33,092	30,472	52,263	52,466	84,296	85,240	116,971	90,350	37,395	33,971	30,172	682,000
1980	33,314	37,640	47,588	169,727	158,162	115,159	85,753	133,307	170,351	77,754	35,723	33,703	1,098,182
1981	34,387	32,410	38,187	42,845	34,265	35,433	41,218	31,317	27,608	32,953	27,040	28,181	405,845
1982	33,324	43,966	86,461	119,578	172,104	163,682	252,316	296,147	183,108	75,959	51,421	38,521	1,516,586
1983	49,806	85,813	129,223	127,951	158,589	257,638	144,176	215,580	368,150	207,624	70,538	57,932	1,873,020
1984	57,537	118,595	183,914	116,507	88,245	96,778	78,628	143,744	107,502	58,204	50,723	35,374	1,135,749
1985	37,985	46,372	43,362	24,151	34,542	49,780	59,604	32,207	29,254	29,445	32,713	32,199	451,614
1986	35,285	37,803	38,661	53,427	280,305	211,205	125,986	196,524	129,884	44,628	36,640	33,936	1,224,284
1987	35,611	35,985	31,698	24,565	18,178	25,867	20,676	16,011	20,057	30,350	29,614	26,347	314,959
1988	13,085	12,528	16,632	22,393	14,304	15,900	18,343	21,669	24,911	27,949	23,214	19,666	230,594
1989	12,985	12,434	12,775	13,459	14,304	61,577	78,920	105,565	67,218	33,233	30,219	31,123	473,811
1990	21,924	35,330	34,243	31,835	22,747	33,178	23,790	32,685	33,361	31,639	27,741	27,640	356,112
1991	30,775	7,727	11,213	4,386	8,038	26,657	25,863	29,759	42,186	32,376	28,143	28,308	275,430
1992	31,923	33,548	30,810	22,683	31,691	39,085	23,973	20,890	16,755	29,083	28,408	19,081	327,930
1993	18,382	14,622	23,755	83,504	73,505	118,644	99,603	171,659	172,345	43,758	52,524	33,908	906,209
1994	38,203	29,818	31,743	20,819	16,703	18,227	17,673	21,820	27,709	22,339	25,208	32,021	302,282
1995	32,084	13,136	32,267	116,778	71,804	207,217	159,327	250,518	303,620	181,834	50,796	48,230	1,467,610
1996	50,567	33,221	36,677	45,791	116,059	129,314	115,982	220,431	110,497	45,817	43,707	33,853	981,917
1997	24,222	51,815	142,753	353,177	115,332	94,277	92,792	145,086	78,547	38,331	40,189	35,430	1,211,950
1998	37,155	40,149	27,163	67,244	134,474	128,178	123,340	158,884	278,329	133,387	57,432	47,788	1,233,522
1999	41,110	40,062	46,083	65,154	122,843	85,202	81,420	117,110	147,259	57,826	39,467	35,592	879,127
2000	32,008	38,083	33,329	51,204	87,318	89,714	63,818	123,506	78,968	44,909	37,020	29,428	709,305
2001	30,722	32,926	31,538	17,978	17,950	37,039	50,768	42,080	30,205	32,250	29,567	25,762	378,785
2002	23,826	18,216	35,717	50,874	34,389	67,921	61,383	50,273	58,868	30,106	27,583	27,031	486,187
2003	30,375	33,208	40,813	52,672	47,039	44,911	56,148	99,822	112,588	32,239	29,650	32,297	611,762
2004	33,411	29,202	45,542	50,309	50,837	78,713	46,160	26,197	43,582	29,191	30,425	27,523	491,092
2005	15,409	31,227	41,666	84,512	76,750	120,516	117,792	174,700	163,724	69,140	45,082	37,285	977,804
2006	30,000	34,469	94,356	103,998	79,116	150,709	289,596	291,555	179,837	66,828	50,039	28,915	1,399,416
2007	32,579	35,320	43,944	30,939	35,666	44,312	26,758	33,148	25,437	28,975	27,566	26,173	390,817
2008	18,285	29,763	22,290	28,927	29,688	43,899	26,285	36,573	31,789	22,170	26,542	18,036	334,246
2009	28,521	30,133	26,155	39,532	37,239	77,897	64,920	155,810	55,350	37,164	31,576	22,742	607,038
2010	23,970	26,039	31,977	46,378	42,524	59,623	80,559	113,428	130,029	47,313	27,031	18,398	647,268
2011	36,862	36,988	125,590	101,963	81,113	185,887	180,776	185,354	248,747	151,889	34,664	23,130	1,392,963
2012	35,056	33,893	33,131	38,366	15,107	40,547	58,585	79,844	36,734	28,502	26,246	24,871	450,882
2013	25,086	32,080	66,422	46,118	39,848	44,900	38,590	32,807	25,420	27,223	27,010	23,519	429,023
2014	30,109	27,551	13,549	5,378	19,779	20,659	19,456	27,291	26,678	18,211	24,016	22,116	254,793
2015	27,637	25,645	34,077	19,932	28,625	15,696	30,074	26,962	26,532	15,691	15,375	13,558	279,804
2016	8,327	8,400	26,891	44,563	51,607	120,406	80,138	114,092	85,317	27,694	27,395	24,824	619,654
2017	37,319	35,223	65,157	257,726	362,065	199,242	235,587	292,488	260,574	83,946	41,619	35,567	1,906,513
2018	35,962	57,474	54,063	39,826	20,607	84,736	136,065	85,517	49,222	31,053	12,910	37,261	644,696
2019	28,886	26,957	34,549	55,544	102,183	149,965	185,409	199,242	252,414	87,657	43,772	34,581	1,201,159
2020	26,994	29,200	37,677	37,374	19,739	26,149	59,486	43,023	41,337	28,992	33,252	29,511	412,734
2021	29,373	29,565	34,304	16,037	16,025	27,371	16,677	20,760	18,105	17,267	20,954	16,402	262,840
Ave	32,270	35,015	49,796	64,928	64,271	77,772	79,807	105,274	104,228	49,280	34,994	31,443	729,079
Max	57,537	118,595	209,152	353,177	362,065	257,638	289,596	296,147	368,150	207,624	70,538	57,932	1,906,513
Min	0	1,650	7,933	4,386	5,040	6,413	12,442	16,011	14,352	14,828	12,910	13,558	139,526

TABLE 4B
MOCASIM - Inflow to Pardee Reservoir (Mokelumne River + Local Inflow) Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	38,079	35,963	34,971	35,882	36,128	55,000	70,530	84,465	37,594	27,030	29,231	31,882	516,755
1955	34,087	37,671	33,705	32,329	25,057	34,504	26,865	44,566	48,483	28,282	28,796	27,717	402,064
1956	29,643	30,434	167,241	186,082	97,511	93,114	94,487	188,102	192,121	46,084	31,378	29,474	1,185,673
1957	36,032	39,692	42,204	33,709	38,467	49,686	39,051	89,444	124,571	28,455	25,885	27,491	574,688
1958	35,763	40,218	40,516	47,288	84,305	98,166	148,830	197,244	210,457	56,496	39,283	30,976	1,029,542
1959	35,968	34,988	30,807	36,933	46,124	37,994	20,903	22,632	26,091	27,404	27,096	26,017	372,957
1960	28,565	27,233	29,177	17,786	32,054	28,829	27,992	53,735	49,192	25,983	26,176	25,866	372,589
1961	27,073	26,776	28,854	20,582	12,717	14,853	15,289	17,938	25,440	25,755	24,487	25,256	265,020
1962	26,939	15,738	15,739	17,998	56,396	49,949	84,212	65,150	126,662	33,935	31,634	29,370	553,722
1963	36,341	34,444	35,165	44,795	82,973	44,662	105,131	211,009	134,987	36,673	33,244	31,679	831,104
1964	34,124	38,615	40,770	46,172	34,710	31,181	28,747	28,439	28,981	31,125	29,656	29,756	402,276
1965	32,677	39,919	207,267	161,449	84,727	73,087	113,350	130,703	157,008	51,894	39,744	51,206	1,143,030
1966	52,126	55,420	46,322	39,716	22,087	39,574	48,573	42,311	22,448	27,898	27,957	31,352	455,784
1967	29,338	36,899	70,389	73,498	52,763	102,596	112,399	158,650	245,652	123,402	34,891	33,635	1,074,113
1968	35,653	37,819	39,217	37,472	45,192	43,798	34,647	25,899	33,080	25,637	26,010	27,499	411,922
1969	28,711	36,781	41,525	167,420	109,969	96,028	149,970	278,722	215,686	66,433	44,384	41,853	1,277,482
1970	44,434	36,355	53,839	165,574	82,928	98,755	64,551	111,540	115,362	40,239	29,876	29,316	872,769
1971	32,583	52,820	76,891	65,086	58,893	77,663	70,078	62,487	124,176	54,422	48,888	36,587	760,574
1972	40,305	29,898	40,771	35,022	27,547	54,603	45,880	35,526	66,631	32,863	28,521	28,957	466,524
1973	33,436	36,403	43,701	80,825	84,330	79,781	74,418	133,854	97,627	41,411	29,016	29,857	764,660
1974	34,705	53,209	78,227	92,354	61,613	118,710	113,279	136,242	135,934	56,736	50,811	39,723	971,546
1975	31,776	27,320	29,918	25,589	38,120	77,364	70,141	104,641	173,192	62,157	50,113	48,026	738,358
1976	41,737	38,249	35,976	25,464	12,163	13,465	13,664	14,365	12,080	11,659	12,165	12,304	243,292
1977	8,288	8,876	6,048	8,339	3,421	4,619	10,446	14,123	11,314	11,420	10,810	12,645	110,349
1978	0	0	21,382	76,773	65,902	97,529	113,905	109,418	186,350	62,146	47,376	35,812	816,594
1979	32,800	31,009	28,587	50,559	50,847	82,501	83,244	114,369	87,312	33,987	30,473	27,134	652,823
1980	30,802	35,557	45,703	168,023	156,543	113,365	83,758	130,705	167,313	74,346	32,225	30,665	1,069,005
1981	31,875	30,327	36,302	41,141	32,645	33,639	39,222	28,714	24,571	29,545	23,542	25,144	376,668
1982	30,812	41,882	84,576	117,875	170,485	161,887	250,320	293,544	180,071	72,552	47,923	35,484	1,487,409
1983	47,294	83,730	127,338	126,247	156,969	255,844	142,180	212,978	365,113	204,216	67,040	54,894	1,843,842
1984	55,025	116,512	182,029	114,803	86,626	94,983	76,633	141,141	104,464	54,796	47,224	32,337	1,106,572
1985	35,473	44,289	41,478	22,447	32,923	47,986	57,609	29,604	26,216	26,037	29,214	29,161	422,437
1986	32,773	35,720	36,776	51,723	278,686	209,411	123,990	193,921	126,847	41,220	33,142	30,898	1,195,107
1987	33,099	33,902	29,813	22,861	16,558	24,073	18,681	13,409	17,019	26,943	26,115	23,310	285,782
1988	10,572	10,445	14,747	20,689	12,684	14,105	16,347	19,067	21,874	24,541	19,716	16,629	201,417
1989	10,473	10,351	10,890	11,755	12,685	59,782	76,925	102,963	64,180	29,825	26,721	28,086	444,634
1990	19,412	33,247	32,358	30,131	21,128	31,383	21,794	30,082	30,324	28,231	24,242	24,602	326,935
1991	28,262	5,644	9,328	2,682	6,419	24,863	23,867	27,157	39,148	28,968	24,645	25,270	246,253
1992	29,411	31,464	28,925	20,979	30,071	37,291	21,977	18,288	13,718	25,675	24,910	16,043	298,753
1993	15,869	12,539	21,870	81,800	71,886	116,849	97,608	169,056	169,308	40,350	49,026	30,870	877,031
1994	35,691	27,735	29,858	19,116	15,084	16,432	15,677	19,217	24,671	18,931	21,710	28,984	273,105
1995	29,572	11,053	30,382	115,074	70,185	205,423	157,331	247,916	300,583	178,426	47,298	45,193	1,438,433
1996	48,055	31,137	34,793	44,087	114,440	127,520	113,986	217,829	107,459	42,410	40,209	30,816	952,740
1997	21,709	49,732	140,868	351,473	113,713	92,483	90,796	142,483	75,509	34,923	36,691	32,393	1,182,773
1998	34,643	38,066	25,278	65,540	132,854	126,384	121,344	156,281	275,292	129,979	53,934	44,750	1,204,345
1999	38,597	37,979	44,198	63,450	121,224	83,408	79,424	114,508	144,221	54,418	35,969	32,554	849,950
2000	29,496	36,000	31,444	49,500	85,699	87,920	61,822	120,904	75,930	41,501	33,522	26,390	680,128
2001	28,210	30,843	29,653	16,274	16,331	35,245	48,772	39,478	27,167	28,842	26,069	22,724	349,608
2002	21,314	16,133	33,832	49,170	32,770	66,127	59,387	47,671	55,830	26,698	24,085	23,993	457,010
2003	27,863	31,125	38,928	50,968	45,420	43,117	54,152	97,220	109,550	28,831	26,152	29,259	582,585
2004	30,899	27,119	43,657	48,605	49,218	76,918	44,165	23,594	40,544	25,783	26,927	24,486	461,915
2005	12,896	29,143	39,781	82,808	75,131	118,722	115,797	172,097	160,687	65,732	41,584	34,248	948,628
2006	27,488	32,385	92,471	102,294	77,497	148,914	287,600	288,953	176,799	63,420	46,540	25,878	1,370,239
2007	30,067	33,237	42,059	29,235	34,047	42,518	24,762	30,545	22,399	25,567	24,068	23,136	361,640
2008	15,773	27,679	20,405	27,223	28,069	42,104	24,289	33,970	28,751	18,762	23,044	14,999	305,069
2009	26,009	28,049	24,270	37,828	35,620	76,103	62,924	153,207	52,313	33,756	28,078	19,705	577,862
2010	21,457	23,956	30,092	44,674	40,905	57,829	78,563	110,826	126,991	43,905	23,533	15,360	618,091
2011	34,350	34,905	123,705	100,259	79,494	184,093	178,780	182,752	245,709	148,481	31,166	20,092	1,363,786
2012	32,544	31,810	31,246	36,662	13,488	38,753	56,589	77,242	33,696	25,094	22,748	21,833	421,705
2013	22,574	29,997	64,537	44,414	38,229	43,106	36,594	30,205	22,382	23,815	23,512	20,481	399,846
2014	27,597	25,468	11,664	3,674	18,160	18,865	17,460	24,689	23,640	14,803	20,518	19,078	225,616
2015	25,125	23,562	32,192	18,228	27,006	13,902	28,078	24,360	23,494	12,283	11,877	10,520	250,627
2016	5,815	6,317	25,006	42,859	49,988	118,612	78,142	111,490	82,279	24,286	23,897	21,786	590,477
2017	34,807	33,140	63,272	256,022	360,446	197,448	233,591	289,886	257,536	80,538	38,121	32,529	1,877,336
2018	33,450	55,391	52,178	38,122	18,988	82,942	134,069	82,915	46,184	27,645	9,412	34,223	615,519
2019	26,374	24,874	32,664	53,840	100,564	148,171	183,413	196,640	249,376	84,249	40,274	31,543	1,171,982
2020	24,482	27,117	35,792	35,670	18,120	24,355	57,490	40,421	38,299	25,584	29,754	26,473	383,557
2021	26,861	27,482	32,419	14,333	14,406	25,577	14,681	18,158	15,067	13,859	17,456	13,364	233,663
Ave	29,795	32,938	47,912	63,224	62,652	75,977	77,811	102,671	101,191	45,872	31,496	28,406	699,945
Max	55,025	116,512	207,267	351,473	360,446	255,844	287,600	293,544	365,113	204,216	67,040	54,894	1,877,336
Min	0	0	6,048	2,682	3,421	4,619	10,446	13,409	11,314	11,420	9,412	10,520	110,349

TABLE 5A
MOCASIM - Lower Mokelumne Needs 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	20,602	19,339	19,984	19,984	18,050	19,984	24,511	32,928	31,938	24,680	21,617	14,176	267,792
1955	18,788	14,876	15,372	15,372	13,884	15,372	21,476	27,518	21,858	24,680	21,617	14,176	224,988
1956	18,788	14,876	15,372	15,372	14,380	16,791	39,685	56,170	44,859	32,583	27,547	18,410	314,831
1957	22,079	19,339	19,984	19,984	18,050	19,984	24,511	36,328	36,538	30,080	25,017	16,176	288,068
1958	20,602	19,339	19,984	19,984	18,050	19,984	39,889	56,390	45,084	32,820	27,767	18,594	338,485
1959	22,219	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	250,883
1960	14,914	13,091	13,527	13,527	12,655	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,566
1961	14,914	13,091	13,527	13,527	12,218	13,527	13,748	15,107	18,294	19,533	16,343	11,092	174,921
1962	7,906	7,924	9,021	8,750	7,493	9,818	24,511	32,928	31,938	24,680	21,617	14,176	200,763
1963	14,914	13,091	13,527	13,527	12,218	13,527	24,511	36,328	36,538	30,080	25,017	16,176	249,455
1964	20,602	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	249,911
1965	14,914	13,091	13,527	13,527	12,218	13,527	38,786	55,198	43,864	31,533	26,574	17,598	294,357
1966	21,459	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	250,123
1967	18,788	14,876	15,372	15,372	13,884	16,810	39,705	56,192	44,881	32,606	27,569	18,428	314,484
1968	22,093	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	251,401
1969	14,914	13,091	13,527	13,527	12,218	15,526	41,637	58,282	47,019	34,862	29,658	20,175	314,437
1970	23,424	19,339	19,984	19,984	18,050	19,984	38,284	54,654	43,308	30,946	26,031	17,143	331,129
1971	21,113	19,339	19,984	19,984	18,050	19,984	24,511	36,328	36,538	30,080	25,017	16,176	287,102
1972	20,602	19,339	19,984	19,984	18,694	19,984	24,511	32,928	31,938	24,680	21,617	14,176	268,436
1973	18,788	14,876	15,372	15,372	13,884	15,372	24,699	36,531	36,745	30,299	25,219	16,345	263,502
1974	20,732	19,339	19,984	19,984	18,050	19,984	37,978	54,323	42,970	30,589	25,700	16,867	326,497
1975	20,902	19,339	19,984	19,984	18,050	19,984	24,511	36,328	36,538	30,080	25,017	16,176	286,892
1976	20,602	19,339	19,984	19,984	18,694	19,984	13,747	15,108	18,294	17,236	14,889	10,567	208,425
1977	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	17,236	14,889	10,567	140,691
1978	7,906	7,924	9,021	8,750	7,493	9,818	13,622	18,264	23,479	26,584	22,815	14,583	170,260
1979	19,984	19,339	19,984	19,984	18,050	19,984	24,511	36,328	36,538	30,080	25,017	16,176	285,973
1980	20,602	19,339	19,984	19,984	18,694	19,984	40,189	56,715	45,416	33,170	28,091	18,865	341,031
1981	22,426	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	251,089
1982	14,914	13,091	13,527	14,119	12,218	17,086	43,264	60,041	48,818	36,762	31,418	21,645	326,903
1983	24,545	19,339	19,984	19,984	18,050	20,222	43,264	60,041	48,818	36,762	31,418	21,645	364,070
1984	24,545	19,339	19,984	19,984	18,694	19,984	37,543	53,852	42,488	30,080	25,229	16,474	328,194
1985	20,602	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	249,266
1986	18,788	14,876	15,372	15,372	13,884	18,173	41,127	57,729	46,454	34,266	29,106	19,713	324,860
1987	23,072	19,339	19,984	19,984	18,050	19,984	13,748	15,107	18,294	19,533	16,343	11,092	214,528
1988	13,527	13,091	13,527	13,527	12,655	13,527	13,748	15,107	18,294	19,533	16,343	11,092	173,971
1989	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1990	10,241	7,924	9,021	8,750	7,493	9,756	21,602	25,559	18,294	19,533	16,343	11,389	165,906
1991	7,906	7,924	9,021	8,750	7,493	9,756	21,602	25,559	18,294	19,533	16,343	11,389	163,572
1992	7,906	7,924	9,021	8,750	7,642	9,756	13,748	15,107	18,294	19,533	16,343	11,092	145,116
1993	7,906	7,924	9,021	8,750	7,493	9,818	13,622	20,466	26,458	30,080	25,017	15,879	182,433
1994	20,602	19,339	19,984	19,984	18,050	19,984	13,748	15,107	18,294	19,533	16,343	11,092	212,058
1995	13,527	13,091	13,527	13,527	12,218	16,380	42,528	59,245	48,004	35,903	30,622	20,980	319,553
1996	24,038	19,339	19,984	19,984	18,694	19,984	39,731	56,220	44,910	32,636	27,596	18,452	341,566
1997	22,110	19,339	19,984	19,984	18,050	19,984	39,675	56,159	44,848	32,571	27,536	18,401	338,638
1998	22,072	19,339	19,984	19,984	18,050	19,984	41,605	58,247	46,983	34,825	29,624	20,146	350,840
1999	23,402	19,339	19,984	19,984	18,050	19,984	37,878	54,215	42,859	30,472	25,592	16,777	328,533
2000	20,833	19,339	19,984	19,984	18,050	19,984	24,511	36,328	36,538	30,080	25,017	16,176	286,823
2001	20,602	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	249,266
2002	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
2003	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
2004	19,984	19,339	19,984	19,984	18,694	19,984	24,511	32,928	31,938	24,680	21,617	14,176	267,818
2005	18,788	14,876	15,372	15,372	13,884	16,012	38,873	55,291	43,960	31,634	26,668	17,676	308,405
2006	21,519	19,339	19,984	19,984	18,050	19,984	42,154	58,841	47,590	35,466	30,217	20,642	353,767
2007	23,780	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	252,444
2008	14,914	13,091	13,527	13,527	12,655	13,527	21,602	25,559	18,294	19,533	16,343	11,389	193,962
2009	13,527	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	229,269
2010	14,914	13,091	13,527	13,527	12,218	13,527	24,511	36,328	36,538	30,080	25,017	16,176	249,455
2011	20,602	19,339	19,984	19,984	18,050	19,984	41,888	58,553	47,296	35,155	29,930	20,401	351,164
2012	23,597	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	252,905
2013	14,914	13,091	13,527	13,527	12,218	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,130
2014	14,914	13,091	13,527	13,527	12,218	13,527	13,748	15,107	18,294	19,533	16,343	11,092	174,921
2015	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	17,236	14,889	10,567	140,691
2016	7,906	7,924	9,021	8,750	7,642	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,782
2017	14,914	13,091	13,527	14,119	12,218	17,086	43,264	60,041	48,818	36,762	31,418	21,645	326,903
2018	24,545	19,339	19,984	19,984	18,050	19,984	24,511	33,244	32,365	25,182	21,933	14,362	273,481
2019	19,984	19,339	19,984	19,984	18,050	19,984	40,790	57,365	46,081	33,873	28,742	19,409	343,583
2020	22,840	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	252,149
2021	14,913	13,091	13,527	13,527	12,218	13,527	13,747	15,108	18,294	17,236	14,889	10,567	170,644
Ave	17,747	15,705	16,351	16,328	14,798	16,735	26,736	36,275	31,903	27,157	23,182	15,423	258,338
Max	24,545	19,339	19,984	19,984	18,694	20,222	43,264	60,041	48,818	36,762	31,418	21,645	364,070
Min	7,906	7,924	9,021	8,749	7,493	9,755	13,622	15,107	18,294	17,236	14,889	10,567	140,691

TABLE 5B
MOCASIM - Lower Mokelumne Needs Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	20,602	19,339	19,984	19,984	18,050	19,984	24,511	32,928	31,938	24,680	21,617	14,176	267,792
1955	14,914	13,091	13,527	13,527	12,218	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,130
1956	10,241	7,924	9,021	9,806	8,490	10,962	38,736	55,144	43,809	31,474	26,520	17,552	269,679
1957	21,425	19,339	19,984	19,984	18,050	19,984	24,511	32,928	31,938	24,680	21,617	14,176	268,614
1958	18,788	14,876	15,372	15,372	13,884	15,788	38,639	55,039	43,702	31,361	26,415	17,465	306,700
1959	21,358	19,339	19,984	19,984	18,050	19,984	21,602	25,559	18,294	19,533	16,343	11,389	231,418
1960	13,527	13,091	13,527	13,527	12,655	13,527	21,602	25,559	18,294	19,533	16,343	11,389	192,575
1961	7,906	7,924	9,021	8,750	7,493	9,756	13,748	15,107	18,294	19,533	16,343	11,092	144,968
1962	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1963	10,241	7,924	9,021	8,750	7,493	9,818	13,622	20,466	26,458	30,080	25,017	15,879	184,768
1964	20,602	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	249,911
1965	14,914	13,091	13,527	13,527	12,218	13,527	37,919	54,260	42,905	30,520	25,636	16,814	288,858
1966	20,862	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	249,526
1967	14,914	13,091	13,527	13,527	12,218	13,527	38,215	54,580	43,233	30,866	25,957	17,081	290,736
1968	21,066	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	250,374
1969	14,914	13,091	13,527	13,527	12,218	13,910	39,952	56,458	45,154	32,894	27,835	18,651	302,130
1970	22,262	19,339	19,984	19,984	18,050	19,984	37,543	50,452	37,888	24,680	21,829	14,474	306,467
1971	19,984	19,339	19,984	19,984	18,050	19,984	24,511	36,328	36,538	30,080	25,017	16,176	285,973
1972	20,602	19,339	19,984	19,984	18,694	19,984	24,511	32,928	31,938	24,680	21,617	14,176	268,436
1973	14,914	13,091	13,527	13,527	12,218	13,527	24,511	36,328	36,538	30,080	25,017	16,176	249,455
1974	20,602	19,339	19,984	19,984	18,050	19,984	37,543	53,852	42,488	30,080	25,229	16,474	323,607
1975	20,602	19,339	19,984	19,984	18,050	19,984	24,511	36,328	36,538	30,080	25,017	16,176	286,592
1976	20,602	19,339	19,984	19,984	18,694	19,984	13,747	15,108	18,294	17,236	14,889	10,567	208,425
1977	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	17,236	14,889	10,567	140,691
1978	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1979	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
1980	18,788	14,876	15,372	15,372	14,380	16,198	39,067	55,502	44,175	31,861	26,878	17,851	310,320
1981	21,653	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	250,317
1982	14,914	13,091	13,527	14,119	12,218	17,086	43,264	60,041	48,818	36,762	31,418	21,645	326,903
1983	24,545	19,339	19,984	19,984	18,050	20,222	43,264	60,041	48,818	36,762	31,418	21,645	364,070
1984	24,545	19,339	19,984	19,984	18,694	19,984	37,543	53,852	42,488	30,080	25,229	16,474	328,194
1985	20,602	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	249,266
1986	14,914	13,091	13,527	13,527	12,218	13,527	39,537	56,010	44,695	32,409	27,386	18,276	299,117
1987	21,977	19,339	19,984	19,984	18,050	19,984	13,748	15,107	18,294	19,533	16,343	11,092	213,432
1988	7,906	7,924	9,021	8,750	7,642	9,756	13,748	15,107	18,294	19,533	16,343	11,092	145,116
1989	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1990	10,241	7,924	9,021	8,750	7,493	9,756	13,748	15,107	18,294	19,533	16,343	11,092	147,302
1991	7,906	7,924	9,021	8,750	7,493	9,756	13,748	15,107	18,294	19,533	16,343	11,092	144,968
1992	7,906	7,924	9,021	8,750	7,642	9,756	13,748	15,107	18,294	19,533	16,343	11,092	145,116
1993	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1994	14,914	13,091	13,527	13,527	12,218	13,527	13,748	15,107	18,294	19,533	16,343	11,092	174,921
1995	7,906	7,924	9,021	11,203	9,463	12,476	16,395	23,465	29,526	33,319	28,016	18,385	207,100
1996	22,513	19,339	19,984	19,984	18,694	19,984	38,693	55,097	43,761	31,424	26,474	17,514	333,459
1997	21,395	19,339	19,984	19,984	18,050	19,984	38,925	51,948	39,418	26,295	23,324	15,723	314,367
1998	19,740	14,876	15,372	15,372	13,884	17,737	40,672	57,238	45,951	33,735	28,614	19,302	322,492
1999	22,759	19,339	19,984	19,984	18,050	19,984	37,543	53,852	42,488	30,080	25,229	16,474	325,764
2000	20,602	19,339	19,984	19,984	18,050	19,984	24,511	36,209	36,377	29,891	24,898	16,106	285,933
2001	20,560	19,339	19,984	19,984	18,050	19,984	21,602	25,559	18,294	19,533	16,343	11,389	230,620
2002	13,527	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	229,269
2003	10,241	7,924	9,021	8,750	7,493	9,818	24,511	32,928	31,938	24,680	21,617	14,176	203,097
2004	14,914	13,091	13,527	13,527	12,655	13,527	24,511	32,928	31,938	24,680	21,617	14,176	231,092
2005	14,914	13,091	13,527	13,527	12,218	13,527	37,543	53,852	42,488	30,080	25,229	16,474	286,471
2006	20,602	19,339	19,984	19,984	18,050	19,984	41,325	57,944	46,673	34,498	29,321	19,892	347,594
2007	23,209	19,339	19,984	19,984	18,050	19,984	21,602	25,559	18,294	19,533	16,343	11,389	233,268
2008	13,527	13,091	13,527	13,527	12,655	13,527	21,602	25,559	18,294	19,533	16,343	11,389	192,575
2009	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
2010	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
2011	14,914	13,091	13,527	13,527	12,218	14,971	41,058	57,655	46,377	34,186	29,031	19,651	310,206
2012	23,025	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	252,333
2013	14,914	13,091	13,527	13,527	12,218	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,130
2014	10,241	7,924	9,021	8,750	7,493	9,756	13,748	15,107	18,294	19,533	16,343	11,092	147,302
2015	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	17,236	14,889	10,567	140,691
2016	7,906	7,924	9,021	8,750	7,642	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,782
2017	10,241	7,924	9,021	13,812	11,557	15,303	19,343	26,654	32,788	36,762	31,205	21,050	235,660
2018	24,545	19,339	19,984	19,984	18,050	19,984	24,511	32,928	31,938	24,680	21,617	14,176	271,734
2019	18,788	14,876	15,372	15,372	13,884	16,548	39,432	55,896	44,579	32,287	27,273	18,181	312,486
2020	21,904	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	251,213
2021	14,913	13,091	13,527	13,527	12,218	13,527	13,747	15,108	18,294	17,236	14,889	10,567	170,644
Ave	16,024	14,233	14,940	14,999	13,524	15,445	25,036	33,529	30,014	25,998	22,224	14,764	240,730
Max	24,545	19,339	19,984	19,984	18,694	20,222	43,264	60,041	48,818	36,762	31,418	21,645	364,070
Min	7,906	7,924	9,021	8,749	7,493	9,755	13,622	15,107	18,294	17,236	14,889	10,567	140,691

TABLE 6A
MOCASIM - Total Camanche Release 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	20,602	19,339	19,984	19,984	18,050	19,984	24,511	32,928	31,938	24,680	21,617	14,176	267,792
1955	18,788	14,876	15,372	15,372	13,884	15,372	21,476	27,518	21,858	24,680	21,617	14,176	224,988
1956	18,788	14,876	128,568	182,113	67,714	22,153	39,685	134,072	107,857	72,684	67,648	57,218	913,374
1957	22,079	19,339	19,984	19,984	18,050	19,984	24,511	42,546	42,555	36,298	31,234	22,193	318,755
1958	20,602	19,339	19,984	19,984	64,721	67,651	119,112	170,227	111,483	78,239	73,185	62,547	827,073
1959	22,219	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	250,883
1960	14,914	13,091	13,527	13,527	12,655	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,566
1961	14,914	13,091	13,527	13,527	12,218	13,527	13,748	15,107	18,294	19,533	16,343	11,092	174,921
1962	7,906	7,924	9,021	8,750	7,493	9,818	24,511	32,928	31,938	24,680	21,617	14,176	200,763
1963	14,914	13,091	13,527	13,527	23,262	13,527	24,511	103,142	82,605	65,631	60,568	50,580	478,885
1964	20,602	41,996	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	272,568
1965	14,914	13,091	154,255	143,368	48,734	13,527	38,786	99,057	86,309	75,392	70,434	60,042	817,909
1966	21,459	38,167	22,472	22,401	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	273,858
1967	18,788	14,876	15,372	23,895	29,945	63,812	74,605	198,678	105,993	92,402	87,365	76,295	802,024
1968	22,093	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	251,401
1969	14,914	13,091	13,527	80,093	91,852	55,424	145,790	222,212	109,097	84,393	79,189	68,107	977,688
1970	23,424	19,339	29,248	215,501	60,491	36,066	38,284	60,649	49,110	36,940	32,025	22,945	624,020
1971	21,113	40,661	52,425	46,589	35,250	37,415	24,511	58,083	57,590	51,835	46,771	37,228	509,470
1972	20,602	23,885	27,022	19,984	18,694	19,984	24,511	32,928	31,938	24,680	21,617	14,176	280,022
1973	18,788	14,876	15,372	38,231	70,637	42,578	24,699	61,014	60,439	54,782	49,703	40,039	491,156
1974	20,732	83,425	58,852	88,001	18,050	57,951	44,760	94,353	81,709	70,619	65,730	55,606	739,787
1975	20,902	19,339	19,984	19,984	18,050	19,984	24,511	82,010	80,746	75,762	70,698	60,384	512,350
1976	20,602	23,631	19,984	19,984	18,694	19,984	13,747	15,108	18,294	17,236	14,889	10,567	212,717
1977	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	17,236	14,889	10,567	140,691
1978	7,906	7,924	9,021	8,750	7,493	9,818	13,622	19,204	24,389	27,524	23,755	15,493	174,900
1979	19,984	19,339	19,984	19,984	22,520	42,504	24,511	57,256	56,790	51,008	45,944	36,428	416,250
1980	20,602	19,339	19,984	197,218	142,682	37,247	40,189	97,150	84,547	73,606	68,526	57,996	859,084
1981	22,426	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	251,089
1982	14,914	13,091	23,233	94,205	168,569	115,414	226,748	197,884	104,308	94,102	88,758	77,135	1,218,358
1983	24,545	85,419	110,427	90,357	131,531	218,492	116,300	279,536	228,062	129,853	124,508	111,733	1,650,762
1984	24,545	141,329	171,012	97,041	55,851	27,907	37,543	74,950	62,906	51,178	46,327	36,891	827,478
1985	20,602	35,590	20,494	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	266,028
1986	18,788	14,876	15,372	15,372	281,462	172,404	41,127	109,916	77,733	66,588	61,428	50,992	926,057
1987	23,072	19,339	19,984	19,984	18,050	19,984	13,748	15,107	18,294	19,533	16,343	11,092	214,528
1988	13,527	13,091	13,527	13,527	12,655	13,527	13,748	15,107	18,294	19,533	16,343	11,092	173,971
1989	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1990	10,241	7,924	9,021	8,750	7,493	9,756	21,602	25,559	18,294	19,533	16,343	11,389	165,906
1991	7,906	7,924	9,021	8,750	7,493	9,756	21,602	25,559	18,294	19,533	16,343	11,389	163,572
1992	7,906	7,924	9,021	8,750	7,642	9,756	13,748	15,107	18,294	19,533	16,343	11,092	145,116
1993	7,906	7,924	9,021	8,750	7,493	9,818	13,622	32,944	38,534	42,559	37,495	27,955	244,022
1994	20,602	19,339	19,984	19,984	18,050	19,984	13,748	15,107	18,294	19,533	16,343	11,092	212,058
1995	13,527	13,091	13,527	13,527	12,218	125,959	160,999	283,845	135,267	111,780	106,499	94,409	1,084,648
1996	24,038	19,339	19,984	19,984	128,637	72,518	39,731	120,655	69,744	58,299	53,259	43,286	669,473
1997	22,110	37,086	149,003	378,921	92,707	32,444	39,675	59,107	47,701	35,519	30,484	21,254	946,012
1998	22,072	29,228	19,984	42,920	123,859	87,007	109,448	179,674	121,589	98,656	93,454	81,917	1,009,806
1999	23,402	19,792	19,984	40,792	109,578	49,620	37,878	84,534	72,200	60,791	55,910	46,117	620,596
2000	20,833	19,339	19,984	19,984	66,070	47,563	24,511	51,431	51,153	45,183	40,119	30,791	436,960
2001	20,602	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	249,266
2002	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
2003	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
2004	19,984	19,339	19,984	19,984	19,316	34,006	24,511	32,928	31,938	24,680	21,617	14,176	282,462
2005	18,788	14,876	15,372	15,372	14,329	82,732	49,052	137,541	92,704	69,258	64,292	54,087	628,404
2006	21,519	19,339	110,565	110,644	68,069	86,475	263,572	186,411	106,017	64,458	59,209	48,698	1,144,977
2007	23,780	21,379	22,937	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	257,437
2008	14,914	13,091	13,527	13,527	12,655	13,527	21,602	25,559	18,294	19,533	16,343	11,389	193,962
2009	13,527	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	229,269
2010	14,914	13,091	13,527	13,527	12,218	13,527	24,511	52,804	52,482	46,556	41,493	32,120	330,772
2011	20,602	42,879	105,117	57,134	36,575	139,202	161,893	199,515	107,798	97,076	91,850	80,324	1,139,965
2012	23,597	24,371	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	257,938
2013	14,914	13,091	13,527	13,527	12,218	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,130
2014	14,914	13,091	13,527	13,527	12,218	13,527	13,748	15,107	18,294	19,533	16,343	11,092	174,921
2015	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	17,236	14,889	10,567	140,691
2016	7,906	7,924	9,021	8,750	7,642	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,782
2017	14,914	13,091	13,527	217,908	335,026	155,463	206,009	184,732	126,245	81,591	76,247	65,027	1,489,780
2018	24,545	43,402	19,984	19,984	18,050	30,062	71,308	33,492	32,605	25,430	22,180	14,602	355,640
2019	19,984	19,339	19,984	19,984	84,817	112,492	150,712	154,076	126,881	76,471	71,340	60,633	916,709
2020	22,840	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	252,149
2021	14,913	13,091	13,527	13,527	12,218	13,527	13,747	15,108	18,294	17,236	14,889	10,567	170,644
Ave	17,747	21,922	29,636	43,183	43,501	39,432	46,427	70,188	52,712	43,973	39,998	31,696	480,414
Max	24,545	141,329	171,012	378,921	335,026	218,492	263,572	283,845	228,062	129,853	124,508	111,733	1,650,762
Min	7,906	7,924	9,021	8,749	7,493	9,755	13,622	15,107	18,294	17,236	14,889	10,567	140,691

TABLE 6B
MOCASIM - Total Camanche Release Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	20,602	19,339	19,984	19,984	18,050	19,984	24,511	32,928	31,938	24,680	21,617	14,176	267,792
1955	14,914	13,091	13,527	13,527	12,218	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,130
1956	10,241	7,924	9,021	158,295	62,323	15,591	38,736	119,599	98,307	60,118	55,164	45,272	680,592
1957	21,425	19,339	19,984	19,984	18,050	19,984	24,511	32,928	31,938	24,680	21,617	14,176	268,614
1958	18,788	14,876	15,372	15,372	14,190	60,751	112,278	161,622	101,933	65,712	60,766	50,708	692,367
1959	21,358	19,339	19,984	19,984	18,050	19,984	21,602	25,559	18,294	19,533	16,343	11,389	231,418
1960	13,527	13,091	13,527	13,527	12,655	13,527	21,602	25,559	18,294	19,533	16,343	11,389	192,575
1961	7,906	7,924	9,021	8,750	7,493	9,756	13,748	15,107	18,294	19,533	16,343	11,092	144,968
1962	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1963	10,241	7,924	9,021	8,750	7,493	9,818	13,622	25,469	31,300	35,084	30,020	20,720	209,461
1964	20,602	35,479	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	266,051
1965	14,914	13,091	76,050	137,428	43,818	13,527	37,919	85,290	72,935	61,551	56,667	46,844	660,034
1966	20,862	31,649	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	261,836
1967	14,914	13,091	13,527	13,527	12,218	13,527	55,707	190,072	96,443	79,916	75,006	64,549	642,497
1968	21,066	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	250,374
1969	14,914	13,091	13,527	13,527	64,314	48,524	138,956	213,606	99,547	71,923	66,864	56,421	815,216
1970	22,262	19,339	19,984	206,061	55,575	29,166	37,543	50,452	37,888	24,680	21,829	14,474	539,253
1971	19,984	25,908	46,202	40,650	30,334	30,515	24,511	45,399	45,316	39,151	34,087	24,954	407,010
1972	20,602	19,339	19,984	19,984	18,694	19,984	24,511	32,928	31,938	24,680	21,617	14,176	268,436
1973	14,914	13,091	13,527	13,527	12,218	24,649	24,511	48,394	48,214	42,146	37,082	27,852	320,124
1974	20,602	76,907	52,629	82,062	18,050	46,133	37,926	83,089	70,782	59,317	54,465	44,767	646,728
1975	20,602	19,339	19,984	19,984	18,050	19,984	24,511	63,239	62,581	56,991	51,928	42,219	419,410
1976	20,602	19,339	19,984	19,984	18,694	19,984	13,747	15,108	18,294	17,236	14,889	10,567	208,425
1977	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	17,236	14,889	10,567	140,691
1978	0	0	8,702	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	147,483
1979	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
1980	18,788	14,876	15,372	155,371	137,291	30,685	39,067	84,850	72,576	61,209	56,226	46,253	732,564
1981	21,653	19,339	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	250,317
1982	14,914	13,091	13,527	14,119	160,400	108,514	219,914	189,279	92,705	82,112	76,768	65,532	1,050,875
1983	24,545	78,901	104,204	84,418	126,615	211,592	109,466	270,931	218,512	117,176	111,831	99,464	1,557,655
1984	24,545	134,812	164,789	91,102	50,460	21,345	37,543	62,268	50,633	38,496	33,645	24,618	734,255
1985	20,602	29,073	19,984	19,984	18,050	19,984	21,476	27,518	21,858	24,680	21,617	14,176	259,000
1986	14,914	13,091	13,527	13,527	196,077	165,504	39,537	96,088	66,293	54,727	49,704	39,874	762,862
1987	21,977	19,339	19,984	19,984	18,050	19,984	13,748	15,107	18,294	19,533	16,343	11,092	213,432
1988	7,906	7,924	9,021	8,750	7,642	9,756	13,748	15,107	18,294	19,533	16,343	11,092	145,116
1989	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1990	10,241	7,924	9,021	8,750	7,493	9,756	13,748	15,107	18,294	19,533	16,343	11,092	147,302
1991	7,906	5,371	9,021	2,996	7,019	9,756	13,748	15,107	18,294	19,533	16,343	11,092	136,186
1992	7,906	7,924	9,021	8,750	7,642	9,756	13,748	15,107	13,007	19,533	16,343	11,092	139,830
1993	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
1994	14,914	13,091	13,527	13,527	12,218	13,527	13,748	15,107	18,294	19,533	16,343	11,092	174,921
1995	7,906	7,924	9,021	11,203	9,463	12,476	106,173	275,240	125,717	99,644	94,342	82,571	841,681
1996	22,513	19,339	19,984	19,984	104,457	65,957	38,693	106,263	58,239	46,385	41,434	31,991	575,238
1997	21,395	30,568	142,780	372,982	87,791	25,544	38,925	51,948	39,418	26,295	23,324	15,723	876,693
1998	19,740	14,876	15,372	21,415	118,943	80,107	102,613	171,068	112,039	86,095	80,974	69,973	893,217
1999	22,759	19,339	19,984	22,533	104,662	42,720	37,543	71,964	60,016	48,192	43,340	34,001	527,051
2000	20,602	19,339	19,984	19,984	42,346	40,664	24,511	38,772	38,857	32,454	27,460	18,586	343,556
2001	20,560	19,339	19,984	19,984	18,050	19,984	21,602	25,559	18,294	19,533	16,343	11,389	230,620
2002	13,527	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	229,269
2003	10,241	7,924	9,021	8,750	7,493	9,818	24,511	32,928	31,938	24,680	21,617	14,176	203,097
2004	14,914	13,091	13,527	13,527	12,655	13,527	24,511	32,928	31,938	24,680	21,617	14,176	231,092
2005	14,914	13,091	13,527	13,527	12,218	13,527	37,543	79,916	67,711	56,144	51,292	41,696	415,105
2006	20,602	19,339	97,805	104,705	63,153	79,576	256,738	177,806	96,468	51,876	46,699	36,710	1,051,475
2007	23,209	19,339	19,984	19,984	18,050	19,984	21,602	25,559	18,294	19,533	16,343	11,389	233,268
2008	13,527	13,091	13,527	13,527	12,655	13,527	21,602	25,559	18,294	19,533	16,343	11,389	192,575
2009	7,906	7,924	9,021	8,750	7,493	9,818	13,622	17,066	21,858	24,680	21,617	13,879	163,633
2010	14,914	13,091	13,527	13,527	12,218	13,527	24,511	32,928	31,938	24,680	21,617	14,176	230,655
2011	14,914	13,091	46,606	51,195	31,659	132,302	155,059	190,909	98,248	84,493	79,339	68,335	966,150
2012	23,025	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	252,333
2013	14,914	13,091	13,527	13,527	12,218	13,527	21,476	27,518	21,858	24,680	21,617	14,176	212,130
2014	10,241	7,924	9,021	8,750	7,493	9,756	13,748	15,107	18,294	19,533	16,343	11,092	147,302
2015	7,906	7,925	9,024	8,749	7,493	9,755	13,747	15,108	18,294	12,228	11,674	7,798	129,700
2016	4,306	6,801	9,021	8,750	7,642	9,818	13,622	17,066	21,858	24,680	21,617	13,879	159,058
2017	10,241	7,924	9,021	13,812	292,125	148,564	199,175	176,126	116,695	69,175	63,619	52,417	1,158,893
2018	24,545	36,884	19,984	19,984	18,050	19,984	50,527	32,928	31,938	24,680	21,617	14,176	315,295
2019	18,788	14,876	15,372	15,372	23,958	105,593	143,877	145,470	117,331	63,966	58,952	48,838	772,392
2020	21,904	19,339	19,984	19,984	18,694	19,984	21,476	27,518	21,858	24,680	21,617	14,176	251,213
2021	14,913	13,091	13,527	13,527	12,218	13,527	13,747	15,108	18,294	17,236	14,889	10,567	170,644
Ave	15,855	18,564	23,525	34,043	35,717	32,333	43,047	62,215	45,849	37,136	33,389	25,573	407,245
Max	24,545	134,812	164,789	372,982	292,125	211,592	256,738	275,240	218,512	117,176	111,831	99,464	1,557,655
Min	0	0	8,702	2,996	7,019	9,755	13,622	15,107	13,007	12,228	11,674	7,798	129,700

TABLE 7A
MOCASIM - Lower Mokelumne Flows Available for Diversion
2050 LOD Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	113,196	166,741	53,334	5,362	0	77,902	62,998	479,533
1957	0	0	0	0	0	6,218	6,017	12,235
1958	0	0	46,671	47,667	79,224	113,837	66,399	353,798
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	11,044	0	0	66,813	46,067	123,924
1964	0	0	0	0	0	0	0	0
1965	140,727	129,840	36,516	0	0	43,860	42,445	393,388
1966	2,489	2,417	0	0	0	0	0	4,906
1967	0	8,523	16,061	47,002	34,899	142,486	61,111	310,082
1968	0	0	0	0	0	0	0	0
1969	0	66,565	79,634	39,897	104,153	163,930	62,079	516,258
1970	9,264	195,517	42,442	16,082	0	5,995	5,801	275,101
1971	32,442	26,606	17,200	17,431	0	21,754	21,052	136,485
1972	7,039	0	0	0	0	0	0	7,039
1973	0	22,859	56,753	27,206	0	24,483	23,693	154,994
1974	38,868	68,018	0	37,968	6,782	40,030	38,739	230,405
1975	0	0	0	0	0	45,681	44,208	89,889
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	940	910	1,850
1979	0	0	4,471	22,521	0	20,927	20,252	68,170
1980	0	177,235	123,988	17,263	0	40,435	39,131	398,052
1981	0	0	0	0	0	0	0	0
1982	9,705	80,085	156,351	98,328	183,484	137,843	55,490	721,286
1983	90,443	70,374	113,482	198,270	73,036	219,495	179,244	944,344
1984	151,029	77,058	37,157	7,923	0	21,098	20,417	314,681
1985	510	0	0	0	0	0	0	510
1986	0	0	267,577	154,231	0	52,187	31,279	505,274
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	12,479	12,076	24,555
1994	0	0	0	0	0	0	0	0
1995	0	0	0	109,579	118,471	224,600	87,263	539,912
1996	0	0	109,943	52,535	0	64,436	24,835	251,747
1997	129,020	358,938	74,657	12,460	0	2,948	2,853	580,877
1998	0	22,937	105,809	67,023	67,842	121,427	74,606	459,644
1999	0	20,809	91,528	29,636	0	30,319	29,341	201,633
2000	0	0	48,021	27,580	0	15,102	14,615	105,318
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	622	14,022	0	0	0	14,644
2005	0	0	445	66,720	10,180	82,250	48,744	208,339
2006	90,582	90,660	50,019	66,492	221,418	127,571	58,427	705,169
2007	2,953	0	0	0	0	0	0	2,953
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	16,476	15,944	32,420
2011	85,134	37,150	18,525	119,219	120,005	140,962	60,502	581,497
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	203,788	322,808	138,378	162,745	124,690	77,427	1,029,837
2018	0	0	0	10,078	46,796	248	240	57,362
2019	0	0	66,767	92,509	109,921	96,711	80,799	446,707
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	13,285	26,855	28,703	22,697	19,691	33,914	20,809	165,953
Max	151,029	358,938	322,808	198,270	221,418	224,600	179,244	1,029,837
Min	0	0	0	0	0	0	0	0

TABLE 7B
MOCASIM - Lower Mokelumne Flows Available for Diversion
Max WR Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	0	148,489	53,833	4,629	0	64,456	54,498	325,905
1957	0	0	0	0	0	0	0	0
1958	0	0	306	44,963	73,639	106,583	58,232	283,722
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	5,003	4,842	9,845
1964	0	0	0	0	0	0	0	0
1965	62,523	123,901	31,600	0	0	31,031	30,030	279,084
1966	0	0	0	0	0	0	0	0
1967	0	0	0	0	17,492	135,492	53,210	206,195
1968	0	0	0	0	0	0	0	0
1969	0	0	52,096	34,614	99,004	157,148	54,394	397,255
1970	0	186,078	37,526	9,183	0	0	0	232,786
1971	26,218	20,667	12,284	10,531	0	9,071	8,778	87,549
1972	0	0	0	0	0	0	0	0
1973	0	0	0	11,121	0	12,065	11,676	34,862
1974	32,645	62,079	0	26,150	383	29,236	28,293	178,787
1975	0	0	0	0	0	26,911	26,043	52,954
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	139,999	122,911	14,487	0	29,348	28,401	335,147
1981	0	0	0	0	0	0	0	0
1982	0	0	148,181	91,428	176,650	129,237	43,887	589,384
1983	84,220	64,434	108,566	191,370	66,202	210,890	169,694	895,376
1984	144,806	71,119	31,766	1,362	0	8,416	8,144	265,612
1985	0	0	0	0	0	0	0	0
1986	0	0	183,858	151,977	0	40,078	21,598	397,511
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	89,778	251,775	96,191	437,744
1996	0	0	85,763	45,973	0	51,166	14,478	197,380
1997	122,797	352,999	69,741	5,561	0	0	0	551,097
1998	0	6,043	105,059	62,370	61,941	113,831	66,089	415,332
1999	0	2,550	86,612	22,737	0	18,111	17,527	147,537
2000	0	0	24,296	20,680	0	2,562	2,480	50,018
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	26,063	25,222	51,286
2006	77,821	84,721	45,103	59,592	215,413	119,862	49,795	652,307
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0
2011	33,078	37,667	19,441	117,332	114,001	133,255	51,871	506,644
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	280,567	133,261	179,832	149,472	83,908	827,039
2018	0	0	0	0	26,016	0	0	26,016
2019	0	0	10,074	89,045	104,446	89,574	72,752	365,890
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	8,590	19,129	22,200	16,888	18,012	28,686	15,912	129,416
Max	144,806	352,999	280,567	191,370	215,413	251,775	169,694	895,376
Min	0	0	0	0	0	0	0	0

TABLE 8A
WAAT - Water Available for Diversion by MICUP 2050 LOD Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	38,122	38,122	33,755	0	0	0	0	110,000
1957	0	0	0	0	0	0	0	0
1958	0	0	34,433	38,122	36,893	552	0	110,000
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	9,325	0	0	38,122	34,225	81,673
1964	0	0	0	0	0	0	0	0
1965	38,122	38,122	33,755	0	0	0	0	110,000
1966	586	515	0	0	0	0	0	1,101
1967	0	6,620	14,342	38,122	33,058	17,858	0	110,000
1968	0	0	0	0	0	0	0	0
1969	0	38,122	34,433	37,445	0	0	0	110,000
1970	7,362	38,122	34,433	14,180	0	0	0	94,097
1971	30,539	24,703	15,482	15,528	0	9,852	9,211	105,315
1972	5,136	0	0	0	0	0	0	5,136
1973	0	20,956	34,433	25,303	0	12,581	11,852	105,125
1974	36,966	38,122	0	34,912	0	0	0	110,000
1975	0	0	0	0	0	33,778	32,366	66,145
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	2,752	20,618	0	9,025	8,411	40,805
1980	0	38,122	35,663	15,361	0	20,854	0	110,000
1981	0	0	0	0	0	0	0	0
1982	7,803	38,122	34,433	29,642	0	0	0	110,000
1983	38,122	38,122	33,755	0	0	0	0	110,000
1984	38,122	38,122	33,755	0	0	0	0	110,000
1985	0	0	0	0	0	0	0	0
1986	0	0	34,433	38,122	0	37,445	0	110,000
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	576	235	811
1994	0	0	0	0	0	0	0	0
1995	0	0	0	38,122	36,893	34,985	0	110,000
1996	0	0	35,663	38,122	0	36,215	0	110,000
1997	38,122	38,122	33,755	0	0	0	0	110,000
1998	0	21,034	34,433	38,122	16,410	0	0	110,000
1999	0	18,906	34,433	27,734	0	18,416	10,511	110,000
2000	0	0	35,663	25,677	0	3,199	2,774	67,313
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	12,119	0	0	0	12,119
2005	0	0	0	38,122	8,338	38,122	25,417	110,000
2006	38,122	38,122	33,755	0	0	0	0	110,000
2007	1,050	0	0	0	0	0	0	1,050
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	4,573	4,103	8,676
2011	38,122	35,247	16,807	19,824	0	0	0	110,000
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	38,122	34,433	37,445	0	0	0	110,000
2018	0	0	0	8,175	36,893	0	0	45,068
2019	0	0	34,433	38,122	36,893	552	0	110,000
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	5,240	8,610	10,479	9,249	3,020	4,657	2,046	43,301
Max	38,122	38,122	35,663	38,122	36,893	38,122	34,225	110,000
Min	0	0	0	0	0	0	0	0

TABLE 8B
WAAT - Water Available for Diversion by MICUP Max WR Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	0	38,122	35,663	0	0	36,215	0	110,000
1957	0	0	0	0	0	0	0	0
1958	0	0	0	38,122	36,893	34,985	0	110,000
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0
1965	38,122	38,122	27,303	0	0	6,452	0	110,000
1966	0	0	0	0	0	0	0	0
1967	0	0	0	0	12,889	38,122	36,893	87,904
1968	0	0	0	0	0	0	0	0
1969	0	0	34,433	29,857	36,893	8,818	0	110,000
1970	0	38,122	33,229	4,426	0	0	0	75,777
1971	21,462	15,910	7,988	5,775	0	0	0	51,134
1972	0	0	0	0	0	0	0	0
1973	0	0	0	6,365	0	0	0	6,365
1974	27,889	38,122	0	21,393	0	14,480	8,116	110,000
1975	0	0	0	0	0	12,154	11,440	23,594
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	38,122	35,663	9,730	0	14,591	11,893	110,000
1981	0	0	0	0	0	0	0	0
1982	0	0	34,433	38,122	36,893	552	0	110,000
1983	38,122	38,122	33,755	0	0	0	0	110,000
1984	38,122	38,122	27,316	0	0	0	0	103,560
1985	0	0	0	0	0	0	0	0
1986	0	0	34,433	38,122	0	25,321	6,995	104,871
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	36,893	38,122	34,985	110,000
1996	0	0	35,663	38,122	0	36,215	0	110,000
1997	38,122	38,122	33,755	0	0	0	0	110,000
1998	0	1,286	34,433	38,122	36,158	0	0	110,000
1999	0	0	34,433	17,980	0	3,355	2,924	58,691
2000	0	0	19,846	15,923	0	0	0	35,770
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	11,306	10,619	21,926
2006	38,122	38,122	33,755	0	0	0	0	110,000
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0
2011	28,322	32,910	15,144	33,624	0	0	0	110,000
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	34,433	38,122	36,893	552	0	110,000
2018	0	0	0	0	21,413	0	0	21,413
2019	0	0	5,777	38,122	36,893	29,208	0	110,000
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	3,945	5,783	8,110	6,058	4,291	4,565	1,822	34,574
Max	38,122	38,122	35,663	38,122	36,893	38,122	36,893	110,000
Min	0	0	0	0	0	0	0	0

TABLE 9A
WAAT - Monthly Amounts of Water Available for Diversion by MICUP based on 620 cfs, 2050 LOD Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun
1954	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-
1956	38,122	38,122	35,663	3,459	-	38,122	36,893
1957	-	-	-	-	-	-	-
1958	-	-	34,433	38,122	36,893	38,122	36,893
1959	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-
1961	-	-	-	-	-	-	-
1962	-	-	-	-	-	-	-
1963	-	-	9,325	-	-	38,122	34,225
1964	-	-	-	-	-	-	-
1965	38,122	38,122	34,433	-	-	31,957	30,604
1966	586	515	-	-	-	-	-
1967	-	6,620	14,342	38,122	33,058	38,122	36,893
1968	-	-	-	-	-	-	-
1969	-	38,122	34,433	37,995	36,893	38,122	36,893
1970	7,362	38,122	34,433	14,180	-	-	-
1971	30,539	24,703	15,482	15,528	-	9,851	9,211
1972	5,136	-	-	-	-	-	-
1973	-	20,956	34,433	25,303	-	12,580	11,852
1974	36,966	38,122	-	36,065	4,941	28,127	26,898
1975	-	-	-	-	-	33,778	32,366
1976	-	-	-	-	-	-	-
1977	-	-	-	-	-	-	-
1978	-	-	-	-	-	-	-
1979	-	-	2,752	20,618	-	9,024	8,411
1980	-	38,122	35,663	15,361	-	28,532	27,289
1981	-	-	-	-	-	-	-
1982	7,802	38,122	34,433	38,122	36,893	38,122	36,893
1983	38,122	38,122	34,433	38,122	36,893	38,122	36,893
1984	38,122	38,122	35,377	6,021	-	9,195	8,576
1985	-	-	-	-	-	-	-
1986	-	-	34,433	38,122	-	38,122	19,438
1987	-	-	-	-	-	-	-
1988	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-
1990	-	-	-	-	-	-	-
1991	-	-	-	-	-	-	-
1992	-	-	-	-	-	-	-
1993	-	-	-	-	-	576	235
1994	-	-	-	-	-	-	-
1995	-	-	-	38,122	36,893	38,122	36,893
1996	-	-	35,663	38,122	-	38,122	12,993
1997	38,122	38,122	34,433	10,557	-	-	-
1998	-	21,034	34,433	38,122	36,893	38,122	36,893
1999	-	18,906	34,433	27,734	-	18,416	17,499
2000	-	-	35,663	25,677	-	3,199	2,774
2001	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-
2004	-	-	-	12,119	-	-	-
2005	-	-	-	38,122	8,338	38,122	36,893
2006	38,122	38,122	34,433	38,122	36,893	38,122	36,893
2007	1,050	-	-	-	-	-	-
2008	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-
2010	-	-	-	-	-	4,573	4,103
2011	38,122	35,247	16,807	38,122	36,893	38,122	36,893
2012	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-
2017	-	38,122	34,433	38,122	36,893	38,122	36,893
2018	-	-	-	8,175	36,893	-	-
2019	-	-	34,433	38,122	36,893	38,122	36,893
2020	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-
Ave	5,240	8,610	10,571	11,094	6,649	11,761	10,678
Max	38,122	38,122	35,663	38,122	36,893	38,122	36,893
Min	-	-	-	-	-	-	-

TABLE 9B
WAAT - Monthly Amounts of Water Available for Diversion by MICUP based on 620 cfs, Max WR Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun
1954	-	-	-	-	-	-	-
1955	-	-	-	-	-	-	-
1956	-	38,122	35,663	-	-	38,122	36,893
1957	-	-	-	-	-	-	-
1958	-	-	-	38,122	36,893	38,122	36,893
1959	-	-	-	-	-	-	-
1960	-	-	-	-	-	-	-
1961	-	-	-	-	-	-	-
1962	-	-	-	-	-	-	-
1963	-	-	-	-	-	-	-
1964	-	-	-	-	-	-	-
1965	38,122	38,122	27,303	-	-	16,274	15,426
1966	-	-	-	-	-	-	-
1967	-	-	-	-	12,889	38,122	36,893
1968	-	-	-	-	-	-	-
1969	-	-	34,433	29,857	36,893	38,122	36,893
1970	-	38,122	33,229	4,426	-	-	-
1971	21,462	15,910	7,988	5,775	-	-	-
1972	-	-	-	-	-	-	-
1973	-	-	-	6,364	-	-	-
1974	27,889	38,122	-	21,393	-	14,480	13,690
1975	-	-	-	-	-	12,154	11,440
1976	-	-	-	-	-	-	-
1977	-	-	-	-	-	-	-
1978	-	-	-	-	-	-	-
1979	-	-	-	-	-	-	-
1980	-	38,122	35,663	9,730	-	14,591	13,798
1981	-	-	-	-	-	-	-
1982	-	-	34,433	38,122	36,893	38,122	29,284
1983	38,122	38,122	34,433	38,122	36,893	38,122	36,893
1984	38,122	38,122	27,316	-	-	-	-
1985	-	-	-	-	-	-	-
1986	-	-	34,433	38,122	-	25,321	6,995
1987	-	-	-	-	-	-	-
1988	-	-	-	-	-	-	-
1989	-	-	-	-	-	-	-
1990	-	-	-	-	-	-	-
1991	-	-	-	-	-	-	-
1992	-	-	-	-	-	-	-
1993	-	-	-	-	-	-	-
1994	-	-	-	-	-	-	-
1995	-	-	-	-	36,893	38,122	36,893
1996	-	-	35,663	38,122	-	36,409	-
1997	38,122	38,122	34,433	804	-	-	-
1998	-	1,286	34,433	38,122	36,893	38,122	36,893
1999	-	-	34,433	17,980	-	3,355	2,924
2000	-	-	19,846	15,923	-	-	-
2001	-	-	-	-	-	-	-
2002	-	-	-	-	-	-	-
2003	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-
2005	-	-	-	-	-	11,306	10,619
2006	38,122	38,122	34,433	38,122	36,893	38,122	35,191
2007	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-
2011	28,321	32,910	15,144	38,122	36,893	38,122	36,893
2012	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-
2015	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-
2017	-	-	34,433	38,122	36,893	38,122	36,893
2018	-	-	-	-	21,413	-	-
2019	-	-	5,777	38,122	36,893	38,122	36,893
2020	-	-	-	-	-	-	-
2021	-	-	-	-	-	-	-
Ave	3,945	5,782	8,140	7,257	5,930	8,696	7,475
Max	38,122	38,122	35,663	38,122	36,893	38,122	36,893
Min	-	-	-	-	-	-	-

TABLE 10A
WAAT - Mokelumne Outflow 2050 LOD Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total Dec - Jun
1954	14,989	15,377	14,300	14,233	14,551	15,863	10,080	99,392
1955	10,378	10,765	10,135	9,622	11,516	10,452	0	62,867
1956	83,549	135,586	26,893	12,446	27,582	99,386	67,187	452,628
1957	13,093	15,377	14,300	14,233	14,551	15,863	10,080	97,497
1958	14,989	13,301	23,153	19,626	68,072	134,769	70,588	344,498
1959	12,913	15,377	14,300	14,233	11,516	10,452	0	78,791
1960	8,533	8,921	8,891	7,777	11,516	10,452	0	56,089
1961	8,533	8,921	8,469	7,838	3,661	0	0	37,422
1962	4,027	4,143	3,744	4,067	14,551	15,863	10,080	56,474
1963	8,533	8,921	8,469	7,777	14,551	32,651	10,080	90,980
1964	14,989	15,377	14,931	14,233	11,516	10,452	0	81,498
1965	109,235	97,635	8,627	6,585	27,582	65,344	46,634	361,642
1966	13,889	15,377	14,300	14,233	11,516	10,452	0	79,766
1967	10,378	8,851	8,598	15,963	27,582	146,113	65,301	282,785
1968	13,075	15,377	14,931	14,233	11,516	10,452	0	79,584
1969	8,533	31,838	49,042	6,400	129,893	185,414	66,268	477,388
1970	11,366	170,213	20,064	13,523	27,582	33,387	16,030	292,164
1971	14,333	15,377	14,300	14,233	14,551	15,863	10,080	98,736
1972	14,989	15,377	14,931	14,233	14,551	15,863	10,080	100,023
1973	10,378	10,599	30,603	9,442	14,551	15,863	10,080	101,515
1974	14,823	42,984	13,991	14,969	32,523	61,514	42,928	223,732
1975	14,604	15,377	14,300	14,233	14,551	15,863	10,080	99,007
1976	14,985	15,377	14,932	14,296	3,662	0	0	63,252
1977	4,025	4,143	3,744	4,068	3,662	0	0	19,642
1978	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1979	14,989	15,377	14,300	14,233	14,551	15,863	10,080	99,392
1980	14,989	150,245	99,597	11,697	27,582	41,065	43,320	388,494
1981	12,648	15,377	14,300	14,233	11,516	10,452	0	78,525
1982	8,533	44,510	124,604	72,634	209,225	159,327	59,679	678,511
1983	60,345	40,663	88,244	205,354	98,777	240,979	183,433	917,794
1984	120,930	52,409	16,552	20,254	27,582	42,582	24,606	304,915
1985	14,989	15,377	14,300	14,233	11,516	10,452	0	80,867
1986	10,378	7,594	239,015	123,192	27,582	36,226	35,468	479,454
1987	11,818	15,377	14,300	14,295	3,661	0	0	59,450
1988	8,533	8,921	8,891	7,838	3,661	0	0	37,844
1989	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1990	4,027	4,143	3,744	4,067	11,516	10,452	0	37,948
1991	4,027	4,143	3,744	4,067	11,516	10,452	0	37,948
1992	4,027	4,143	3,879	4,067	3,661	0	0	19,777
1993	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1994	14,989	15,377	14,300	14,295	3,661	0	0	62,622
1995	8,533	4,509	4,927	75,404	107,319	211,099	91,452	503,243
1996	10,578	13,440	85,876	24,645	27,582	49,705	29,024	240,849
1997	102,047	332,403	51,969	22,746	27,582	33,387	16,030	586,164
1998	13,102	11,782	81,072	37,337	77,172	142,911	78,795	442,170
1999	11,394	15,080	69,438	13,912	27,582	33,387	23,018	193,811
2000	14,692	15,377	24,878	14,233	14,551	15,863	10,080	109,674
2001	14,989	15,377	14,300	14,233	11,516	10,452	0	80,867
2002	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
2003	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
2004	14,989	15,377	14,931	14,233	14,551	15,863	10,080	100,023
2005	10,378	9,588	9,190	35,682	27,582	65,612	27,516	185,547
2006	64,369	61,932	25,570	74,402	247,159	149,055	62,616	685,102
2007	10,909	15,377	14,300	14,233	11,516	10,452	0	76,786
2008	8,533	8,921	8,891	7,838	11,516	10,452	0	56,151
2009	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
2010	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
2011	60,098	11,532	11,213	107,560	145,746	162,446	64,691	563,285
2012	11,144	15,377	14,931	14,233	11,516	10,452	0	77,653
2013	8,533	8,921	8,469	7,777	11,516	10,452	0	55,667
2014	8,533	8,921	8,469	7,838	3,661	0	0	37,422
2015	4,025	4,143	3,744	4,068	3,662	0	0	19,642
2016	4,027	4,143	3,879	4,067	3,661	0	0	19,777
2017	8,533	168,214	291,061	104,881	188,486	146,174	81,616	988,965
2018	9,927	15,377	14,300	14,233	22,613	15,863	10,080	102,392
2019	14,989	12,503	42,609	63,604	98,769	117,643	84,988	435,105
2020	12,116	15,377	14,931	14,233	11,516	10,452	0	78,624
2021	8,529	8,921	8,470	7,840	3,662	0	0	37,421
Ave	18,170	28,602	27,974	22,787	32,102	41,108	21,213	191,955
Max	120,930	332,403	291,061	205,354	247,159	240,979	183,433	988,965
Min	4,025	4,143	3,744	4,067	3,661	0	0	19,642

TABLE 10B
WAAT - Mokelumne Ouflow Max WR Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total Dec - Jun
1954	14,989	15,377	14,300	14,233	14,551	15,863	10,080	99,392
1955	8,533	8,921	8,469	7,777	11,516	10,452	0	55,667
1956	4,027	109,753	17,599	4,067	27,582	46,871	55,925	265,823
1957	13,933	15,377	14,300	14,233	14,551	15,863	10,080	98,336
1958	10,378	9,795	9,356	11,070	59,725	90,228	59,659	250,210
1959	14,019	15,377	14,300	14,295	11,516	10,452	0	79,958
1960	8,533	8,921	8,891	7,838	11,516	10,452	0	56,151
1961	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1962	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1963	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1964	14,989	15,377	14,931	14,233	11,516	10,452	0	81,498
1965	28,177	89,609	8,201	7,416	27,582	43,209	31,457	235,651
1966	14,656	15,377	14,300	14,233	11,516	10,452	0	80,533
1967	8,533	8,325	7,991	7,132	27,582	116,000	17,745	193,308
1968	14,394	15,377	14,931	14,233	11,516	10,452	0	80,903
1969	8,533	6,789	20,124	5,850	85,091	166,960	55,821	349,168
1970	12,858	158,575	14,300	14,233	27,582	33,387	16,030	276,965
1971	14,989	15,377	14,300	14,233	14,551	15,863	10,080	99,392
1972	14,989	15,377	14,931	14,233	14,551	15,863	10,080	100,023
1973	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
1974	14,989	34,576	14,300	14,233	27,582	33,387	21,604	160,671
1975	14,989	15,377	14,300	14,233	14,551	15,863	10,080	99,392
1976	14,985	15,377	14,932	14,296	3,662	0	0	63,252
1977	4,025	4,143	3,744	4,068	3,662	0	0	19,642
1978	3,707	4,143	3,744	4,067	3,661	0	0	19,323
1979	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
1980	10,378	106,536	92,332	8,986	27,582	33,387	17,935	297,136
1981	13,640	15,377	14,300	14,233	11,516	10,452	0	79,518
1982	8,533	4,450	113,857	54,400	162,736	147,315	45,315	536,605
1983	51,268	31,870	80,750	195,600	89,180	229,520	171,121	849,309
1984	111,853	43,616	14,931	14,233	27,582	33,387	16,030	261,633
1985	14,989	15,377	14,300	14,233	11,516	10,452	0	80,867
1986	8,533	7,156	152,181	114,963	27,582	33,387	16,030	359,831
1987	13,225	15,377	14,300	14,295	3,661	0	0	60,857
1988	4,027	4,143	3,879	4,067	3,661	0	0	19,777
1989	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1990	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1991	4,027	0	3,269	4,067	3,661	0	0	15,024
1992	4,027	4,143	3,879	4,067	3,661	0	0	19,777
1993	4,027	4,143	3,744	4,067	3,661	0	0	19,642
1994	8,533	8,921	8,469	7,838	3,661	0	0	37,422
1995	4,027	4,143	3,744	4,067	51,944	198,896	46,603	313,422
1996	12,535	14,359	59,764	16,224	27,582	33,581	16,030	180,075
1997	93,889	324,273	45,007	13,712	27,582	33,387	16,030	553,880
1998	9,154	7,996	74,241	28,478	48,762	132,461	67,516	368,607
1999	12,220	15,377	62,183	14,233	27,582	33,387	16,030	181,012
2000	14,989	15,377	14,300	14,233	14,551	15,863	10,080	99,392
2001	14,989	15,377	14,300	14,295	11,516	10,452	0	80,928
2002	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
2003	4,027	4,143	3,744	4,067	14,551	15,863	10,080	56,474
2004	8,533	8,921	8,891	7,777	14,551	15,863	10,080	74,615
2005	8,533	8,921	8,469	7,777	27,582	33,387	16,030	110,698
2006	49,931	53,872	18,665	65,442	238,392	138,492	51,222	616,016
2007	11,642	15,377	14,300	14,295	11,516	10,452	0	77,581
2008	8,533	8,921	8,891	7,838	11,516	10,452	0	56,151
2009	4,027	4,143	3,744	4,067	3,661	0	0	19,642
2010	8,533	8,921	8,469	7,777	14,551	15,863	10,080	74,192
2011	8,533	5,810	5,972	84,801	136,980	151,885	53,298	447,278
2012	11,879	15,377	14,931	14,233	11,516	10,452	0	78,387
2013	8,533	8,921	8,469	7,777	11,516	10,452	0	55,667
2014	4,027	4,143	3,744	4,067	3,661	0	0	19,642
2015	4,025	4,143	3,744	4,068	3,662	0	0	19,642
2016	4,027	4,143	3,879	4,067	3,661	0	0	19,777
2017	4,027	4,143	245,582	94,449	141,997	134,163	69,304	693,664
2018	9,927	15,377	14,300	14,233	14,551	15,863	10,080	94,330
2019	10,378	9,093	8,793	55,152	90,532	78,996	74,179	327,123
2020	13,317	15,377	14,931	14,233	11,516	10,452	0	79,826
2021	8,529	8,921	8,470	7,840	3,662	0	0	37,421
Ave	13,453	22,227	22,178	18,502	27,298	34,238	15,911	153,807
Max	111,853	324,273	245,582	195,600	238,392	229,520	171,121	849,309
Min	3,707	0	3,269	4,067	3,661	0	0	15,024

APPENDIX A

Application 29835 by Mokelumne River Water and Power Authority, October 4, 1990

Jim Hanson's Office

MINIMUM FILING FEE: $100.00
FILE ORIGINAL & ONE COPY
TYPE OR PRINT IN BLACK INK
(For explanation of entries required, see booklet "How to File an Application to Appropriate Water in California")

STATE OF CALIFORNIA
State Water Resources Control Board
DIVISION OF WATER RIGHTS
901 P Street, Sacramento
P. O. Box 2000, Sacramento, CA 95810

STATE WATER RESOURCES CONTROL BOARD
1990 OCT -4 PM 4:31
DIV. OF WATER RIGHTS SACRAMENTO

(Check one box only)

[X] ***APPLICATION TO APPROPRIATE WATER BY PERMIT***
or
[ ] ***REGISTRATION OF SMALL DOMESTIC USE APPROPRIATION****

(If this form is used to register a small domestic use appropriation, the terms "application" and "applicant" herein, and in related forms, shall mean "registration" and "registrant".)

Application No. 29835 (Leave blank)

1. APPLICANT

Mokelumne River Water and Power Authority (209) 468 - 3100
(Name of applicant) (Telephone number where you may be reached between 8 a. m. and 5 p. m. - include area code)

c/o County of San Joaquin, Department of Public Works

P.O. Box 1810 Stockton CA 95201
(Mailing address) (City or town) (State) (Zip code)

2. SOURCE

a. The name of the source at the point of diversion is See attached
(If unnamed, state that it is an unnamed stream, spring, etc.)

tributary to _____

b. In a normal year does the stream dry up at any point downstream from your project? YES[ ] NO[ ] If yes, during what months is it usually dry? From _____ to _____

What alternate sources are available to your project should a portion of your requested direct diversion season be excluded because of a dry stream or nonavailability of water? Ground water

3. POINTS of DIVERSION and REDIVERSION

a. The point(s) of diversion will be in the County of Amador, Calaveras, & San Joaquin Counties

b.

List all points giving coordinate distances from section corner or other tie as allowed by Board regulations i. e. California Coordinate System	Point is within (40-acre subdivision)	Section	Township	Range	Base and Meridian
See attachment	1/4 of 1/4				
	1/4 of 1/4				
	1/4 of 1/4				

c. Does applicant own the land at the point of diversion? YES[ ] NO[X]

d. If applicant does not own the land at point of diversion, state name and address of owner and what steps have been taken to obtain right of access: The Authority will seek to negotiate right of access, but will use its right to condemn, if necessary.

4. PURPOSE of USE, AMOUNT and SEASON

a. In the table below, state the purpose(s) for which water is to be appropriated, the quantities of water for each purpose, and the dates between which diversions will be made. Use gallons per day if rate is less than 0.025 cubic foot per second (approximately 16,000 gallons per day). Purpose must only be "Domestic" for registration of small domestic use.*

PURPOSE OF USE (Irrigation, Domestic, etc.)	DIRECT DIVERSION: QUANTITY: RATE (Cubic feet per second ~~or gallons per day~~)	DIRECT DIVERSION: QUANTITY: AMOUNT (Acre-feet per year)	DIRECT DIVERSION: SEASON OF DIVERSION: Beginning Date (Mo. & Day)	DIRECT DIVERSION: SEASON OF DIVERSION: Ending date (Mo. & Day)	STORAGE: AMOUNT: Acre-feet per annum	STORAGE: COLLECTION SEASON: Beginning Date (Mo. & Day)	STORAGE: COLLECTION SEASON: Ending date (Mo. & Day)
Municipal							
Industrial	620	110,000	12/1	6/30**	434,000	12/1	6/30**
Irrigation							
Power* (Incidental)	~~3000~~ 1000	~~1,200,000~~	Oct. 1	Sept 30			
		110,000	TOTAL AMOUNT		434,000	TOTAL AMOUNT	

*Power generation is incidental to direct diversion and/or storage releases necessary to meet consumptive use requirements within the service area under this application.

b. Total combined amount taken by direct diversion and storage during any one year will be ~~550,000*~~ 544,000 acre-feet.

* *Not to exceed 4,500 gallons per day by direct diversion or 10 acre-feet per annum by storage.*

WR 1 (12/88) ** For Point #5 on Duck Creek, diversion season is 12/1 - 4/30.

~~*Includes losses~~

9.9.96 PRW

8/31/90 PRW 10/2/90

9-21-90 $84,300

5. JUSTIFICATION OF AMOUNT (For small domestic use registration, complete item b. only)

a. IRRIGATION: Maximum area to be irrigated in any one year is _____ acres.

CROP	ACRES	METHOD OF IRRIGATION (Sprinklers, flooding, etc.)	ACRE-FEET PER YEAR	NORMAL SEASON	
				Beginning date	Ending date
See attachment					

b. DOMESTIC: Number of residences to be served is _____. Separately owned? YES ☐ NO ☐
Total number of people to be served is _____. Estimated daily use per person is _____ (Gallons per day)
Total area of domestic lawns and gardens is _____ square feet.
Incidential domestic uses are _____ (Dust control area, number and kind of domestic animals, etc.)

c. STOCKWATERING: Kind of stock _____ Maximum number _____ Describe type of operation: _____ (Feed lot, dairy, range, etc.)

d. RECREATIONAL: Type of recreation: Fishing ☐ Swimming ☐ Boating ☐ Other ☐

e. MUNICIPAL: (Estimated projected use)

POPULATION 5-year periods until use is completed		MAXIMUM MONTH		ANNUAL USE		
PERIOD	POP.	Average daily use per capita (gal.)	Rate of diversion (cfs)	Average daily use (gal. per capita)	Acre-foot (per capita)	Total acre-feet
Present	470,000	248	180	147	.17	77,600
2000	612,000	232	220	139	.16	95,500
2010	723,800	223	250	135	.15	109,300
2020	837,700	220	285	131	.15	123,000

Month of maximum use during year is July. Month of minimum use during year is February.

f. HEAT CONTROL: The total area to be heat protected is _____ net acres.
Type of crop protected is _____
Rate at which water is applied to use is _____ gpm per acre.
The heat protection season will begin about _____ (Date) and end about _____ (Date)

g. FROST PROTECTION: The total area to be frost protected is _____ net acres.
Type of crop protected is _____
Rate at which water is applied to use is _____ gpm per acre.
The frost protection season will begin about _____ (Date) and end about _____ (Date)

h. INDUSTRIAL: Type of industry is _____
Basis for determination of amount of water needed is _____

i. MINING: The name of the claim is _____. Patented ☐ Unpatented ☐
The nature of the mine is _____. Mineral to be mined is _____
Type of milling or processing is _____
After use, the water will be discharged into _____ (Name of stream)
in _____ 1/4 of _____ 1/4 of Section _____, T _____, R _____, _____ B. & M. (40-acre subdivision)

ALTERNATIVE "A"
INCIDENTAL*

j. POWER: The total fall to be utilized is ~~201~~ feet. The maximum amount of water to be used through the penstock is ~~2,000~~ cubic feet per second. The maximum theoretical horsepower capable of being generated by the works is ~~[illegible]~~. (Cubic feet per second x fall ÷ 8.8) Electrical capacity is ~~85,000~~ kilowatts at ~~85~~ % efficiency. (Hp x 0.746 x efficiency)
After use, the water will be discharged into Mokelumne River (Name of stream)
in S.E. 1/4 of N.W. 1/4 of Section 16, T 5N, R 11E M.D. B. & M. FERC No. None issued (40-acre subdivision)

DBW 8-31-90 10-2-90

* Power use is incidental to this application, as it results from required releases to the ~~Mokelumne Riv~~

k. FISH AND WILDLIFE PRESERVATION AND/OR ENHANCEMENT: YES ☐ NO ☐ If yes, list specific species ~~Mokelumne Riv~~ and habitat type that will be preserved or enhanced in item 17 of Environmental Information form WR 1-2.

See companion power application for power specifications.

l. OTHER: Describe use: _____. Basis for determination of amount of water needed is _____

6. PLACE OF USE See attachment

a. Does applicant own the land where the water will be used? YES ☐ NO ☐ Is land in joint ownership? YES ☐ NO ☐
(All joint owners should include their names as applicants and sign the application.)
If applicant does not own land where the water will be used, give name and address of owner and state what arrangements have been made with the owner.

b.

USE IS WITHIN (40-acre subdivision)	SECTION	TOWNSHIP	RANGE	BASE & MERIDIAN	IF IRRIGATED	
					Number of acres	Presently cultivated (Y/N)
1/4 of 1/4						
1/4 of 1/4						
1/4 of 1/4						
1/4 of 1/4						
1/4 of 1/4						
1/4 of 1/4						

(If area is unsurveyed, state the location as if lines of the public land survey were projected, or contact the Division of Water Rights. If space does not permit listing all 40-acre tracts, include on another sheet or state sections, townships and ranges, and show detail on map.)

7. DIVERSION WORKS

a. Diversion will be by gravity by means of AlternativeA: Middle Bar Dam & Pardee Dam
Alternative B: Pardee Dam & Duck Creek Dam
(Dam, pipe in unobstructed channel, pipe through dam, siphon, weir, gate, etc.)

b. Diversion will be by pumping from _____ Pump discharge rate _____ Horsepower _____
(Sump, offset well, channel, reservoir, etc.) (cfs or gpd)

c. Conduit from diversion point to first lateral or to offstream storage reservoir:

	CONDUIT (Pipe or channel)	MATERIAL (Type of pipe or channel lining) (Indicate if pipe is buried or not)	CROSS SECTIONAL DIMENSION (Pipe diameter or ditch depth and top and bottom width)	LENGTH (Feet)	TOTAL LIFT OR FALL		CAPACITY (Estimate)	
					Feet	+ or -		
Alternatives A & B	Tunnel	Concrete Lined	"A"- 12' "B"- 16'	11,000'±	148	-	620 cfs 1000 cfs	"A" "B"
	Pipe	R.C.P.	"A" 2-108"	44,000	130	-	620 cfs 1000 cfs	"A" "B"
			"B" 3-108"					

d. Storage reservoirs: (For underground storage, complete Supplement 1 to WR1, available upon request.)

	Name or number of reservoir, if any	DAM				RESERVOIR		
		Vertical height from downstream toe of slope to spillway level (ft.)	Construction material	Dam length (ft.)	Freeboard Dam height above spillway crest (ft.)	Approximate surface area when full (acres)	Approximate capacity (acre-feet)	Maximum water depth (ft.)
Alt.A	Middle Bar	420'	Concrete Arch	1300'	50	2860	434,000	414
ALT.B	Duck Creek	129'	Earth & Rockfill	30,100'	15'	3850	150,000	118

e. Outlet pipe: (For storage reservoirs having a capacity of 10 acre-feet or more.)

Diameter of outlet pipe (inches)	Length of outlet pipe (feet)	FALL (Vertical distance between entrance and exit of outlet pipe in feet)	HEAD (Vertical distance from spillway to outlet pipe in reservoir in feet)	Estimated storage below outlet pipe entrance (dead storage)
	To be determined during design			

f. If water will be stored and the reservoir is not at the point of diversion, the maximum rate of diversion to offstream storage will be 1000 cfs. Diversion to offstream storage will be made by: ☐ Pumping ☒ Gravity.

8. COMPLETION SCHEDULE See attachment

a. Year work will start _____ b. Year work will be completed _____
c. Year water will be used to the full extent intended _____ d. If completed, year of first use _____

9. GENERAL

a. Name of the post office most used by those living near the proposed point of diversion is Valley Springs

b. Does any part of the place of use comprise a subdivision on file with the State Department of Real Estate? YES [X] NO [ ]
If yes, state name of the subdivision See Attachment
If no, is subdivision of these lands contemplated? YES [ ] NO [ ]
Is it planned to individually meter each service connection? YES [ ] NO [ ] If yes, When? _____

c. List the names and addresses of diverters of water from the source of supply downstream from the proposed point of diversion: Woodbridge Irrigation District and numerous other downstream diverters whose names & addresses are unknown to applicant.

d. Is the source used for navigation, including use by pleasure boats, for a significant part of each year at the point of diversion, or does the source substantially contribute to a waterway which is used for navigation, including use by pleasure boats? YES [X] NO [ ] If yes, explain: Pardee Reservoir is a municipal water supply reservoir which has public access recreation facilities.

10. EXISTING WATER RIGHT

Do you claim an existing right for the use of all or part of the water sought by this application? YES [ ] NO [X]
If yes, complete table below:

Nature of Right (riparian, appropriative, groundwater.)	Year of First Use	Purpose of use made in recent years including amount, if known	Season of Use	Source	Location of Point of Diversion

11. AUTHORIZED AGENT (Optional)

With respect to [X] all matters concerning this water right application [ ] those matters designated as follows:

James C. Hanson, Consulting Civil Engineer (916) 448 - 2821
(Name of agent) (Telephone number of agent between 8 a. m. and 5 p. m.)

444 North Third St., Ste. 400 Sacramento, CA 95814
(Mailing address) (City or town) (State) (Zip code)

is authorized to act on my behalf as my agent.

12. SIGNATURE OF APPLICANT

I (we) declare under penalty of perjury that the above is true and correct to the best of my (our) knowledge and belief.
Dated August 17 19 90, at Stockton, California

Ms. (Mr.)
Miss. Mrs. Henry M. Idrata
(Signature of applicant)

(If there is more than one owner of the project, please indicate their relationship.)

Ms. Mr.
Miss. Mrs. _____
(Signature of applicant)

Additional information needed for preparation of this application may be found in the Instruction Booklet entitled "HOW TO FILE AN APPLICATION TO APPROPRIATE WATER IN CALIFORNIA". If there is insufficient space for answers in this form, attach extra sheets. Please cross-reference all remarks to the numbered item of the application to which they may refer. Send original application and one copy to the STATE WATER RESOURCES CONTROL BOARD, DIVISION OF WATER RIGHTS, P. O. Box 2000, Sacramento, CA 95810, with $100 minimum filing fee.

NOTE:

If this application is approved for a permit, a minimum permit fee of $100 will be required before the permit is issued. There is no additional fee for registration of small domestic use.

ATTACHMENT TO APPLICATION

MOKELUMNE RIVER WATER AND POWER AUTHORITY

This application is for appropriation of water from the Mokelumne River under Alternative A, or the Mokelumne River and Duck Creek under Alternative B. With the Authority's ability to store water and use the available groundwater supplies, it will be possible for diversion to be reduced or eliminated in dry or critically dry years. The water sought by this application under both Alternatives is water which is surplus to E.B.M.U.D.'s diversion and storage rights at Pardee and Camanche Reservoirs and other rights to use water below Camanche Dam. The Authority recognizes that Pardee Dam is owned and operated by East Bay Municipal Utility District and will seek access to the reservoir for the construction of the proposed diversion facilities.

Alternative A:

for consumptive use under this Appl. 10-2-90 PJW

The Authority proposes to construct a dam at the Middle Bar Dam site (Point #1) on the Mokelumne River upstream from the existing Pardee Dam. Water will be diverted to storage at the Middle Bar Dam for Municipal, Irrigation and Industrial purposes and for the incidental generation of power through ~~required~~ releases from the reservoir to the Mokelumne River. Under Alternative A, available, natural flows and releases of water from Middle Bar Dam will be diverted and/or rediverted at Pardee Dam (Point #2) by means of a 12' diameter concrete lined tunnel and/or at point(s) along the Mokelumne River downstream from the Camanche Dam.

Alternative B:

As an alternative, the Authority proposes to divert water at Pardee Dam (Point #2) through a 16' diameter concrete lined tunnel. Water will be diverted to offstream storage in the proposed Duck Creek Reservoir located on Duck Creek (Point #5). The Alternative also seeks a movable point of direct diversion along the Mokelumne River downstream from Camanche Dam.

It is contemplated that either Alternative will be designed to develop a substantial acreage of new wetlands along Duck Creek or at other locations. It is also contemplated that both alternatives, but particularly Alternative "A", would permit additional flows downstream in the Mokelumne River at critical times for fishery purposes, not only as a mitigation measure but as an enhancement of present conditions. Applicant, in this regard intends to work closely with the California Department of Fish and Game and the United States Fish and Wildlife Service as well as other agencies having jurisdiction.

Re: 2a. Source

Point	Source	Tributary to:
Alternative A		
#1	Mokelumne River	San Joaquin River
#2	Mokelumne River	San Joaquin River
Alternative B		
#2	Mokelumne River	San Joaquin River
#5	Duck Creek	Calaveras River

2b. The source at Point #5, Duck Creek, drys up downstream from about May 1 to October 15 of each year.

Re: 3b. Points of Diversion & Rediversion - ALTERNATIVE "A"

PJW 10-2-90

Map Point Designation	Description
#1	Middle Bar Dam - Point of Diversion and Storage for Irrigation, Industrial & Municipal Purposes and Point of ~~Direct~~ Diversion for Incidental Power Generation ~~from Required Releases~~: Located South 56°45'East, 3552' from the N.W. corner of Section 16, T.5 N. R.11 E., M.D.B.& M.; being within the SE¼ of the NW¼ of said Section 16.
#2	Pardee Dam - Point of Direct Diversion and Point of Rediversion for Water Stored at Point #1: Located South 18°10'East, 3420 feet from the N.W. corner of Section 26, T.5 N., R.10 E., M.D.B.& M.; being within the NW¼ of the SW¼ of said Section 26.
	Various Points of Direct Diversion and Points of Rediversion for Water Diverted at Point #1 located between Points #3(a) and #3(b):
#3(a)	Camanche Dam: Located South 43°15'West, 1900 feet from the E.¼ corner of Section 6, T.4 N., R.9 E., M.D.B.& M.; being within the SE¼ of the SE¼ of said Section 6.
#3(b)	Intersection of Mokelumne River and Interstate 5: Located N.640,050 and E.1,728,100 of the California Coordinate System, Zone 3; being within the SE¼ of the NE¼ of projected Section 29, T.5 N., R.5 E., M.D.B.& M.
	Various Points of Rediversion for Water Diverted at Point #1 located between Points #4(a) & #4(b) and between Points #4(a) & #4(c) :
#4(a)	Bellota Weir: Located N.2200' and E.2050' from the S.W. corner of Section 5, T.2 N., R.9 E., M.D.B.& M.; being within the NE¼ of the SW¼ of said Section 5.
#4(b)	Intersection of Stockton Diverting Canal and Calaveras River: Located N.545,050 and E.1,775,500 of the California Coordinate System, Zone 3; being within the SE¼ of the NE¼ of projected Section 24, T.2 N., R.6E., M.D.B.& M.
#4(c)	Intersection of Calaveras River and Interstate 5: Located N.539,800 and E.1,757,800 of the California Coordinate System, Zone 3; being within the SE¼ of the NW¼ of projected Section 32, T.2 N., R.6 E., M.D.B.& M.

Re: 3b. Points of Diversion & Rediversion - ALTERNATIVE "B"

Map Point Designation	Description
#2	Pardee Dam - Point of Direct Diversion and Diversion to Offstream Storage at Point #5: Located South 18°10'East, 3420 feet from the N.W. corner of Section 26, T.5 N., R.10 E., M.D.B.& M.; being within the NW¼ of the SW¼ of said Section 26.
	Various Points of Direct Diversion located between Points #3(a) and #3(b):
#3(a)	Camanche Dam: Located South 43°15'West, 1900 feet from the E.¼ corner of Section 6, T.4 N., R.9 E., M.D.B.& M.; being within the SE¼ of the SE¼ of said Section 6.
#3(b)	Intersection of Mokelumne River and Interstate 5: Located N.640,050 and E.1,728,100 of the California Coordinate System, Zone 3; being within the SE¼ of the NE¼ of projected Section 29, T.5 N., R.5 E., M.D.B.& M.
	Various Points of Rediversion for Water Diverted at Point #2 located between Points #4(a) & #4(b) and between Points #4(a) & #4(c):
#4(a)	Bellota Weir: Located N.2200' and E.2050' from the S.W. corner of Section 5, T.2 N., R.9 E., M.D.B.& M.; being within the NE¼ of the SW¼ of said Section 5.
#4(b)	Intersection of Stockton Diverting Canal and Calaveras River: Located N.545,050 and E.1,775,500 of the California Coordinate System, Zone 3; being within the SE¼ of the NE¼ of projected Section 24, T.2 N., R.6E., M.D.B.& M.
#4(c)	Intersection of Calaveras River and Interstate 5: Located N.539,800 and E.1,757,800 of the California Coordinate System, Zone 3; being within the SE¼ of the NW¼ of projected Section 32, T.2 N., R.6 E., M.D.B.& M.
#5	Duck Creek Dam - Point of Diversion and Storage and Point of Rediversion for Water Diverted at Point #2: Located N.1650' and W.1600' from the S.E. corner of Section 21, T.3 N., R.9 E., M.D.B.&M., being within the NW¼ of the SE¼ of said Section 21.

Re: 5a. Irrigation

Almost all of the irrigable lands within the Authority's service area are currently developed to a variety of crops including truck crops, deciduous orchards, vineyards, row crops, alfalfa and pasture. The following table identifies the irrigated areas within the various service areas for the year 2015, together with the weighted average water requirement.

Service Area	Irrigable Acreage (Ac)	Weighted Average Demand (AF/Ac)	Total Demand (AF)	Conveyance Efficiency (%)	Total Requirement (AF)
North San Joaquin W.C.D.	39,900	2.84	113,300	90	125,900
Woodbridge Area	27,700	3.01	83,400	90	92,700
Stockton East W.D.	56,920	3.28	186,700	90	207,400
Central San Joaquin W.C.D.	59,740	3.10	185,200	90	205,800
San Joaquin County F.C. & W.C.D.					
Area 1	6,530	2.95	19,300	90	21,400
Area 2	4,840	2.88	13,900	90	15,400
Area 3	6,290	2.91	18,300	90	20,300
Area 4	1,690	2.98	5,000	90	5,600
Area 5	4,840	2.86	13,800	90	15,300
TOTAL	**208,450**		**638,900**		**709,800**

Re: 6. Place of Use

Water will be used on land located within the special districts and other areas within the Flood Control and Water Conservation District. The service area (see accompanying map) will consist of a gross area of 399,700 acres within the following townships:

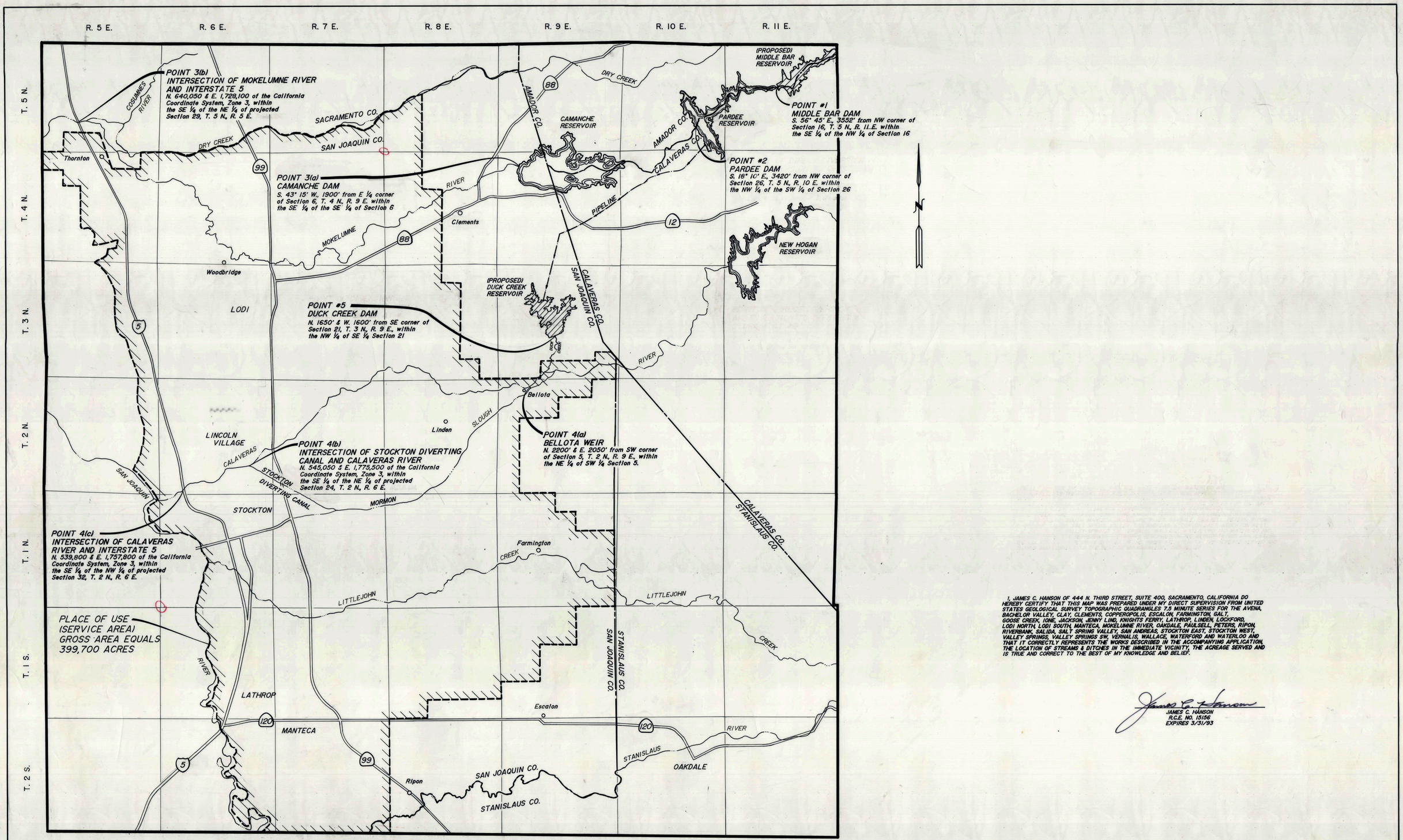
Township	Range
1 South	6, 7, 8, 9 East
2 South	6, 7 East
1 North	5, 6, 7, 8, 9 East
2 North	5, 6, 7, 8, 9 East
3 North	5, 6, 7, 8, 9 East
4 North	5, 6, 7, 8 East
5 North	5, 6, 7, 8 East

Re: 8. Completion Schedule

The Pardee Dam is complete. The Middle Bar Dam or the Duck Creek Dam, tunnel and pipelines for conveyance of the water will be completed by the year 2000. Most of the service area is developed to irrigated agriculture or urban areas. Conveyance systems are in place but some additions will be required. Although most of the water can be placed to immediate use, it will take until the year 2020 for full municipal use.

Re: 9b. General

Water will be used within the cities of Lodi, Stockton, Lathrop and Manteca. In addition, water will be used for municipal purposes within unincorporated areas in San Joaquin County. A policy of requiring meters for all new developments has been adopted by the County.



LOCATION MAP

SCALE IN MILES

0 2 4 6

I, JAMES C. HANSON OF 444 N. THIRD STREET, SUITE 400, SACRAMENTO, CALIFORNIA DO HEREBY CERTIFY THAT THIS MAP WAS PREPARED UNDER MY DIRECT SUPERVISION FROM UNITED STATES GEOLOGICAL SURVEY TOPOGRAPHIC QUADRANGLES 7.5 MINUTE SERIES FOR THE AVENA, BACHELOR VALLEY, CLAY, CLEMENTS, COPPEROPOLIS, ESCALON, FARMINGTON, GALT, GOOSE CREEK, IONE, JACKSON, JENNY LIND, KNIGHTS FERRY, LATHROP, LINDEN, LOCKFORD, LODI NORTH, LODI SOUTH, MANTECA, MOKELUMNE RIVER, OAKDALE, PAULSELL, PETERS, RIPON, RIVERBANK, SALIDA, SALT SPRING VALLEY, SAN ANDREAS, STOCKTON EAST, STOCKTON WEST, VALLEY SPRINGS, VALLEY SPRINGS SW, VERNALIS, WALLACE, WATERFORD AND WATERLOO AND THAT IT CORRECTLY REPRESENTS THE WORKS DESCRIBED IN THE ACCOMPANYING APPLICATION, THE LOCATION OF STREAMS & DITCHES IN THE IMMEDIATE VICINITY, THE ACREAGE SERVED AND IS TRUE AND CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF.

JAMES C. HANSON
R.C.E. NO. 15156
EXPIRES 3/31/93

JAMES C. HANSON
Consulting Civil Engineer
A Corporation

REGISTERED PROFESSIONAL ENGINEER
JAMES C. HANSON
No. 15156
Exp. 3-31-93
CIVIL
STATE OF CALIFORNIA

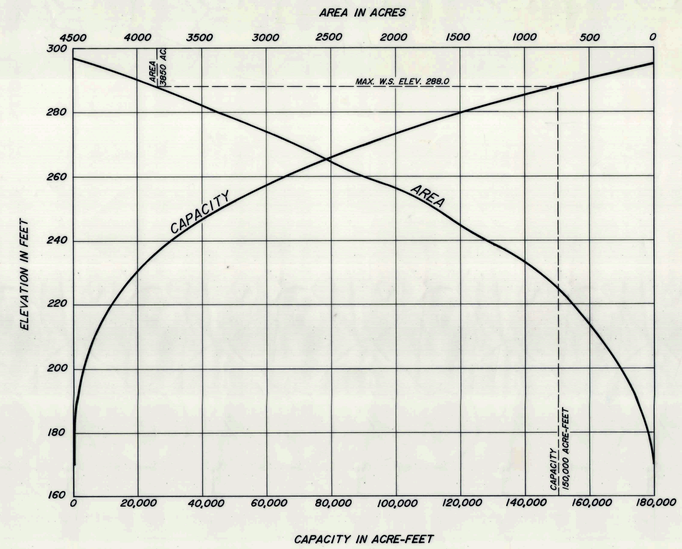
Map to Accompany
Application No. 29835
by
Mokelumne River Water and Power Authority

Designed By: J.C. HANSON	Checked By: P.J. WHEALEN	Date: JULY 1990	
Drawn By: J.W. LIVENGOOD	Approved By: J.C. HANSON	Sheet: 1 OF 4	



PLAN OF DUCK CREEK RESERVOIR

SCALE: 1"=1000'



AREA-CAPACITY CURVES

NOTES:

1. VERTICAL DATUM IS N.G.V.D.
2. CONTOUR INTERVAL IS 10'.
3. RESERVOIR IS WITHIN SAN JOAQUIN COUNTY.
4. LOCATION OF POINT OF DIVERSION IS SHOWN ON SHEET 1.

JAMES C. HANSON
Consulting Civil Engineer
A Corporation

REGISTERED PROFESSIONAL ENGINEER
JAMES C. HANSON
No. 15156
Exp. 3-31-93
CIVIL
STATE OF CALIFORNIA

Maps to Accompany
Application No. 29835
by
Mokelumne River Water and Power Authority

Designed By J.C. HANSON	Checked By P.J. WHEALEN	Date JUNE 1990	
Drawn By J.W. LIVENGOOD	Approved By J.C. HANSON	Sheet 2 OF 4	

SEE SHEET 4

MATCH LINE

MAXIMUM WATER SURFACE ELEV. 914.0

PROPOSED DAM

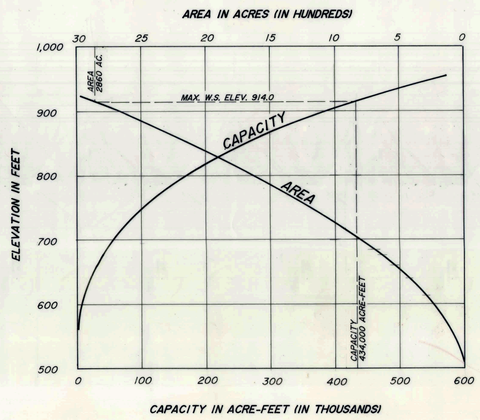
℄ SPILLWAY

MAXIMUM WATER SURFACE ELEV. 914.0

N

PLAN OF MIDDLE BAR RESERVOIR

SCALE: 1" = 1000'



AREA-CAPACITY CURVE

NOTES:

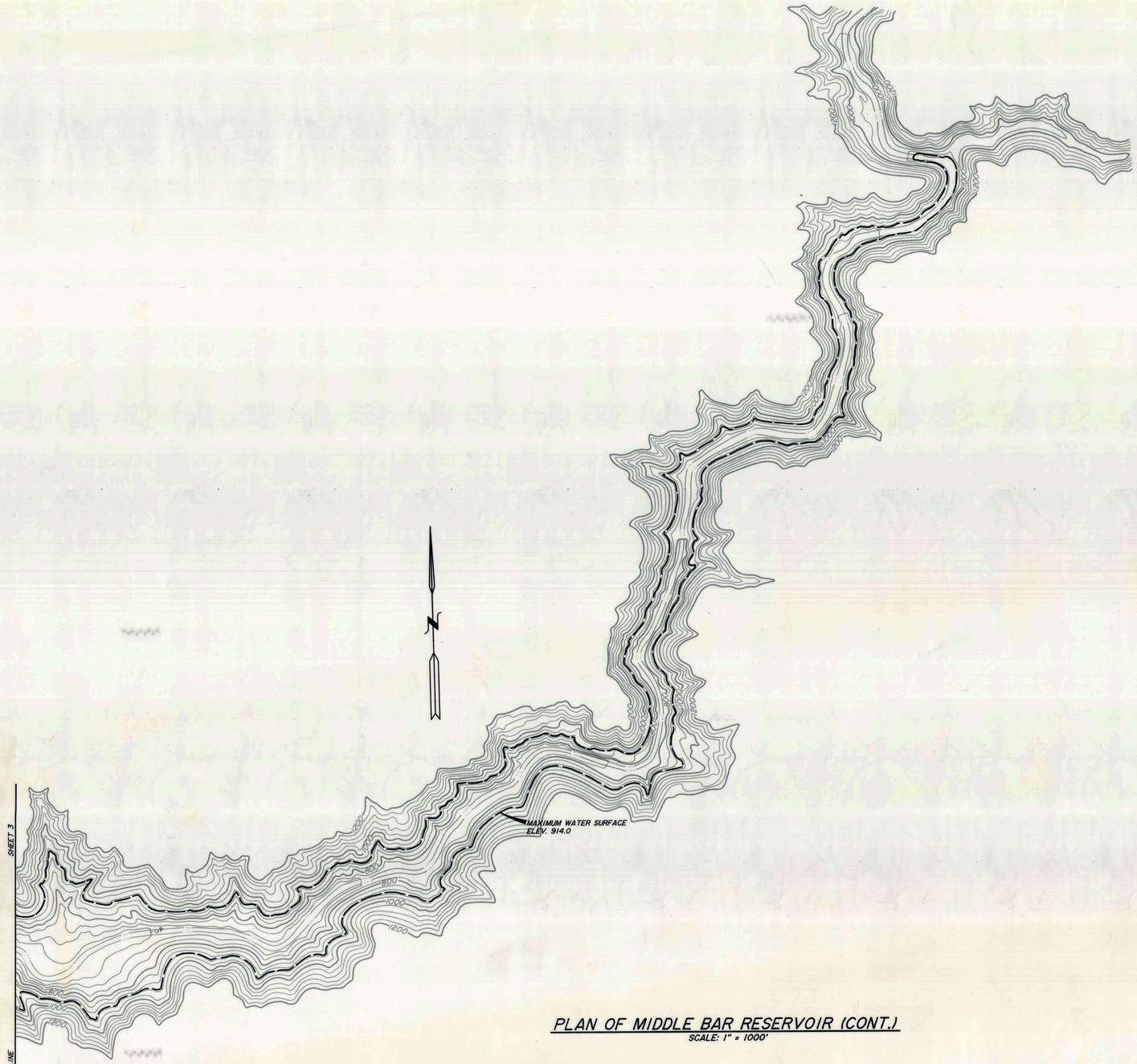
1. VERTICAL DATUM IS N.G.V.D.
2. CONTOUR INTERVAL IS 40'.
3. RESERVOIR IS WITHIN AMADOR & CALAVERAS COUNTIES.
4. LOCATION OF POINT OF DIVERSION IS SHOWN ON SHEET 1.

JAMES C. HANSON
Consulting Civil Engineer
A Corporation

REGISTERED PROFESSIONAL ENGINEER
JAMES C. HANSON
No. 15156
Exp. 3-31-93
CIVIL
STATE OF CALIFORNIA

Maps to Accompany
Application No. 29835
by
Mokelumne River Water and Power Authority

Designed By	J.C. HANSON	Checked By	P.J. WHEALEN	Date	AUGUST 1990
Drawn By	M.J. MONTOYA	Approved By	J.C. HANSON	Sheet	3 OF 4



PLAN OF MIDDLE BAR RESERVOIR (CONT.)

SCALE: 1" = 1000'

JAMES C. HANSON
Consulting Civil Engineer
A Corporation

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Mokelumne River Water and Power Authority

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APPENDIX B

Joint Settlement Agreement, Lower Mokelumne River Project, FERC Project No. 2916-004, March 23, 1998 (JSA)

NSJ-108

LOWER MOKELUMNE RIVER PROJECT

FERC Project No. 2916-004

JOINT SETTLEMENT AGREEMENT

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LOWER MOKELUMNE RIVER
JOINT SETTLEMENT AGREEMENT

This Lower Mokelumne River Joint Settlement Agreement ("Agreement") for the Lower Mokelumne River Project, FERC No. 2916, regarding flow and non-flow measures appropriate for the lower Mokelumne River is entered into by and between East Bay Municipal Utility District ("EBMUD") and the U.S. Fish & Wildlife Service ("the Service"), and California Department of Fish & Game ("CDF&G"), collectively referred to as the "Resource Agencies." EBMUD, the Service and CDF&G are each referred to herein individually as "Party" and together as the "Parties."

WITNESSETH

WHEREAS, on March 10, 1981, the Federal Energy Regulatory Commission ("FERC") issued a license to EBMUD for the Lower Mokelumne River Project No. 2916.

WHEREAS, on July 1, 1991, the staff of the FERC initiated a license modification proceeding, Lower Mokelumne River Project No. 2916-004, to determine if modifications to the Lower Mokelumne River Project facilities or operations were appropriate for the conservation and development of fish and wildlife resources in the Mokelumne River.

WHEREAS, in 1992, the Service intervened in the FERC's license modification proceeding and proposed certain flow and non-flow measures to conserve and restore the anadromous fishery and improve other ecosystem values.

WHEREAS, on July 16, 1993, EBMUD made an Offer of Settlement in the FERC license modification proceeding, Lower Mokelumne River Project No. 2916-004.

WHEREAS, the Parties have engaged in extensive discussions in an effort to resolve issues in dispute in the license modification proceeding before the FERC and the differences between them regarding the flow and non-flow needs of the lower Mokelumne River, and to establish a more cooperative and mutually beneficial working relationship for the future.

WHEREAS, each of the Parties has separately concluded that greater protection and enhancement of the anadromous fishery resources of the lower Mokelumne River will result if EBMUD implements new instream flows and the Parties variously undertake certain non-flow measures.

WHEREAS, in February 1996, the Parties executed a Principles of Agreement setting forth elements of settlement, including flow and non-flow measures, to be reflected in a Joint Settlement Agreement.

WHEREAS, EBMUD has separately concluded that the flows and non-flow measures specified herein can be undertaken without unacceptably jeopardizing the Lower Mokelumne River Project as a reliable, high quality water supply.

WHEREAS, because EBMUD lacks authority to control diversions by other appropriators and riparians downstream of Camanche Dam, this Joint Settlement Agreement sets forth EBMUD's minimum water releases from Camanche Dam and non-flow related measures for the Mokelumne River Ecosystem (Pardee Reservoir to the Delta). The parties also recognize there are important resource management issues and opportunities downstream of Woodbridge Dam that will be considered by the Partnership Steering Committee for non-flow habitat measures.

WHEREAS, EBMUD has agreed to provide flows and the Parties have agreed to undertake certain non-flow measures as specified in this Joint Settlement Agreement.

WHEREAS, EBMUD acknowledges that it is subject to the terms of the Clean Water Act and the Porter-Cologne Act, including the water quality provisions of said acts.

WHEREAS, each of the Resource Agencies agrees to support this Joint Settlement Agreement including the flow and non-flow measures specified herein, believing they will provide reasonable protection and enhancement from current conditions with respect to EBMUD's contribution for the fish and wildlife resources of the lower Mokelumne River.

NOW, THEREFORE, EBMUD, the Service and CDF&G agree as follows:

A. Purpose and Scope.

The Parties intend this Agreement to resolve (1) the pending FERC Proceeding No. 2916-004; and (2) the pending Mokelumne River Water Rights Proceeding before the California State Water Resources Control Board (SWRCB). The Parties agree not to oppose the flows or non-flow measures set forth in this Agreement in any regulatory proceeding, or portion thereof, directed at EBMUD's obligation to protect the fish resources of the Mokelumne River Ecosystem. The Parties further agree that these resolutions are accomplished in a manner which:

- protects and maintains EBMUD's Lower Mokelumne River Project as a reliable, high quality water supply for EBMUD;
- contributes to EBMUD's ability to protect and maintain its water rights attendant to the Lower Mokelumne River Project;
- provides reasonable protection and enhancement from current conditions for the anadromous fishery and ecosystem of the lower Mokelumne River and constitutes

a reasonable contribution on the part of EBMUD toward state and federal fishery restoration goals for the River set forth in the California Salmon, Steelhead Trout, and Anadromous Fisheries Program Act and the CVPIA; and

- encourages cooperative action to achieve and to maintain these objectives over time.

B. Effective and Termination Dates.

This Agreement shall be effective on the date FERC issues a final order in License Modification Proceeding No. 2916-004, and shall remain in effect for the duration of the term of the FERC License No. 2916.

This Agreement shall terminate upon withdrawal from the Agreement of a Party pursuant to Section C below.

C. Action of the FERC.

Within 30 days after all Parties have initialed this Agreement, the Parties agree to submit jointly this Agreement as an Offer of Settlement to the FERC to resolve FERC License Modification Proceeding No. 2916-004 and jointly to request, as a fair and reasonable resolution of that proceeding, that following and subject to compliance with the Endangered Species Act (ESA) as described in Section J hereof, FERC amend EBMUD's existing license to include, in its entirety and without modification, Attachment 1 (pages 1-5) of this Agreement as the flow requirements for the Lower Mokelumne River Project No. 2916. Within 30 days of receiving notification of compliance with the ESA as described in Section J, each Party shall sign the Agreement and jointly submit it to FERC for final action.

In the event that the FERC does not by final, non-appealable Order implement without modification the flow requirements specified in Attachment 1 (pages 1-5) of this Agreement, then each Party shall have 30 days after the FERC Order becomes final and non-appealable to provide notice to the other Parties of its intent to withdraw from the Agreement or to accept the Agreement subject to the provisions reflected in the final, non-appealable Order of the FERC. A failure to provide such notice shall be deemed an acceptance of the Agreement.

D. Support of This Agreement.

The Parties agree that the provisions of this Agreement are in the public interest and represent EBMUD's reasonable obligation under FERC License No. 2916 and the Mokelumne River Water Rights Proceeding pending before the SWRCB to protect and enhance the fishery resources of the lower Mokelumne River and maintain the Lower Mokelumne River Project as a reliable, high quality water supply.

The Parties individually and collectively agree to support this Agreement and to work cooperatively to implement the terms of this Agreement. The Parties agree not to oppose the flows or non-flow measures set forth in this Agreement in any regulatory proceeding, or portion thereof, directed at EBMUD's obligation to protect the fish resources of the Mokelumne River Ecosystem. The Parties also agree that no Party shall take any action which has the purpose or effect of frustrating the accomplishment of the purposes and provisions of this Agreement.

The Parties agree that nothing in this Agreement is intended to nor shall be construed to abrogate, modify or waive any rights, duties or responsibilities of any Party under any federal or state law, order, license or permit, contract, or water rights determination.

E. Establishment of a Lower Mokelumne River Partnership.

EBMUD, the Service and CDF&G will establish a Lower Mokelumne River Partnership (the "Partnership") to develop joint action plans to protect the Mokelumne River Ecosystem (Pardee Reservoir to the Delta). The objectives of the Partnership shall include the:

- Protection and enhancement of the anadromous fishery;
- Protection and improvement of the Mokelumne River Ecosystem;
- Encouragement of stakeholder participation and cooperation; and
- Integration of Mokelumne River strategies with the Bay Delta Accord, CVPIA implementation, or similar measures.

1. Partnership Steering Committee.

One representative each from EBMUD, CDF&G , and the Service will serve as the Partnership Steering Committee responsible for guiding the Partnership, defining and developing annual action programs, schedules and cost estimates for projects and funding strategies to achieve them. EBMUD will chair the Steering Committee for the first year with the option for the Service, CDF&G and District to chair the Committee on an annual rotating basis in subsequent years. Actions of the Steering Committee are intended to be taken with full consideration of input from the Stakeholders Group (described below) and shall only be taken upon the unanimous approval of the Steering Committee. The Steering Committee will coordinate efforts to achieve the objectives of the Partnership through the flow requirements and anadromous fishery protection measures set forth in Section F below, the Ecosystem Protection measures set forth in Section G below, and the Technical Cooperation measures set forth in Section H below.

2. Establishment of a $2 million Partnership Fund.

Within 45 days of the FERC Order implementing this Agreement becoming final and non-appealable, EBMUD will establish, manage and maintain a $2 million fund (the "Partnership Fund") for the life of this Agreement, the annual income from which will provide operating support for the partnership programs. EBMUD will manage the Fund in a manner consistent with law and with an objective of maximizing its annual income. Annual interest earnings that remain unspent from year to year shall accrue in the fund and remain available for use of the Steering Committee during the term of the partnership agreement. The principal and any unspent earnings of the fund shall remain the property of EBMUD and will revert to EBMUD upon the expiration of this agreement or upon the withdrawal of any party to the agreement. EBMUD will report quarterly to the Steering Committee regarding the income earned and current balance of the Fund. Any expenses of administration of the Partnership Fund shall be paid separately by EBMUD and shall not be deducted from the Partnership Fund. The Resource Agencies will seek federal, state and other sources of funds ("Other Funds") to supplement the objectives of the Partnership. The Steering Committee will also solicit the financial participation and involvement of other public agencies, interest groups and private property owners along the lower Mokelumne River to advance the objectives of the Partnership.

EBMUD intends to provide this $2 million Partnership Fund in addition to its current level of effort in funding fishery studies, water quality and biological monitoring, habitat protection, and other operating support for its ongoing operations and responsibilities on the lower Mokelumne River.

It is not EBMUD's intention to reduce its current level of effort. EBMUD, however, reserves the right, at its sole discretion, to reprioritize and reprogram its efforts that are undertaken outside the Partnership Fund based upon improving science, information collected and its operational needs.

3. Water Quality And Resource Management Program.

Within 30 days of the signature of this Agreement in accordance with Section C, the Partnership Steering Committee agrees to begin development of a Water Quality and Resource Management Program. Within six (6) months of the FERC Order implementing this Agreement becoming final and non-appealable, the Partnership Steering Committee will finalize the Water Quality and Resource Management Program. EBMUD agrees to provide $200,000 to support the Partnership efforts in developing the final Water Quality and Resource Management Program. The Water Quality and Resource Management Program will define reasonable goals, measures, performance criteria, and responsive actions.

4. Additional Voluntary Participation.

The Resource Agencies recognize that aside from the upper one-half mile of the lower Mokelumne River corridor owned by EBMUD and included in its FERC project lands, the majority

of the riparian area and associated uplands are privately owned and not subject to the control of EBMUD. The Parties agree that the voluntary participation of these other property owners will be necessary to achieve certain long term objectives for protecting the lower Mokelumne River ecosystem. For actions involving access to the property of, and agreements with, other property owners along the lower Mokelumne River, the Resource Agencies will take the lead and EBMUD and other stakeholders will provide support.

5. Establishment of a Lower Mokelumne River Stakeholders Group.

A Stakeholders Group will be established consisting of EBMUD, the Service, CDF&G, and other stakeholders in the lower Mokelumne River invited to participate including but not limited to Amador, Calaveras and San Joaquin Counties, Woodbridge Irrigation District, the City of Lodi, North San Joaquin Water Conservation District, the Committee to Save the Mokelumne and other interested environmental groups, Native Americans, and private property owners along the river.

The role of the Stakeholders Group will be to:

- Encourage the voluntary participation and cooperation of other stakeholders along the river to contribute financial and in-kind resources, provide access to the river for enhancement work and participate in implementing the Partnership action plans and objectives;

- Recommend ecosystem protection and improvement priorities and measures to the Partnership Steering Committee for annual action plans in conjunction with additional resources available from other stakeholders; and

- Serve as a communications and coordination forum for stakeholders in discussing common concerns and developing joint action plans to address issues.

F. Flow Requirements and Anadromous Fishery Protection.

The Parties agree that water demands in the Mokelumne River basin during the planning horizon of 1996 to 2020 and until the expiration of the FERC license (year 2031) will increase. The Parties also agree that the frequency of critically dry year flows may increase. In order to ensure that protection of the fishery resource continues in the future to be reasonably balanced with other demands, the Parties agree that additional measures are needed and agree that the following additional actions will be implemented. Upon the FERC Order implementing this Agreement becoming final and non-appealable, EBMUD agrees to operate its Lower Mokelumne River Project in accordance with the flow requirements specified in Attachment 1 (pages 1-5) attached hereto and incorporated herein in its entirety by this reference.

1. Adaptive Management of River Operations.

The Parties agree that the flows specified in Attachment 1 and the other elements of the Agreement provide reasonable protection and enhancement from current conditions for the anadromous fishery and ecosystem of the lower Mokelumne River and meet EBMUD's obligation to protect the anadromous fishery and other resources in the lower Mokelumne River pursuant to FERC License No. 2916-004 and the pending SWRCB Water Rights Proceeding. To increase opportunity for optimizing fishery habitat and other ecosystem values consistent with this Agreement, the parties agree to implement an adaptive management approach with operations of the Lower Mokelumne River Project. This could require responsive actions based on changing river conditions. To accomplish this, the Parties agree that, with the prior written concurrence of CDF&G and the Service, EBMUD may reschedule or modify the flows specified in Attachment 1, provided the total quantity of water released in any given year will not be less than the quantity of water provided by the flow requirements specified on Attachment 1 for that type of water year.

2. Gainsharing Increases in Flows.

EBMUD agrees to increase instream flows beyond the flows specified in Attachment 1 by an amount equal to 20% of the actual yield of additional water supplies developed by EBMUD from new facilities until reaching a maximum quantity of 20 TAF[1] which will be available at the joint written request of CDF&G and the Service. Gainsharing water will be available in any year in which carryover storage in EBMUD's storage at the Lower Mokelumne River Project on November 5th is projected to be at the maximum allowable levels according to the US Corps of Engineers permit. But when carry-over storage on November 5th is less than the maximum allowable, such gainsharing water may be used only once during any drought sequence.[2] Such gainsharing water for flow augmentation will be provided upon the completion of construction and initial fill of EBMUD's

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[1] EBMUD estimates its need for water to be 160 TAF by 2020 not counting gainsharing. The District anticipates that conservation and reclamation projects will be implemented sufficient to meet 75 TAF of that need for water in order to manage customer demand so it does not exceed 230 MGD through 2020. EBMUD would provide 20% of the yield from future water storage or conjunctive use projects needed to meet this remaining estimated 85 TAF need for water by 2020 up to a maximum of 20 TAF when such storage projects come on line and water from such projects is available to District customers. This gainsharing water could then be used annually if carry-over storage in the EBMUD Mokelumne storage on November 5th is at maximum allowable levels but may be used only once in each drought sequence.

[2] "Drought sequence" is defined as beginning whenever November 5th carry-over storage levels in Pardee and Camanche Reservoirs are projected to be less than maximum allowable levels under terms of the U.S. Army Corps of Engineers flood control manual, and ending when carry-over levels recover to maximum allowable storage levels.

share of any new reservoir on the Mokelumne River or the expansion of any existing EBMUD reservoir on the Mokelumne River or when EBMUD begins to take stored ground water into its system from any conjunctive use program. Water available to the Resource Agencies in any year under this gainsharing program may be added to carry over storage but shall not affect subsequent water year type determination. This additional gainsharing water will be available from any source other than conservation, reclamation projects, and the Amador Canal pipeline project, and shall be available only once during each drought sequence.

The Parties understand that EBMUD makes no guarantee regarding the timing for the development of new water storage facilities or projects eligible for gainsharing. The Parties, nevertheless, remain optimistic that such efforts will occur, at least partially, during EBMUD's water supply management program current planning period running through 2020 in order to meet the reasonable water supply needs of EBMUD. EBMUD understands that it is important to the Resource Agencies that the non-flow and the gainsharing measures outlined in this Agreement be planned and coordinated to meet agreed resource goals.

3. Surplus Water.

EBMUD agrees to notify the Resource Agencies of the availability for sale of surplus Mokelumne River water.

4. Ramping Rates.

The Parties agree that when flood control releases are not being made, river flow changes should be gradual but should not decrease by more that 50 cfs per day during the October 16 through March 31 spawning and incubation period and by not more than 100 cfs per day at other times except in the case of emergencies.

5. Managing Camanche Reservoir Hypolimnion.

The Parties agree that EBMUD will use its best efforts to maintain Pardee and Camanche Reservoir stratification with a minimum of 28 TAF of hypolimnetic volume in Camanche Reservoir through October whenever Pardee Reservoir volume exceeds 100 TAF. The Parties also agree that EBMUD will strive to maintain dissolved oxygen and to reduce hydrogen sulfide levels in the Camanche Reservoir hypolimnion during the period from May through October by using its Hypolimnetic Oxygenation System (HOS). This provision shall be incorporated into the Water Quality and Resource Management Program.

6. Expansion and Upgrade of the Mokelumne River Fish Hatchery.

The Parties agree that EBMUD will provide funding to expand and upgrade the Mokelumne River Fish Hatchery in accordance with the EBMUD Hatchery Master Plan (1996), up to a maximum of $12.5 million. The Parties agree to support the expansion and upgrade of the fish

hatchery as an integral part of a strategy to supplement the natural production of and to meet the mitigation requirement for anadromous fish in the lower Mokelumne River. EBMUD will construct the fish hatchery in accordance with final design plans and final construction cost estimates approved by CDF&G. During construction, EBMUD and CDF&G will meet at the request of either party to discuss actual construction costs and jointly develop modifications as needed. EBMUD and CDF&G will jointly work to ensure that total project costs do not exceed $12.5 million. EBMUD agrees that it will continue its existing financial support for operations and maintenance actions at the Mokelumne River Fish Hatchery. CDF&G agrees that it will continue to be responsible for the operation and maintenance of the fish hatchery as well as for hatchery production during construction of the hatchery expansion and upgrade.

7. Integration of Natural Production Strategies.

The Parties agree that CDF&G will, to the extent feasible, integrate natural production strategies when implementing its hatchery management operations. The parties agree that a trap and truck program, predator management practices and angling regulations, including provisions to prevent damage to redds from wading, could have some benefit to the fishery resource. However, the amount of such benefit is currently unknown. Trapping and trucking of anadromous salmonids shall take place during critical years with approval of the Partnership Steering Committee. Predator management activities shall only take place with the approval of the Partnership Steering Committee. The California Fish & Game Commission has the authority to adopt angling regulations in California. Upon approval of the Partnership Steering Committee, the Committee may request the Commission to adopt angling regulations for the lower Mokelumne River to prevent damage from redds from wading.

8. Satisfaction of EBMUD's Contribution Toward State and Federal Restoration Goals.

The Parties agree that implementation of the flow requirements and non-flow measures set forth in this Agreement constitutes a reasonable contribution by EBMUD to provide reasonable protection and enhancement from current conditions for the anadromous fishery and ecosystem of the lower Mokelumne River, and constitutes a reasonable contribution on the part of EBMUD toward state and federal fishery restoration goals for the River set forth in the California Salmon, Steelhead Trout, and Anadromous Fisheries Program Act and the CVPIA.

G. Ecosystem Protection.

The Parties agree to establish a Lower Mokelumne River Ecosystem Protection Program to encourage cooperative joint action to protect and to improve the natural production of anadromous fish and the natural resource habitat of the lower Mokelumne River ecosystem.

1. **Ecosystem Action Priorities.**

The Parties agree to work cooperatively through the Steering Committee using income from the Partnership Fund and Other Funds to develop and to implement measures, which will be consistent with the principles of this Agreement, to protect and enhance the natural production of anadromous fish and the habitat of the lower Mokelumne River corridor ecosystem. Such measures may include:

- **Identify riparian values and biological diversity** in the Mokelumne River Ecosystem. Support riparian management actions which improve the lower Mokelumne River Ecosystem, including: Planting trees and shrubs along the river corridor to provide shade cover for moderating instream temperatures, and selective removal of undesirable vegetation to improve habitat conditions. These efforts will be made in cooperation with the U.S. Natural Resources Conservation Service (formerly Soil Conservation Service) and property owners.

- **Improve spawning gravels** in the lower Mokelumne River above tidewater to correct compaction of existing gravels, adding new gravels and creating gravel berms, cleaning gravels, and measures to reduce sediments to improve instream spawning habitat.

- **Encourage fencing and barriers to prevent cattle and livestock from reaching the banks of the river** to enhance bank stability and to protect riparian corridor values. Upon approval of the Partnership Steering Committee, CDF&G would assume the lead in working in cooperation with private property owners along the river corridor, subject to available funding.

- **Identify, design and install screens on diversion facilities** to prevent unintended fish losses in cooperation with diverters. Upon approval of the Partnership Steering Committee, CDF&G would assume the lead for these activities, subject to available funding. *

- **Encourage cooperative action and enforcement to reduce poaching** on the lower Mokelumne River.

- **Cooperative actions to improve fish passage at Woodbridge Dam.** The Parties will work cooperatively with Woodbridge Irrigation District and other parties to improve the coordination of efforts to ensure that the natural resources of the lower Mokelumne River below Camanche Dam are protected. While no commitments of funds for improvements to Woodbridge Dam have been made nor implied by any Party to this Agreement, each Party agrees to work cooperatively with Woodbridge Irrigation District to seek CVPIA Restoration Fund, Category III or other funds to implement agreed improvements.

- **Expand coded-wire tagging to include all fish released from the Mokelumne River Fish Hatchery,** if it is part of a statewide strategy to coded-wire tag all salmon released in California fish hatcheries in cooperation with commercial salmon trawlers, the Resource Agencies, and the California Fish and Game Commission.

- **Update and maintain database on biological diversity and habitat characteristics of aquatic resources at various instream flows.**

- **Other ecosystem improvement actions to be determined by the Steering Committee.**

- **Develop and implement a Water Quality and Resource Management Program.**

H. Mokelumne River Technical Cooperation

The Parties agree to coordinate their respective fishery and habitat studies, monitoring programs, and research efforts to advance the shared knowledge and science about the Mokelumne River. The following actions will be undertaken to support this objective:

1. Mokelumne River Technical Advisory Committee (MRTAC).

The Parties agree that for the interim, the MRTAC will remain the key forum for sharing technical information about the fishery, river operations and other data about the current conditions and planned actions affecting the river. EBMUD, the Service and CDF&G will continue actively to support the MRTAC as a technical information sharing forum.[3]

2. Mokelumne River Science Database.

The Parties agree to convert the technical notebook developed during the negotiation of this Agreement into a Mokelumne River Science Database to be available to the Parties (under the guidance of the Partnership Steering Committee). The database will be jointly maintained by the parties and will summarize existing science, data and research efforts and will be updated and maintained over time by adding new data, studies and research efforts undertaken by any Party using a standard agreed upon format and protocol. EBMUD agrees to provide a one time contribution of up to $50,000 toward establishing this Mokelumne River Science Database.

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[3] The need for the MRTAC will be reviewed periodically by the Steering Committee with input from the Stakeholders Group.

3. Mokelumne River Symposium.

The Parties agree to sponsor periodic symposiums to provide opportunities for scientists, biologists and other professionals who have conducted studies or research on the Mokelumne River Ecosystem to present their papers and participate in peer group discussions about the river corridor and its ecosystem. These papers will be published and become part of the growing Mokelumne River Science Database. A growing professional partnership between EBMUD, the Resource Agencies and others interested in the Mokelumne River will be supported by each agency to build shared values, objectives and agreed upon strategies to protect and enhance the ecosystem of the Mokelumne River corridor. EBMUD will provide up to $10,000 per year for ten years to support the establishment of this Symposium.

4. Adaptive Management Changes in Water Operations Plans.

EBMUD will inform and regularly consult with the Resource Agencies about anticipated changes in its real-time Lower Mokelumne River Project operations to discuss issues or points of concern. The parties intend for this communication to be informal, candid and focused on protecting the environmental resources while assuring water supply reliability.

5. Measuring Progress.

The Parties agree through the Partnership Steering Committee to engage in an ongoing process to measure the success of the flow requirements, non-flow measures and other actions contained in this Agreement. Measures of success shall be developed as a part of the Water Quality and Resource Management Program, and shall be based upon agreed criteria including counts of returning anadromous fish, redd surveys, fry/smolt condition factors, fry and smolt outmigration, and habitat quality taking into account different water year types or other criteria agreed to by the Parties.

The Parties agree that progress must be assessed annually and over time. Assessment of salmonids will be based on successive multi-year cycles to match the life cycle of the anadromous fishery. (E.g.: The first assessment is anticipated to take place in six years after two consecutive life cycles with subsequent future review to be determined by the Steering Committee.)

The Parties agree that in the event that the flow and non-flow measures employed during the first six year evaluation period fail to achieve the goals identified by the Partnership Steering Committee in the Water Quality and Resource Management Program, they will meet and attempt to reach consensus on new strategies for accomplishing the goals and objectives.

The Parties agree that after ten years following the effective date of this Agreement, they shall cooperate in the preparation of a report that describes the successes and failures with respect to agreed upon short and long-term goals and milestones reached. This report shall include findings that relate to protection of the anadromous fishery and ecosystem values of the Mokelumne River

based on the scientific data gathered during and prior to the ten year period. This report shall include the joint and or independent views of the Parties and recommendation for continued or new flow and non-flow measures. This ten year report shall be completed within six months following the ten year period end date.

6. EBMUDSIM.

EBMUD agrees, upon execution of appropriate non-disclosure agreements, to make EBMUDSIM computer runs available to the Parties for the purpose of facilitating a common understanding of river operations, hydrology, and the assessment of alternative approaches.

7. Inter-Agency Communication and Coordination.

The Parties agree to encourage a healthy interchange between their technical staff to build trust and professional respect, to share technical information and views, and to coordinate their efforts on issues related to the lower Mokelumne River to avoid surprises, misunderstandings and miscommunications in the future.

The Parties agree to develop a protocol to inform each other in a timely manner when they become aware of any situation that they believe constitutes an ecological or operational emergency. Such protocol shall be developed within three months of execution of this Agreement.

8. Permits.

The Resource Agencies and/or EBMUD, as appropriate, will seek and secure any permits or regulatory authorization needed to implement the programs or measures contained in this Agreement.

I. Settlement of Outstanding Issues.

The Parties agree that this Agreement resolves the outstanding issues between and among them regarding EBMUD's obligations to lower Mokelumne River flows and Mokelumne River Ecosystem non-flow measures needed to provide reasonable protection and enhancement beyond current conditions for the anadromous fishery and riparian habitat for purposes of:

- **FERC Proceeding 2916-004.** The Parties will jointly submit an initialed copy of this Agreement to the FERC and, in accordance with Section C hereof, recommend and support in writing acceptance of the flow and non-flow measures set forth in this Agreement as a just and reasonable resolution of the issues raised in the pending FERC matter *Lower Mokelumne River Project Proceeding # 2916-004.*

- **Submission to the SWRCB.** Following signature of this Agreement by all Parties as provided in Section C and following a FERC Order consistent with this

Agreement in Lower Mokelumne River Project Proceeding No. 2916-004 becoming final and non-appealable, EBMUD will submit this Agreement to the State Water Resources Control Board as satisfaction of EBMUD's lower Mokelumne River flow and non-flow obligations in the pending Mokelumne River Water Rights Proceeding. The Resource Agencies agree that they will not recommend to the State Water Resources Control Board flows or non-flow measures affecting EBMUD for the lower Mokelumne River in the Mokelumne River Water Rights Proceeding which are inconsistent with those set forth in this Agreement.

- **Fish Guidance Fence Improvement.** The Parties agree that the improvements made by EBMUD to the fish guidance fence in 1995 satisfied the FERC license requirements in 1995 based on available information, and may satisfy the FERC license requirements for permanent improvements, provided EBMUD demonstrates to FERC that the improvements now in place are reasonably effective in preventing fish movements past the fish guidance fence during the period in which the panels are in place.[4] The Resource Agencies agree that the fish guidance fence panels will be installed on or before October 1 of each year and removed on or about January 1 of each year.

J. Section 7 Consultation

To ensure that ESA compliance is accomplished, the Parties will continue to engage in informal Section 7 consultation for those species over which the Service exercises program responsibilities in accordance with Section 3 of the ESA (16 U.S.C. 1532). Pursuant to Section C of this Agreement, upon initialing of the Settlement Agreement, the parties will submit the Agreement to the FERC and the FERC will be requested by the Parties to make its final determination of affect as required by the Interagency Cooperative Regulations (50 CFR 402.14) for those species over which the Service exercises program responsibilities, and to confer as appropriate with the National Marine Fisheries Service (NMFS) in accordance with 50 C.F.R. 402.10 for the steelhead trout which is currently proposed for listing by the NMFS. Throughout any Section 7 consultation and/or conference process, EBMUD will be involved as a "designated non-Federal representative" and as the "applicant" described in 50 CFR 402.08.

In the event any Section 7 consultation and/or conference referenced above results in recommended conditions or mitigations that are materially different from the terms and conditions of this Agreement, then any Party shall have 30 days after said consultation and/or conference is final and

---

[4]EBMUD is developing a monitoring plan (to be available on November 15, 1996) to be coordinated and concurred in by the Resource Agencies. The monitoring plan will address adequate monitoring implementation guidelines and provisions for remedial measures if the guidance fence is not effective. Planning for remedial measures may include a benefits analysis and related studies.

complete or 30 days after the FERC Order becomes final and non-appealable, to provide notice to the other Parties of its intent to withdraw from the Agreement.

K. Dispute Resolution.

In the event any Party to this Agreement believes there is an issue over the interpretation of, or compliance with, any provision of this Agreement, then, prior to that Party initiating a judicial or administrative proceeding, that Party shall provide written notice of said issue to the other Parties.

The Parties shall then meet and confer within (14) days of said written notice, or at a later date by mutual agreement, in an effort to resolve said issue.

If the matter cannot be resolved after 60 days from the date of the meeting, the Parties will enter into a non-binding mediation process. The mediator shall be approved by all Parties and the cost of the mediator borne equally amongst the parties. The non-binding mediation process shall not exceed 60 days without mutual agreement of all Parties.

If non-binding mediation does not resolve the issue, the complainant may file a protest of non-compliance with the FERC.

L. Choice of Law.

This Agreement shall be interpreted under the laws of the State of California and applicable federal law.

M. Authority.

The undersigned representative of each Party certifies that he or she is fully authorized by the Party whom he or she represents to enter into the terms and conditions of this Agreement and legally to bind such Party.

N. **Execution in Counterparts.**

This Agreement may be executed in counterparts. A copy with all original executed signature pages affixed shall constitute the original Agreement, and shall be retained by EBMUD.

EBMUD shall distribute true copies of the Agreement with the executed signature pages to all Parties to this Agreement.

IN WITNESS WHEREOF, the Parties have caused this Lower Mokelumne River Joint Settlement Agreement to be executed in Oakland, California.

UNITED STATES FISH & WILDLIFE SERVICE

Date: 3/23/98

By: _____
Wayne S. White
State Supervisor
United States Fish & Wildlife Service

CALIFORNIA DEPARTMENT OF FISH & GAME

Date: 3/23/98

By: _____
Banky Curtis
Regional Manager, Region II
California Department of Fish & Game

EAST BAY MUNICIPAL UTILITY DISTRICT

Date: 3/23/98

By: _____
Dennis M. Diemer
General Manager
East Bay Municipal Utility District

W:\ADVC\WOPS\2916\NOV8FIN.SET

Normal a Above Year Flows
Mokelumne River Minimum Flow Schedule (1)

Life Stage	Period		Days	Agreed Release From Camanche Dam (cfs)	Expected Flow Below Woodbridge Dam (cfs)
Adult Immigration	10/1-10/15	(2)	15	325	100
Spawn/Incubation	10/16-10/31	(2)	16	325	100
	11/1-11/30	(3)	30	325	100
	12/1-12/31	(3)	31	325	100
Incubation/Alevin	1/1-1/31	(3)	31	325	100
	2/1-2/28	(3)	28	325	100
Fry Rearing	3/1-3/31	(3)	31	325	100
	4/1-4/15	(4),(5)	15	325	150
	4/16-4/30	(4),(5)	15	325	150
Fry Rearing/Juvenile Rearing/ Outmigration	5/1-5/31	(5)	31	325	300
	6/1-6/30	(5)	30	325	300
Oversummer	7/1-9/30		92	100	25
	Total Days		365		

NOTES:

(1) Due to changes in water conditions or to optimize fishery conditions, EBMUD may modify the above Flow Standards upon written concurrence of CDF&G and USFWS, provided the total quantity of water released for fishery purposes in Normal and Above year types is not less than the quantity provided by this flow schedule.

(2) During October, EBMUD will maintain minimum flows of 325 cfs below Camanche Dam and 100 cfs below WID's dam in Normal and Above year types.

(3) During the period when WID dam boards are pulled out and Lodi Lake is empty (approximately Nov. 1 through March 31), EBMUD shall make minimum releases of 325 cfs from Camanche Dam in Normal and Above year types. This release from Camanche dam is expected to provide at least 100 cfs below WID dam during this period. However, EBMUD shall not be obligated to increase releases above 325 cfs during this period in Normal and Above year types.

(4) During April, EBMUD will maintain minimum flows of 325 cfs below Camanche Dam and 150 cfs below WID's dam in Normal and Above year types.

(5) For the months of April, May, and June during Normal and Above year types, additional release of up to 200 cfs is required depending on combined Pardee and Camanche storage levels relative to the maximum allowable for the end of the prior month as follows:

Less than 10 TAF below maximum allowable storage (BMAS), additional release is 200 cfs for subsequent month.
10 TAF <= BMAS < 20 TAF, additional release is 150 cfs for subsequent month.
20 TAF <= BMAS < 30 TAF, additional release is 100 cfs for subsequent month.
30 TAF <= BMAS < 40 TAF, additional release is 50 cfs for subsequent month.

Below Nc ıl Year Flows

Mokelumne River Minimum Flow Schedule (1)

Life Stage	Period		Days	Agreed Release From Camanche Dam (cfs)	Expected Flow Below Woodbridge Dam (cfs)
Adult Immigration	10/1-10/15	(2)	15	250	100
Spawn/Incubation	10/16-10/31	(2)	16	250	100
	11/1-11/30	(3)	30	250	100
	12/1-12/31	(3)	31	250	100
Incubation/Alevin	1/1-1/31	(3)	31	250	100
	2/1-2/28	(3)	28	250	100
Fry Rearing	3/1-3/31	(3)	31	250	100
	4/1-4/15	(4),(5)	15	250	150
	4/16-4/30	(4),(5)	15	250	150
Fry Rearing/Juvenile Rearing/ Outmigration	5/1-5/31	(5)	31	250	200
	6/1-6/30	(5)	30	250	200
Oversummer	7/1-9/30		92	100	20
	Total Days		365		

NOTES:

(1) Due to changes in water conditions or to optimize fishery conditions, EBMUD may modify the above Flow Standards upon written concurrence of CDF&G and USFWS, provided the total quantity of water released for fishery purposes in Below Normal year types is not less than the quantity provided by this flow schedule.

(2) During October, EBMUD will maintain minimum flows of 250 cfs below Camanche Dam and 100 cfs below WID dam in Below Normal year types.

(3) During the period when WID dam boards are pulled out and Lodi Lake is empty (approximately Nov. 1 through March 31), EBMUD shall make a minimum release of 250 cfs from Camanche Dam in Below Normal year types. This release from Camanche dam is expected to provide at least 100 cfs below WID dam during this period. However, EBMUD shall not be obligated to increase releases above 250 cfs during this period in Below Normal year types.

(4) During April, EBMUD will maintain minimum flows of 250 cfs below Camanche Dam and 150 cfs below WID's dam in Below Normal year types.

(5) For the months of April, May, and June in Below Normal year types, additional release of up to 200 cfs is required depending on combined Pardee and Camanche storage levels relative to the maximum allowable for the end of the prior month as follows:

Less than 10 TAF below maximum allowable storage (BMAS), additional release is 200 cfs for subsequent month.

10 TAF <= BMAS < 20 TAF, additional release is 150 cfs for subsequent month.

20 TAF <= BMAS < 30 TAF, additional release is 100 cfs for subsequent month.

30 TAF <= BMAS < 40 TAF, additional release is 50 cfs for subsequent month.

Dry Year: /s

Mokelumne River Minimum Flow Schedule (1)

Life Stage	Period		Days	Agreed Release From Camanche Dam (1) (cfs)	Expected Flow Below Woodbridge Dam (cfs)
Adult Immigration	10/1-10/15	(2)	15	220	80
Spawn/Incubation	10/16-10/31	(2)	16	220	80
	11/1-11/30	(3)	30	220	80
	12/1-12/31	(3)	31	220	80
Incubation/Alevin	1/1-1/31	(3)	31	220	80
	2/1-2/28	(3)	28	220	80
Fry Rearing	3/1-3/31	(3)	31	220	80
	4/1-4/15	(4)	15	220	150
	4/16-4/30	(4)	15	220	150
Fry Rearing/Juvenile Rearing/	5/1-5/31		31	220	150
Outmigration	6/1-6/30	(5)	30	100	20
Oversummer	7/1-9/30		92	100	20
	Total Days		365		

NOTES:

(1) Due to changes in water conditions or to optimize fishery conditions, EBMUD may modify the above Flow Standards upon written concurrence of CDF&G and USFWS, provided the total quantity of water released for fishery purposes in Dry year types is not less than the quantity provided by this flow schedule.

(2) During October, EBMUD will maintain minimum flows of 220 cfs below Camanche Dam and 100 cfs below WID dam in Dry year types.

(3) During the period when WID dam boards are pulled out and Lodi Lake is empty (approximately Nov. 1 through March 31), EBMUD shall make minimum releases of 220 cfs from Camanche Dam in Dry year types. This release from Camanche dam is expected to provide at least 80 cfs below WID dam during this period. However, EBMUD shall not be obligated to increase releases above 220 cfs during this period in Dry year types.

(4) During April, EBMUD will maintain minimum flows of 220 cfs below Camanche Dam and 150 cfs below WID's dam in Dry year types.

(5) During June, outmigrating smolts will be trapped, tagged, and transported around the Delta in Dry year types.

Critically L 'ear Flows
Mokelumne River Minimum Flow Schedule (1)

Life Stage	Period		Days	Agreed Release From Camanche Dam (cfs)	Expected Flow Below Woodbridge Dam (cfs)
Adult Immigration	10/1-10/15	(2)	15	100	15
Spawn/Incubation	10/16-10/31	(2)	16	130	75
	11/1-11/30	(3)	30	130	75
	12/1-12/31	(3)	31	130	75
Incubation/Alevin	1/1-1/31	(3)	31	130	75
	2/1-2/28	(3)	28	130	75
Fry Rearing	3/1-3/31	(3)	31	130	75
	4/1-4/15	(4)	15	130	75
	4/16-4/30	(4)	15	130	75
Fry Rearing/Juvenile Rearing/	5/1-5/31	(5)	31	100	15
Outmigration	6/1-6/30	(5)	30	100	15
Oversummer	7/1-9/30		92	100	15
	Total Days		365		

NOTES:
(1) Due to changes in water conditions or to optimize fishery conditions, EBMUD may modify the above Flow Standards upon written concurrence of CDF&G and USFWS, provided the total quantity of water released for fishery purposes in Critically Dry year types is not less than the quantity provided by this flow schedule.
(2) During October, EBMUD will maintain minimum flows of 130 cfs below Camanche Dam, and will maintain minimum flows of 15 cfs from Oct. 1 - 15 and 75 cfs from Oct. 16 - 31 below WID dam in Critially Dry year types.
(3) During the period when WID dam boards are pulled out and Lodi Lake is empty (approximately Nov. 1 through March 31), EBMUD shall make minimum releases of 130 cfs from Camanche Dam in Critically Dry year types. This release from Camanche dam is expected to provide 75 cfs below WID dam during this period. However, EBMUD shall not be obligated to increase releases above 130 cfs during this period in Critically-Dry year types.
(4) During April, EBMUD will maintain minimum flows of 130 cfs below Camanche Dam and 75 cfs below WID's dam in Critically Dry year types.
(5) During May and June outmigrating smolts will be trapped, tagged, and transported around the Delta in Critically Dry year types.

Attachment 1

WATER YEAR TYPE DETERMINATION

Year Type	Normal/Above	Below Normal	Dry	Critically Dry
Oct. - Mar. (1) (Pardee/Camanche Storage)	Max Allowable (2)	Max Allowable to 400 TAF	399 TAF to 270 TAF	269 TAF or Less
Apr. - Sep. (3) (Unimpaired runoff)	890 TAF or More	889 TAF to 500 TAF	499 TAF to 300 TAF	299 TAF or Less (4)

Notes:

(1) October through March minimum flows are determined by total Pardee and Camanche storage on November 5th. Year type storage limits are based on the capacities of Pardee and Camanche Reservoirs in 1995.

(2) Maximum allowable storage on November 5th, shall be determined in accordance with the Army Corps of Engineer's Water Control Manual for Camanche Dam and Reservoir dated September, 1981.

(3) April through September minimum flows are determined by the water year unimpaired runoff into Pardee Reservoir as forecasted by DWR in the April 1st Bulletin 120 Report except when combined Pardee/Camanche Nov. 5 storage is projected to be less than 200 TAF.

(4) April through September minimum flows shall be critically dry whenever Nov. 5 combined Pardee/Camanche storage is projected to be 200 TAF or less based on the runoff forecast in DWR bulletin 120, beginning April 1st.

2/5/96

Lower Mokelumne River Fall Run Chinook Salmon Escapement Data, 1989-1999

Year	Total Escapement	Percent of Average	Hatchery Returns	Natural Spawners	Percent Natural Spawners of Total
1989	280	8	80	200	71
1990	497	14	68	429	86
1991	410	12	41	369	90
1992	1,645	47	710	935	57
1993	3,157	89	2,164	993	31
1994	3,421	97	1,918	1,503	44
1995	5,417	153	3,323	2,094	39
1996	7,775	220	3,883	3,892	50
1997	10,175	287	6,485	3,690	36
1998	7,202	204	3,090	4,112	57
1999	5320	150	3,153	2,167	41

Notes:

1. Escapement monitoring generally occurs from September through January but dates vary slightly each year.
2. Total Escapement: From 1990-1999, actual count by EBMUD at Woodbridge Irrigation Dam on the lower Mokelumne River.
3. Percent of Average: Long term average escapement, 1940-1999.
4. Hatchery Returns: Actual count by CDFG at the Mokelumne River Fish Hatchery.
5. In 1996, spawning surveys were discontinued on 12/10/96 due to high flows.
6. 1998 data reflects final numbers at the end of the monitoring period.
7. Because monitoring has not ended, 1999 data is provisional as of 1/9/00.
8. Outmigration numbers are abundance estimates, not actual counts.
9. Fry and smolt data are from the following sources: Biosystems (1989-1992) and NRS Inc, (1992-1999)
10. For this table, April 1st was used to define smolt data from 1992-1994, March 18 for 1995, March 20 for 1996, March 19 for 1997 and April 7 for 1998.
11. For fry and smolt data, the numbers shown are water year data, not calendar year data (i.e., calendar year 1991 is actually data from water year 1991-1992).

Source: Joseph J. Miyamoto, Manager of Fisheries and Wildlife
East Bay Municipal Utility District (510) 287-2021, miyamoto@ebmud.com

MAILING LIST

LOWER MOKELUME RIVER
HEARING

Wayne S. White
U.S. Fish and Wildlife Service
2800 Cottage Way
Sacramento, CA 95825

Larry Week
Calif Department of Fish and Game
Native Anadromous Fish and
Watershed Branch
1807 13th Street, Suite 104
Sacramento, CA 95814

Banky Curtis
Calif Department of Fish and Game
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670

Bob Baiocchi
Calif Sportfishing Protection Alliance
P.O. Box 1790
Graeagle, CA 96103

Bill Jennings
Committee To Save The Mokelumne
3536 Rainer Avenue
Stockton, CA 95204

Walker Cook, ESQ.
Mokelumne River Alliance
42 Northwood Commons
Chico, CA 95973-7214

Dan Gallery, ESQ.
Woodbridge Irrigation District
926 J Street, Suite 505
Sacramento, CA 95814

Dante John Nomellini ESQ.
Central Delta Water Agency
P.O. Box 1461
Stockton, CA 95201

Simon Granville
Calaveras County Water Agency
P.O. Box 846
San Andreas, CA 95249

Stewart C. Adams, Jr. ESQ.
North San Joaquin Water
Conservation District
Adams, Edwards and Welch
15 North School
Lodi, CA 95240

Karna Harrigfeld, ESQ.
Herum, Crabtree, Brown, Dyer,
Zolezzi & Terpstra
North San Joaquin Water
Conservation District
2291 West March Lane Suite B100
Stockton, CA 95207

Jeanne M. Zolezzi, ESQ.
Herum, Crabtree, Brown, Dyer,
Zolezzi & Terpstra
Stockton East Water District
2291 West March Lane Suite B100
Stockton, CA 95207

John Stovall, ESQ.
County of San Joaquin
Neumiller & Beardslee
P.O. Box 20
Stockton, CA 95201-3020

Roderick Schuler
Amador County Public Works
500 Argonaut Lane
Jackson, CA 95642

Henry Willy
Jackson Valley Irrigation District
6755 Lake Amador Drive
Ion, CA 95640

John Lampe
Director of Water Planning
East Bay Municipal Utility District
375 11th Street
Oakland, CA 94607-4240

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Stat Water Resources Con l Board

Division of Water Rights
901 P Street • Sacramento, California 95814 • (916) 657-1359
Mailing Address: P.O. Box 2000 • Sacramento, California • 95812-2000
FAX (916) 657-1485 • Web Site Address: http://www.waterrights.ca.gov

Winston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

ATTACHMENT 13

OCT 16 2000

To: Enclosed Mailing List

FINAL ACTION REGARDING THE LOWER MOKELUME RIVER HEARING - EAST BAY MUNICIPAL UTILITY DISTRICT'S WATER RIGHT APPLICATIONS 4228, 4768, 5128, 13156, 15201 AND 25056

In November of 1992 the State Water Resources Control Board (SWRCB) held a hearing to determine what measures were needed to protect public trust resources in the lower Mokelumne River. The hearing focused primarily on water rights held by East Bay Municipal Utility District (EBMUD), and to a lesser extent, on water rights held by the Woodbridge Irrigation District (WID) and North San Joaquin Water District (NSJ). The hearing was initiated after: (1) the California Department of Fish and Game (DFG) requested a revision to the existing water rights based on a new fisheries management plan developed pursuant to Section 10003 of the Public Resources Code, and (2) complaints were filed by The Committee to Save the Mokelumne River and the California Sportfishing Protection Alliance (CSPA) requesting increased streamflow in the Lower Mokelumne River.

The primary purpose of that hearing was to determine what action should be taken by the SWRCB to protect the fishery resources of the lower Mokelumne River. DFG, CSPA and EBMUD were the major participants in the hearing; however, the U.S. Fish and Wildlife Service (USFWS) and several other parties also participated in the hearing.

The DFG and CSPA also filed complaints with the Federal Energy Regulatory Commission (FERC), requesting that they modify EBMUD's federal power license in order to provide higher instream flows. In response, the FERC reviewed EBMUD's federal power license to determine if additional measures were necessary to protect the fishery resources. The scope of the FERC review was very similar to the scope of the water right hearing. In addition, most of the parties to the water right hearing are also parties to the FERC proceeding. In order to avoid a duplication of efforts, the SWRCB held its hearing in abeyance until after the FERC process was completed.

FERC proposed to modify the EBMUD's power license and released a final Environmental Impact Statement (EIS) in November 1993 which proposed instream flows that were midway between the flows recommended by DFG and those recommended by EBMUD. EBMUD strongly objected and, subsequently, made a formal "offer of settlement" to FERC. That offer included the original EBMUD instream flows, but also included an offer to fund approximately $20 million for other non-flow measures to improve the fishery, such as placement of spawning gravel and upgrades to the lower Mokelumne Fish Hatchery to improve the fishery resources. Discussions between EBMUD, DFG, and USFWS eventually resulted in a Joint Settlement Agreement (JSA), which was approved with minor modifications by FERC in an Order issued November 27, 1998. (See Enclosed Agreement.)

SURNAME DWR 540 | MM 9/13/00 | WW 9/14/2000 | VAW 9/14/00 | J.L 10/12/2000

As a result of the recent Bay/Delta Water Right Hearings, the SWRCB adopted Water Right Decision 1641, which addressed water quality objectives for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary. In Decision 1641, the SWRCB amended EBMUD's License 11109 and Permit 10478 (Applications 4228 and 13156) and Woodbridge Irrigation District's Licenses 5945, 8214, and 8215 (Applications 5807, 10240, and 12648) to include the streamflow conditions described in the JSA. The amended water rights do not include the JSA's nonflow-related activities directed toward the improvement of fish passage and habitat; however, these measures are included in the FERC Licenses. Although FERC did not issue its order until November 27, 1998, substantial provisions of the JSA were implemented in the mid-1990's and the results to date suggest that fall-run Chinook salmon populations have increased. (See Enclosed Table)

The SWRCB believes that the issues considered by the SWRCB during the Lower Mokelumne River Hearing have been resolved. The SWRCB does not intend to take any further action on these issues unless the parties identify issues considered during the hearing that are not resolved.

If you believe that an issue considered during the Mokelumne River Hearing remains unresolved, please notify me by October 15, 2000. You should also identify whether any new evidence exists related to the unresolved issue that will assist the SWRCB in making a determination on the matter. We will notify all parties to the hearing if the SWRCB moves to close this issue.

If you have any questions regarding this matter, please contact Mike Meinz of my staff at (916) 657-2048.

Sincerely,

ORIGINAL SIGNED BY.

Harry M. Schueller, Chief
Division of Water Rights

Enclosures:
1. Joint Settlement Agreement w/cover letter
2. Table – Salmon Escapement Data
3. Mailing List

bcc: HMS, VAW, LJM, Tom Howard, Barbara Leideigh, Dan Frink

MMEINZ:lvalin 09/13/2000
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APR 3 0 2001

State Water Resources Control Board

Executive Office
1001 I Street • Sacramento, California 95814 • (916) 341-5615
Mailing Address: P.O. Box 100 • Sacramento, California • 95812-0100
FAX (916) 341-5621 • Web Site Address: http://www.swrcb.ca.gov

Winston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.

APR 2 6 2001

To: Enclosed Mailing List

PENDING ACTION REGARDING THE LOWER MOKELUMNE RIVER HEARING

In September of 2000, the Chief of the Division of Water Rights sent a letter to participants of the 1992 Lower Mokelumne River Hearing stating that no further action would be taken unless parties identified issues from the hearing that remained unresolved. Responses to the letter were received from East Bay Municipal Utility District (EBMUD), Woodbridge Irrigation District (WID), San Joaquin County (SJC), North San Joaquin Water Conservation District (NSJ), California Sportfishing Protection Alliance (CSPA), and Central Delta Water Agency (CDWA).

In their responses, the parties identify three primary issues as being unresolved. These issues fall into three main categories: protection of public trust resources, water supply problems in San Joaquin County, and a procedural question regarding evidence taken in the 1992 hearing.

The U.S. Fish and Wildlife Service (USFWS) and the California Department of Fish and Game (CDFG) reviewed the fisheries habitat restoration and enhancement measures proposed by EBMUD and WID. Both agencies determined that these non-flow measures, along with the flows specified in the Joint Settlement Agreement, are adequate to protect the public trust resources. In addition the U.S. Bureau of Reclamation has undertaken significant fisheries enhancement measures at the WID diversion dam. I believe that the actions currently being taken to protect the public trust resources are appropriate and that no further action need be taken at this time.

Water rights and water supply in San Joaquin County were identified as components of a key issue in the original 1992 hearing notice. However, the purpose of the State Water Resources Control Board (SWRCB) exploring the water rights on the Mokelumne River was not to find additional water for use by San Joaquin County water right holders, but to ascertain the amount of water available for public trust uses. Contrary to the opinions expressed by the respondents, groundwater is not entitled to protections under the public trust doctrine. Furthermore, issues regarding the relative priorities of competing water rights to the Mokelumne River were addressed long ago and the statute of limitations regarding past decisions is long past. This hearing is not the appropriate forum in which to revisit concerns regarding water supplies for San Joaquin County.

Some parties claimed that the SWRCB must hold a hearing to take additional evidence prior to determining what action to take following the 1992 Lower Mokelumne River hearing. The SWRCB is not required to take any additional evidence in this matter.

The Chief of the Division of Water Rights has been delegated authority to dismiss a complaint when he believes the problem that forms the basis of the complaint has been remedied. All issues raised in the original complaints have been remedied through means other than the 1992 hearing. Further action on the Lower Mokelumne hearing is not required. The Chief of the Division of Water Rights has dismissed the complaints that initiated the hearing.

Any questions regarding this letter can be directed to Andrew Fecko of my staff at (916) 341-5393.

Sincerely,

Harry M. Schueller, Chief
Division of Water Rights

MAILING LIST

LOWER MOKELUME RIVER

Wayne S. White
US Fish and Wildlife Service
1800 Cottage Way
Sacramento, CA 95825

Larry Week
CA Department of Fish & Game
Native Anadromous Fish
and Watershed Branch
1807 13th Street, Suite 104
Sacramento, CA 95814

Banky Curtis
CA Department of Fish & Game
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670

Jim Crenshaw, President
Calif. Sportfishing Protection Alliance
1248 East Oak Ave.
Woodland, CA 95695

Bill Jennings
Committee to Save the Mokelumne
3536 Rainer Ave.
Stockton, CA 95204

Walker Cook, ESQ
Mokelumne River Alliance
42 Northwood Commons
Chico, CA 95973-7214

Dan Gallery, ESQ.
Woodbridge Irrigation District
926 J Street, Suite 505
Sacramento, CA 95814

Dante John Nomellini, ESQ.
Central Delta Water Agency
P.O. Box CA 1461
Stockton, CA 95201

Simon Granville
Calaveras County Water Agency
P.O. Box 846
San Andreas, CA 95249

Stewart C. Adams, Jr. ESQ.
North San Joaquin Water
Conservation District
Adams, Edwards and Welch
15 North School
Lodi, CA 95240

Karna Harrigfeld, ESQ.
Herum, Crabtree, Brown, Dyer,
Zolezzi & Terpstra
North San Joaquin Water
Conservation District
2291 W. March Lane Suite B100
Stockton, CA 95207

Jeanne M. Zolezzi, ESQ.
Herum, Crabtree, Brown, Dyer,
Zolezzi & Terpstra
Stockton East Water District
2291 W. March Lane Suite B100
Stockton, CA 95207

John Lampe
Director of Water Planning
East Bay Municipal Utility District
375 11th Street
Oakland, CA 94607-4240

John Stovall, ESQ.
County of San Joaquin
Neumiller & Beardslee
P.O. Box 20
Stockton, CA 95201-3020

Roderick Schuler
Amador County Public Works
500 Argonaut Lane
Jackson, CA 95642

Henry Willy
Jackson Valley Irrigation District
1755 Lake Amador Drive
Ione, CA 95640

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APPENDIX C

Historical days of excess flow condition in the Delta and Standard Term 91 Curtailments for Water Years 2001-2019

APPENDIX C

Historical days of excess flow condition in the Delta and SWRCB's Standard Term 91 Curtailment Periods for Water Years 2001-2019

Days of Excess Flow Condition at Delta (Based on SWP-CVP Operations Office Daily Reports)			SWRCB Term 91 **	MOCASIM Results ***
Water Year*	**Number of Days of Excess Flow (October 1 - September 30)**	**Number of Days of Excess Flow (December 1 - June 30)**	**Curtailment Period**	**Modeled Availability for MICUP**
2001	100	83	June 4 - August 31	No
2002	179	146	June 17 - August 31, October 10 - November 15	No
2003	180	119	July 3 - August 31	No
2004	156	126	May 29 - August 31	No
2005	296	121	None	Yes
2006	306	132	None	Yes
2007	176	120	June 15 - August 31	No
2008	121	104	June 2 - August 31, September 1 - November 15	No
2009	77	47	June 11 - August 31	No
2010	162	101	July 16 - August 31	No
2011	308	151	None	Yes
2012	162	64	August 2 - 31	No
2013	123	123	May 7 - August 31, September 1 - 20, October 30 - November 16, November 17 - Unspecified	No
2014	36	36	January 12 to February 11, March 1 - Unspecified, May 20 to November 26	No
2015	74	74	April 30 - Unspecified	No
2016	120	116	June 6 - October 14	No
2017	285	146	None	Yes
2018	159	102	June 1 - October 23	No
2019	174	113	None	Yes
Average	**168**	**107**		
Minimum	**36**	**36**		
Maximum	**308**	**151**		

* From SWP-CVP Coordinated Operations Agreement. Data after 2019 has not been posted.

** From SWRCB Bay-Delta - Standard Term 91 website and communications with SWRCB staff.

*** Indicates if modeling shows water is available during the curtailment period. A "No" answer indicates that the model shows no water available during the curtailed months. A "Yes" answer indicates that water is available during any months of the diversion season.

APPENDIX D

Additional Tables Showing MOCASIM and WAAT Inputs and Results

TABLE D1
MOCASIM - Upstream Diversions 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1955	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1956	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1957	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1958	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1959	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1960	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1961	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1962	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1963	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1964	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1965	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1966	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1967	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1968	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1969	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1970	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1971	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1972	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1973	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1974	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1975	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1976	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1977	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1978	1,107	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,396
1979	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1980	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1981	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1982	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1983	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1984	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1985	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1986	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1987	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1988	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1989	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1990	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1991	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1992	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1993	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1994	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1995	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1996	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1997	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1998	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
1999	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2000	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2001	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2002	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2003	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2004	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2005	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2006	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2007	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2008	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2009	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2010	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2011	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2012	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2013	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2014	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2015	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2016	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2017	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2018	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2019	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2020	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
2021	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
Ave	1,528	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,817
Max	1,535	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,823
Min	1,107	1,273	1,151	1,041	989	1,096	1,219	1,590	1,855	2,082	2,137	1,855	17,396

TABLE D2
MOCASIM - Upstream Diversions Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1955	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1956	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1957	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1958	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1959	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1960	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1961	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1962	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1963	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1964	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1965	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1966	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1967	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1968	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1969	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1970	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1971	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1972	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1973	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1974	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1975	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1976	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1977	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1978	1,107	2,923	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	43,628
1979	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1980	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1981	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1982	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1983	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1984	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1985	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1986	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1987	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1988	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1989	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1990	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1991	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1992	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1993	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1994	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1995	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1996	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1997	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1998	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
1999	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2000	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2001	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2002	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2003	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2004	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2005	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2006	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2007	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2008	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2009	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2010	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2011	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2012	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2013	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2014	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2015	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2016	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2017	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2018	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2019	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2020	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
2021	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
Ave	4,004	3,349	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	46,950
Max	4,047	3,356	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	47,000
Min	1,107	2,923	3,036	2,745	2,609	2,891	3,215	4,192	4,893	5,490	5,635	4,893	43,628

TABLE D3
MOCASIM - EBMUD Demand 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1955	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1956	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
1957	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1958	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1959	19,806	16,960	16,592	15,745	14,221	17,013	17,987	21,995	23,862	25,670	25,194	22,169	237,215
1960	19,250	16,485	16,127	14,264	13,343	15,406	16,290	18,840	20,439	21,984	21,580	18,986	212,995
1961	17,430	14,930	14,606	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	207,637
1962	17,430	14,930	14,606	15,055	13,598	16,265	17,197	20,526	22,269	23,954	23,512	20,688	220,029
1963	18,403	15,761	15,419	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	240,519
1964	19,806	16,960	16,592	15,995	14,963	17,284	18,273	22,527	24,439	26,291	25,803	22,706	241,639
1965	19,557	16,747	16,384	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	243,625
1966	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1967	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1968	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
1969	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1970	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1971	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1972	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
1973	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1974	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1975	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1976	19,806	16,960	16,592	15,231	14,248	16,455	17,398	20,899	22,673	24,390	23,939	21,064	229,654
1977	18,618	15,945	15,599	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	210,834
1978	17,430	14,930	14,606	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	237,902
1979	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1980	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
1981	19,806	16,960	16,592	15,872	14,336	17,151	18,132	22,265	24,155	25,985	25,503	22,441	239,195
1982	19,406	16,618	16,257	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	243,218
1983	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1984	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
1985	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1986	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1987	19,806	16,960	16,592	15,310	13,828	16,541	17,488	21,067	22,856	24,586	24,131	21,233	230,398
1988	18,715	16,027	15,680	14,264	13,343	15,406	16,290	18,840	20,439	21,984	21,580	18,986	211,555
1989	17,430	14,930	14,606	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	207,637
1990	17,430	14,930	14,606	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	207,637
1991	17,430	14,930	14,606	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	207,637
1992	17,430	14,930	14,606	14,264	13,343	15,406	16,290	18,840	20,439	21,984	21,580	18,986	208,097
1993	17,430	14,930	14,606	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	237,902
1994	19,806	16,960	16,592	15,408	13,917	16,648	17,601	21,277	23,083	24,831	24,371	21,445	231,938
1995	18,836	16,131	15,781	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	241,685
1996	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
1997	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1998	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
1999	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2000	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2001	19,806	16,960	16,592	16,061	14,507	17,356	18,349	22,668	24,592	26,456	25,965	22,848	242,161
2002	19,639	16,816	16,452	15,688	14,170	16,951	17,921	21,873	23,729	25,527	25,054	22,046	235,865
2003	19,180	16,424	16,068	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	242,609
2004	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
2005	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2006	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2007	19,806	16,960	16,592	16,114	14,554	17,413	18,409	22,780	24,714	26,587	26,093	22,961	242,981
2008	19,703	16,871	16,505	14,264	13,343	15,406	16,290	18,840	20,439	21,984	21,580	18,986	214,212
2009	17,430	14,930	14,606	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	237,902
2010	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2011	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2012	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
2013	19,806	16,960	16,592	15,653	14,139	16,914	17,882	21,800	23,650	25,442	24,970	21,972	235,779
2014	19,138	16,388	16,033	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	212,231
2015	17,430	14,930	14,606	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	207,637
2016	17,430	14,930	14,606	15,114	14,139	16,329	17,264	20,652	22,405	24,101	23,655	20,814	221,438
2017	18,475	15,823	15,479	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	240,714
2018	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2019	19,806	16,960	16,592	16,198	14,630	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,295
2020	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
2021	19,806	16,960	16,592	15,231	13,757	16,455	17,398	20,899	22,673	24,390	23,939	21,064	229,162
Ave	19,293	16,521	16,163	15,766	14,358	17,036	18,010	22,039	23,910	25,721	25,244	22,214	236,274
Max	19,806	16,960	16,592	16,198	15,153	17,504	18,505	22,959	24,908	26,796	26,298	23,141	244,817
Min	17,430	14,930	14,606	14,264	12,883	15,406	16,290	18,840	20,439	21,984	21,580	18,986	207,637

TABLE D4
MOCASIM - EBMUD Demand Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1955	24,985	21,394	20,930	19,213	17,354	20,758	21,946	26,364	28,602	30,767	30,198	26,571	289,081
1956	23,486	20,114	19,677	20,433	19,115	22,081	23,344	28,962	31,420	33,802	33,174	29,192	304,797
1957	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1958	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1959	24,985	21,394	20,930	19,213	17,354	20,758	21,946	26,364	28,602	30,767	30,198	26,571	289,081
1960	23,486	20,114	19,677	17,993	16,832	19,435	20,549	23,766	25,783	27,733	27,222	23,951	266,540
1961	21,987	18,833	18,425	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	261,927
1962	21,987	18,833	18,425	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	261,927
1963	21,987	18,833	18,425	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	300,106
1964	24,985	21,394	20,930	19,213	17,973	20,758	21,946	26,364	28,602	30,767	30,198	26,571	289,701
1965	23,486	20,114	19,677	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	304,138
1966	24,985	21,394	20,930	19,777	17,863	21,370	22,593	27,566	29,906	32,171	31,575	27,784	297,915
1967	24,180	20,706	20,257	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	306,004
1968	24,985	21,394	20,930	19,325	18,078	20,880	22,075	26,603	28,861	31,046	30,472	26,813	291,462
1969	23,624	20,231	19,793	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	304,509
1970	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1971	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1972	24,985	21,394	20,930	20,322	19,011	21,961	23,217	28,726	31,164	33,526	32,904	28,954	307,093
1973	24,849	21,278	20,816	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	307,804
1974	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1975	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1976	24,985	21,394	20,930	19,213	17,973	20,758	21,946	26,364	28,602	30,767	30,198	26,571	289,701
1977	23,486	20,114	19,677	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	6,666	248,675
1978	0	0	12,601	18,856	17,031	20,371	21,538	25,604	27,777	29,880	29,328	25,805	228,791
1979	23,047	19,739	19,311	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	302,959
1980	24,985	21,394	20,930	20,433	19,115	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,829
1981	24,985	21,394	20,930	19,213	17,354	20,758	21,946	26,364	28,602	30,767	30,198	26,571	289,081
1982	23,486	20,114	19,677	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	304,138
1983	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1984	24,985	21,394	20,930	20,433	19,115	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,829
1985	24,985	21,394	20,930	19,721	17,813	21,309	22,529	27,447	29,777	32,032	31,439	27,664	297,038
1986	24,111	20,647	20,199	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	305,819
1987	24,985	21,394	20,930	19,213	17,354	20,758	21,946	26,364	28,602	30,767	30,198	26,571	289,081
1988	23,486	20,114	19,677	17,993	16,832	19,435	20,549	23,766	25,783	27,733	27,222	23,951	266,540
1989	21,987	18,833	18,425	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	261,927
1990	21,987	18,833	18,425	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	261,927
1991	21,987	18,833	10,939	0	0	19,204	10,300	11,918	20,215	8,858	7,892	13,912	144,057
1992	21,460	18,833	18,425	17,993	16,832	19,435	20,549	9,306	0	5,509	8,132	4,804	161,277
1993	7,555	4,820	13,435	19,136	17,284	20,674	21,858	26,200	28,424	30,576	30,011	26,406	246,380
1994	23,391	20,033	19,598	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	265,706
1995	21,987	18,833	18,425	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	300,106
1996	24,985	21,394	20,930	20,433	19,115	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,829
1997	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1998	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
1999	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
2000	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
2001	24,985	21,394	20,930	19,333	17,462	20,888	22,083	26,619	28,878	31,065	30,490	26,828	290,953
2002	23,633	20,239	19,800	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	266,355
2003	21,987	18,833	18,425	18,734	16,921	20,238	21,397	25,343	27,494	29,575	29,029	25,542	273,517
2004	22,897	19,611	19,185	17,993	16,832	19,435	20,549	23,766	25,783	27,733	27,222	23,951	264,956
2005	21,987	18,833	18,425	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	300,106
2006	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
2007	24,985	21,394	20,930	19,426	17,546	20,989	22,191	26,818	29,094	31,297	30,718	27,029	292,417
2008	23,748	20,337	19,896	17,993	16,832	19,435	20,549	23,766	25,783	27,733	27,222	23,951	267,245
2009	21,987	18,833	18,425	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	261,927
2010	21,987	18,833	18,425	20,014	18,077	21,627	22,864	28,069	30,452	32,759	32,152	28,292	293,549
2011	24,470	20,954	20,500	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	306,785
2012	24,985	21,394	20,930	19,371	18,121	20,929	22,127	26,700	28,967	31,160	30,583	26,911	292,177
2013	23,680	20,279	19,839	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	266,482
2014	21,987	18,833	18,425	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	261,927
2015	21,987	18,833	18,425	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	20,114	258,091
2016	0	0	17,204	17,993	16,832	19,435	20,549	23,766	25,783	27,733	27,222	23,951	220,467
2017	21,987	18,833	18,425	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	300,106
2018	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
2019	24,985	21,394	20,930	20,433	18,455	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,170
2020	24,985	21,394	20,930	19,383	18,133	20,943	22,142	26,727	28,996	31,191	30,614	26,938	292,374
2021	23,695	20,293	19,852	17,993	16,252	19,435	20,549	23,766	25,783	27,733	27,222	23,951	266,523
Ave	22,979	19,661	19,691	19,205	17,492	21,033	22,090	26,524	28,735	30,802	30,260	26,384	284,857
Max	24,985	21,394	20,930	20,433	19,115	22,081	23,344	28,962	31,420	33,802	33,174	29,192	308,829
Min	0	0	10,939	0	0	19,204	10,300	9,306	0	5,509	7,892	4,804	144,057

TABLE D5
MOCASIM - NSJWCD Demand 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1957	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1958	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1959	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1960	0	0	0	0	0	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1964	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1965	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1966	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1967	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1968	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1969	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1970	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1971	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1972	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1973	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1974	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1975	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1976	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	1,198	1,621	1,903	1,198	705	6,626
1979	423	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	19,223
1980	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1981	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1982	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1983	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1984	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1985	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1986	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1987	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1994	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1995	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1996	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1997	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1998	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1999	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
2000	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
2001	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2002	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
2006	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
2007	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2008	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
2011	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
2012	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2013	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
2018	1,200	0	0	0	0	0	0	316	427	502	316	186	2,947
2019	112	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,912
2020	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
Ave	573	0	0	0	0	0	0	1,572	2,127	2,497	1,572	925	9,266
Max	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
Min	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE D6
MOCASIM - NSJWCD Demand Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1955	0	0	0	0	0	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1957	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1958	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1959	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1960	0	0	0	0	0	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1964	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1965	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1966	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1967	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1968	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1969	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1970	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1971	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1972	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1973	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1974	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1975	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1976	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1977	0	0	0	0	0	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1981	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1982	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1983	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1984	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1985	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1986	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1987	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1988	0	0	0	0	0	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1996	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
1997	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
1998	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
1999	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
2000	1,200	0	0	0	0	0	0	3,281	4,439	5,211	3,281	1,930	19,342
2001	1,158	0	0	0	0	0	0	0	0	0	0	0	1,158
2002	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
2006	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
2007	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2008	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
2012	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2013	0	0	0	0	0	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
2018	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2019	0	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	18,800
2020	1,200	0	0	0	0	0	0	0	0	0	0	0	1,200
2021	0	0	0	0	0	0	0	0	0	0	0	0	0
Ave	458	0	0	0	0	0	0	1,248	1,689	1,983	1,248	734	7,360
Max	1,200	0	0	0	0	0	0	3,400	4,600	5,400	3,400	2,000	20,000
Min	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE D7
MOCASIM - WID Demand 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1955	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1956	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1957	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1958	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1959	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1960	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1961	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1962	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1963	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1964	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1965	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1966	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1967	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1968	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1969	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1970	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1971	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1972	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1973	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1974	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1975	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1976	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1977	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1978	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1979	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1980	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1981	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1982	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1983	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1984	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1985	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1986	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1987	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1988	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1989	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1990	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1991	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1992	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1993	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1994	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1995	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1996	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1997	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1998	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1999	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2000	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2001	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2002	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2003	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2004	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2005	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2006	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2007	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2008	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
2009	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
2010	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2011	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2012	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2013	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2014	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
2015	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
2016	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
2017	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2018	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2019	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2020	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2021	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
Ave	3,338	0	0	0	0	420	3,174	7,372	10,383	12,720	11,652	6,961	56,020
Max	3,750	0	0	0	0	432	3,276	7,746	11,064	13,704	12,660	7,494	60,000
Min	1,416	0	0	0	0	371	3,150	5,788	7,500	8,557	7,387	4,707	39,000

TABLE D8
MOCASIM - WID Demand Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1955	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1956	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1957	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1958	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1959	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1960	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1961	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1962	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1963	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1964	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1965	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1966	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1967	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1968	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1969	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1970	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1971	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1972	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1973	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1974	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1975	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1976	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1977	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1978	0	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	56,250
1979	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1980	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1981	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1982	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1983	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1984	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1985	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1986	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1987	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1988	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1989	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1990	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1991	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
1992	1,416	0	0	0	0	371	3,276	5,788	6,589	8,557	7,387	4,707	38,089
1993	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1994	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
1995	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
1996	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1997	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1998	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
1999	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2000	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2001	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
2002	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
2003	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2004	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2005	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2006	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2007	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
2008	1,416	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	39,000
2009	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
2010	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2011	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2012	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2013	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2014	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
2015	1,416	0	0	0	0	371	3,276	5,788	7,500	7,182	7,387	4,564	37,482
2016	1,416	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	57,666
2017	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2018	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2019	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2020	3,750	0	0	0	0	432	3,150	7,746	11,064	13,704	12,660	7,494	60,000
2021	3,750	0	0	0	0	371	3,276	5,788	7,500	8,557	7,387	4,707	41,334
Ave	3,180	0	0	0	0	417	3,182	7,256	10,160	12,397	11,342	6,795	54,728
Max	3,750	0	0	0	0	432	3,276	7,746	11,064	13,704	12,660	7,494	60,000
Min	0	0	0	0	0	371	3,150	5,788	6,589	7,182	7,387	4,564	37,482

TABLE D9
MOCASIM - Lower Mokelumne Riparian 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1955	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1956	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1957	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1958	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1959	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1960	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1961	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1962	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1963	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1964	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1965	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1966	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1967	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1968	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1969	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1970	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1971	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1972	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1973	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1974	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1975	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1976	701	297	540	148	127	399	1,302	3,304	4,702	2,303	1,499	749	16,068
1977	701	297	540	148	127	399	1,302	3,304	4,702	2,303	1,499	749	16,068
1978	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1979	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1980	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1981	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1982	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1983	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1984	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1985	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1986	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1987	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1988	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1989	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1990	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1991	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1992	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1993	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1994	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1995	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1996	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1997	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1998	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1999	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2000	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2001	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2002	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2003	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2004	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2005	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2006	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2007	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2008	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2009	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2010	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2011	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2012	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2013	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2014	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2015	701	297	540	148	127	399	1,302	3,304	4,702	2,303	1,499	749	16,068
2016	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2017	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2018	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2019	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2020	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2021	701	297	540	148	127	399	1,302	3,304	4,702	2,303	1,499	749	16,068
Ave	701	297	536	148	128	400	1,303	3,303	4,701	4,465	2,914	1,455	20,350
Max	701	297	540	148	128	400	1,303	3,304	4,702	4,600	3,002	1,499	20,618
Min	701	297	536	148	127	399	1,302	3,303	4,701	2,303	1,499	749	16,068

TABLE D10
MOCASIM - Lower Mokelumne Riparian Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1955	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1956	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1957	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1958	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1959	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1960	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1961	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1962	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1963	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1964	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1965	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1966	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1967	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1968	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1969	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1970	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1971	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1972	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1973	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1974	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1975	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1976	701	297	540	148	127	399	1,302	3,304	4,702	2,303	1,499	749	16,068
1977	701	297	540	148	127	399	1,302	3,304	4,702	2,303	1,499	749	16,068
1978	0	0	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	19,620
1979	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1980	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1981	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1982	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1983	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1984	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1985	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1986	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1987	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1988	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1989	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1990	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1991	701	297	536	104	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,574
1992	701	297	536	148	128	400	1,303	3,303	3,056	4,600	3,002	1,499	18,973
1993	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1994	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1995	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1996	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1997	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1998	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
1999	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2000	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2001	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2002	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2003	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2004	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2005	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2006	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2007	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2008	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2009	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2010	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2011	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2012	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2013	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2014	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2015	701	297	540	148	127	399	1,302	3,304	4,702	1,497	1,000	487	14,501
2016	491	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,408
2017	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2018	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2019	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2020	701	297	536	148	128	400	1,303	3,303	4,701	4,600	3,002	1,499	20,618
2021	701	297	540	148	127	399	1,302	3,304	4,702	2,303	1,499	749	16,068
Ave	688	293	536	148	128	400	1,303	3,303	4,677	4,453	2,906	1,451	20,285
Max	701	297	540	148	128	400	1,303	3,304	4,702	4,600	3,002	1,499	20,618
Min	0	0	536	104	127	399	1,302	3,303	3,056	1,497	1,000	487	14,501

TABLE D11
MOCASIM - Mokelumne Outflow 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	11,294	15,378	14,989	15,377	14,300	14,233	14,551	15,863	10,080	0	0	330	126,394
1955	10,679	10,915	10,378	10,765	10,135	9,622	11,516	10,452	0	0	0	330	84,791
1956	10,679	10,915	123,574	175,611	62,429	14,348	27,582	111,288	79,029	40,101	40,314	39,435	735,304
1957	11,294	13,849	13,093	15,377	14,300	14,233	14,551	22,081	16,097	6,218	6,218	6,347	153,656
1958	11,294	15,378	14,989	13,301	59,305	59,651	106,806	147,224	82,430	45,418	45,631	44,581	646,005
1959	11,294	13,703	12,913	15,377	14,300	14,233	11,516	10,452	0	0	0	330	104,118
1960	6,805	9,130	8,533	8,921	8,891	7,777	11,516	10,452	0	0	0	330	72,354
1961	6,805	9,130	8,533	8,921	8,469	7,838	3,661	0	0	0	0	32	53,389
1962	2,132	3,963	4,027	4,143	3,744	4,067	14,551	15,863	10,080	0	0	330	62,899
1963	6,805	9,130	8,533	8,921	19,513	7,777	14,551	82,676	56,147	35,551	35,551	34,734	319,887
1964	11,294	38,035	14,989	15,377	14,931	14,233	11,516	10,452	0	0	0	330	131,156
1965	6,805	9,130	149,260	137,660	44,101	6,585	27,582	77,247	58,475	43,860	44,072	43,072	647,849
1966	11,294	33,318	16,378	17,794	14,300	14,233	11,516	10,452	0	0	0	330	129,615
1967	10,679	10,915	10,378	17,374	24,659	55,988	62,481	175,873	77,142	59,796	60,008	58,494	623,787
1968	11,294	13,834	13,075	15,377	14,931	14,233	11,516	10,452	0	0	0	330	105,042
1969	6,805	9,130	8,533	71,863	85,194	45,748	131,735	197,317	78,109	49,530	49,743	48,560	782,266
1970	11,294	12,455	20,630	210,238	56,215	29,605	27,582	39,381	21,832	5,995	6,207	6,429	447,862
1971	11,294	36,171	46,775	41,983	31,500	31,664	14,551	37,617	31,132	21,754	21,754	21,382	347,577
1972	11,294	19,924	22,028	15,377	14,931	14,233	14,551	15,863	10,080	0	0	330	138,610
1973	10,679	10,915	10,378	33,458	66,754	36,648	14,551	40,346	33,773	24,483	24,483	24,023	330,491
1974	11,294	79,330	53,692	83,009	13,991	51,784	34,364	73,417	54,769	40,030	40,243	39,366	575,288
1975	11,294	15,067	14,604	15,377	14,300	14,233	14,551	61,544	54,288	45,681	45,681	44,537	351,156
1976	11,294	19,669	14,985	15,377	14,932	14,296	3,662	0	0	0	48	257	94,521
1977	2,133	3,963	4,025	4,143	3,744	4,068	3,662	0	0	0	48	257	26,043
1978	2,132	3,963	4,027	4,143	3,744	4,067	3,661	940	910	940	940	942	30,410
1979	11,452	15,378	14,989	15,377	18,771	36,754	14,551	36,790	30,332	20,927	20,927	20,582	256,829
1980	11,294	15,378	14,989	190,270	137,039	28,960	27,582	73,822	55,161	40,435	40,648	39,758	675,336
1981	11,294	13,489	12,648	15,377	14,300	14,233	11,516	10,452	0	0	0	330	103,638
1982	6,805	9,130	18,238	84,535	160,755	104,178	211,066	171,230	71,521	57,340	57,552	56,118	1,008,468
1983	11,294	77,374	100,370	80,688	123,718	207,256	100,618	252,882	195,275	93,091	93,303	90,715	1,426,583
1984	11,294	133,285	160,955	92,434	52,088	22,156	27,582	54,485	36,448	21,098	21,310	21,044	654,178
1985	11,294	31,629	15,499	15,377	14,300	14,233	11,516	10,452	0	0	0	330	124,629
1986	10,679	10,915	10,378	7,594	275,166	163,217	27,582	85,574	47,310	32,322	32,534	31,907	735,176
1987	11,294	12,820	11,818	15,377	14,300	14,295	3,661	0	0	0	0	32	83,596
1988	7,753	9,130	8,533	8,921	8,891	7,838	3,661	0	0	0	0	32	54,759
1989	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
1990	2,132	3,963	4,027	4,143	3,744	4,067	11,516	10,452	0	0	0	330	44,374
1991	2,132	3,963	4,027	4,143	3,744	4,067	11,516	10,452	0	0	0	330	44,374
1992	2,132	3,963	4,027	4,143	3,879	4,067	3,661	0	0	0	0	32	25,905
1993	2,132	3,963	4,027	4,143	3,744	4,067	3,661	12,479	12,076	12,479	12,479	12,109	87,358
1994	11,294	15,378	14,989	15,377	14,300	14,295	3,661	0	0	0	0	32	89,325
1995	7,753	9,130	8,533	4,509	4,927	115,429	146,053	257,987	103,293	75,877	76,089	74,057	883,637
1996	11,294	11,820	10,578	13,440	123,319	64,670	27,582	97,822	40,865	25,663	25,875	25,462	478,389
1997	11,294	31,562	142,073	372,428	87,443	24,649	27,582	36,335	18,884	2,948	3,161	3,481	761,839
1998	11,294	23,745	13,102	34,719	117,224	77,362	95,424	154,813	90,636	63,831	64,043	62,399	808,591
1999	11,294	12,931	11,394	35,889	105,590	43,548	27,582	63,705	45,371	30,319	30,531	29,968	448,121
2000	11,294	15,138	14,692	15,377	62,321	41,813	14,551	30,965	24,695	15,102	15,102	14,945	275,995
2001	11,294	15,378	14,989	15,377	14,300	14,233	11,516	10,452	0	0	0	330	107,868
2002	6,805	9,130	8,533	8,921	8,469	7,777	14,551	15,863	10,080	0	0	330	90,457
2003	6,805	9,130	8,533	8,921	8,469	7,777	14,551	15,863	10,080	0	0	330	90,457
2004	11,875	15,378	14,989	15,377	15,553	28,255	14,551	15,863	10,080	0	0	330	142,250
2005	10,679	10,915	10,378	9,588	9,635	75,707	37,762	115,637	64,774	37,625	37,837	37,038	457,573
2006	11,294	14,428	104,394	101,957	61,044	76,304	249,000	160,957	74,458	28,992	29,205	28,684	940,717
2007	11,294	14,126	13,862	15,377	14,300	14,233	11,516	10,452	0	0	0	330	105,489
2008	6,805	9,130	8,533	8,921	8,891	7,838	11,516	10,452	0	0	0	330	72,416
2009	7,753	9,130	8,533	8,921	8,469	7,777	14,551	15,863	10,080	0	0	330	91,405
2010	6,805	9,130	8,533	8,921	8,469	7,777	14,551	32,339	26,024	16,476	16,476	16,274	171,773
2011	11,294	38,917	100,123	48,682	29,739	129,286	147,587	174,349	76,532	61,921	62,133	60,550	941,112
2012	11,294	17,309	11,144	15,377	14,931	14,233	11,516	10,452	0	0	0	330	106,585
2013	6,805	9,130	8,533	8,921	8,469	7,777	11,516	10,452	0	0	0	330	71,931
2014	6,805	9,130	8,533	8,921	8,469	7,838	3,661	0	0	0	0	32	53,389
2015	2,133	3,963	4,025	4,143	3,744	4,068	3,662	0	0	0	48	257	26,043
2016	2,132	3,963	4,027	4,143	3,879	4,067	3,661	0	0	0	0	32	25,905
2017	6,805	9,130	8,533	208,239	327,213	144,228	190,327	158,077	93,457	44,829	45,041	44,010	1,279,889
2018	11,294	35,357	9,927	15,377	14,300	24,311	61,347	16,111	10,320	248	248	570	199,408
2019	11,764	15,378	14,989	12,503	78,760	103,629	137,503	130,097	96,830	42,598	42,810	41,851	728,712
2020	11,294	13,060	12,116	15,377	14,931	14,233	11,516	10,452	0	0	0	330	103,308
2021	6,806	9,129	8,529	8,921	8,470	7,840	3,662	0	0	0	48	257	53,662
Ave	8,830	17,290	23,809	37,743	39,080	32,791	35,501	50,907	28,367	16,816	16,887	16,651	324,672
Max	11,875	133,285	160,955	372,428	327,213	207,256	249,000	257,987	195,275	93,091	93,303	90,715	1,426,583
Min	2,132	3,963	4,025	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770

TABLE D12
MOCASIM - Mokelumne Outflow Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	11,294	15,378	14,989	15,377	14,300	14,233	14,551	15,863	10,080	0	0	330	126,394
1955	6,805	9,130	8,533	8,921	8,469	7,777	11,516	10,452	0	0	0	330	71,931
1956	2,132	3,963	4,027	152,632	57,712	8,697	27,582	97,842	70,528	28,644	28,856	28,347	510,963
1957	11,294	14,526	13,933	15,377	14,300	14,233	14,551	15,863	10,080	0	0	330	124,486
1958	10,679	10,915	10,378	9,795	9,661	53,949	101,221	139,970	74,262	34,351	34,563	33,870	523,614
1959	11,294	14,595	14,019	15,377	14,300	14,295	11,516	10,452	0	0	0	330	106,176
1960	7,753	9,130	8,533	8,921	8,891	7,838	11,516	10,452	0	0	0	330	73,363
1961	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
1962	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
1963	2,132	3,963	4,027	4,143	3,744	4,067	3,661	5,003	4,842	5,003	5,003	4,874	50,463
1964	11,294	31,517	14,989	15,377	14,931	14,233	11,516	10,452	0	0	0	330	124,639
1965	6,805	9,130	71,056	132,489	39,801	7,416	27,582	64,418	46,060	31,031	31,243	30,657	497,687
1966	11,294	27,420	14,656	15,377	14,300	14,233	11,516	10,452	0	0	0	330	119,577
1967	6,805	9,130	8,533	8,325	7,991	7,132	45,074	168,879	69,241	49,050	49,262	48,095	477,517
1968	11,294	14,898	14,394	15,377	14,931	14,233	11,516	10,452	0	0	0	330	107,424
1969	6,805	9,130	8,533	6,789	58,853	40,464	126,586	190,535	70,424	39,030	39,242	38,398	634,789
1970	11,294	13,658	12,858	201,454	51,826	23,416	27,582	33,387	16,030	0	212	627	392,344
1971	11,875	21,946	41,208	36,044	26,584	24,765	14,551	24,934	18,858	9,071	9,071	9,108	248,012
1972	11,294	15,378	14,989	15,377	14,931	14,233	14,551	15,863	10,080	0	0	330	127,025
1973	6,805	9,130	8,533	8,921	8,469	18,898	14,551	27,928	21,756	12,065	12,065	12,006	161,126
1974	11,294	72,946	47,634	77,455	14,300	40,383	27,965	62,623	44,324	29,236	29,449	28,921	486,530
1975	11,294	15,378	14,989	15,377	14,300	14,233	14,551	42,774	36,123	26,911	26,911	26,373	259,212
1976	11,294	15,377	14,985	15,377	14,932	14,296	3,662	0	0	0	48	257	90,229
1977	2,133	3,963	4,025	4,143	3,744	4,068	3,662	0	0	0	48	257	26,043
1978	0	0	3,707	4,143	3,744	4,067	3,661	0	0	0	0	32	19,355
1979	6,805	9,130	8,533	8,921	8,469	7,777	14,551	15,863	10,080	0	0	330	90,457
1980	10,679	10,915	10,378	149,415	132,445	23,474	27,582	62,735	44,432	29,348	29,560	29,029	559,991
1981	11,294	14,290	13,640	15,377	14,300	14,233	11,516	10,452	0	0	0	330	105,431
1982	6,805	9,130	8,533	4,450	152,586	97,279	204,232	162,624	59,918	45,350	45,563	44,515	840,984
1983	11,294	70,857	94,147	74,749	118,802	200,357	93,784	244,277	185,725	80,414	80,626	78,447	1,333,476
1984	11,294	126,767	154,732	86,495	46,697	15,595	27,582	41,803	24,175	8,416	8,628	8,772	560,955
1985	11,294	25,111	14,989	15,377	14,300	14,233	11,516	10,452	0	0	0	330	117,602
1986	6,805	9,130	8,533	7,156	190,911	157,842	27,582	73,465	37,628	22,318	22,530	22,225	586,124
1987	11,294	13,954	13,225	15,377	14,300	14,295	3,661	0	0	0	0	32	86,138
1988	2,132	3,963	4,027	4,143	3,879	4,067	3,661	0	0	0	0	32	25,905
1989	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
1990	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
1991	2,132	1,410	4,027	0	3,269	4,067	3,661	0	0	0	0	32	18,599
1992	2,132	3,963	4,027	4,143	3,879	4,067	3,661	0	0	0	0	32	25,905
1993	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
1994	6,805	9,130	8,533	8,921	8,469	7,838	3,661	0	0	0	0	32	53,389
1995	2,132	3,963	4,027	4,143	3,744	4,067	93,439	251,775	96,191	66,326	66,326	64,218	660,350
1996	11,294	13,399	12,535	14,359	99,877	59,103	27,582	84,553	30,508	14,960	15,173	15,105	398,447
1997	11,294	25,786	136,768	367,152	83,059	18,468	27,582	33,387	16,030	0	212	627	720,366
1998	10,679	9,928	9,154	14,039	112,970	71,357	89,523	147,217	82,119	52,360	52,573	51,299	703,219
1999	11,294	13,144	12,220	17,927	100,912	36,970	27,582	51,498	33,558	18,111	18,324	18,155	359,694
2000	11,294	15,378	14,989	15,377	38,596	34,913	14,551	18,425	12,560	2,562	2,562	2,810	184,016
2001	11,294	15,378	14,989	15,377	14,300	14,295	11,516	10,452	0	0	0	330	107,929
2002	7,753	9,130	8,533	8,921	8,469	7,777	14,551	15,863	10,080	0	0	330	91,405
2003	2,132	3,963	4,027	4,143	3,744	4,067	14,551	15,863	10,080	0	0	330	62,899
2004	6,805	9,130	8,533	8,921	8,891	7,777	14,551	15,863	10,080	0	0	330	90,880
2005	6,805	9,130	8,533	8,921	8,469	7,777	27,582	59,450	41,253	26,063	26,276	25,850	256,107
2006	11,294	15,378	92,811	96,751	56,717	70,199	242,995	153,249	65,825	17,378	17,591	17,445	857,631
2007	11,294	12,678	11,642	15,377	14,300	14,295	11,516	10,452	0	0	0	330	101,883
2008	7,753	9,130	8,533	8,921	8,891	7,838	11,516	10,452	0	0	0	330	73,363
2009	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
2010	6,805	9,130	8,533	8,921	8,469	7,777	14,551	15,863	10,080	0	0	330	90,457
2011	6,805	9,130	41,611	43,477	25,412	123,182	141,583	166,641	67,901	50,308	50,520	49,312	775,883
2012	11,294	12,869	11,879	15,377	14,931	14,233	11,516	10,452	0	0	0	330	102,880
2013	6,805	9,130	8,533	8,921	8,469	7,777	11,516	10,452	0	0	0	330	71,931
2014	2,132	3,963	4,027	4,143	3,744	4,067	3,661	0	0	0	0	32	25,770
2015	2,133	3,963	4,025	4,143	3,744	4,068	3,662	0	0	0	0	0	25,738
2016	0	2,840	4,027	4,143	3,879	4,067	3,661	0	0	0	0	32	22,649
2017	2,132	3,963	4,027	4,143	284,311	137,328	183,493	149,472	83,908	32,413	32,413	31,400	949,002
2018	11,294	28,839	9,927	15,377	14,300	14,233	40,567	15,863	10,080	0	0	330	160,809
2019	10,679	10,915	10,378	9,093	18,866	98,031	132,028	122,961	88,783	31,679	31,891	31,284	596,588
2020	11,294	14,029	13,317	15,377	14,931	14,233	11,516	10,452	0	0	0	330	105,479
2021	6,806	9,129	8,529	8,921	8,470	7,840	3,662	0	0	0	48	257	53,662
Ave	7,498	14,199	17,958	28,887	31,504	25,977	32,407	43,690	22,554	11,212	11,276	11,185	258,346
Max	11,875	126,767	154,732	367,152	284,311	200,357	242,995	251,775	185,725	80,414	80,626	78,447	1,333,476
Min	0	0	3,707	0	3,269	4,067	3,661	0	0	0	0	0	18,599

TABLE D13
MOCASIM - EBMUD's Mokelumne Aqueducts Diversion 2050 LOD Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1955	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1956	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
1957	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1958	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1959	19,806	19,960	20,592	20,745	24,221	18,013	17,987	18,995	18,862	20,670	18,194	19,169	237,215
1960	19,250	19,485	20,127	19,264	23,343	16,406	16,290	15,840	15,439	16,984	14,580	15,986	212,995
1961	17,430	17,930	18,606	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	207,637
1962	17,430	17,930	18,606	20,055	23,598	17,265	17,197	17,526	17,269	18,954	16,512	17,688	220,029
1963	18,403	18,761	19,419	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	240,519
1964	19,806	19,960	20,592	20,995	24,963	18,284	18,273	19,527	19,439	21,291	18,803	19,706	241,639
1965	19,557	19,747	20,384	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	243,625
1966	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1967	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1968	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
1969	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1970	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1971	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1972	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
1973	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1974	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1975	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1976	19,806	19,960	20,592	20,231	24,248	17,455	17,398	17,899	17,673	19,390	16,939	18,064	229,654
1977	18,618	18,945	19,599	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	210,834
1978	17,430	8,084	14,573	30,919	27,927	19,365	18,505	19,959	19,908	21,796	19,298	20,141	237,902
1979	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1980	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
1981	19,806	19,960	20,592	20,872	24,336	18,151	18,132	19,265	19,155	20,985	18,503	19,441	239,195
1982	19,406	19,618	20,257	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	243,218
1983	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1984	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
1985	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1986	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1987	19,806	19,960	20,592	20,310	23,828	17,541	17,488	18,067	17,856	19,586	17,131	18,233	230,398
1988	18,715	19,027	19,680	19,264	23,343	16,406	16,290	15,840	15,439	16,984	14,580	15,986	211,555
1989	17,430	17,930	18,606	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	207,637
1990	17,430	17,930	18,606	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	207,637
1991	17,430	17,930	18,606	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	207,637
1992	17,430	17,930	18,606	19,264	23,343	16,406	16,290	15,840	15,439	16,984	14,580	15,986	208,097
1993	17,430	17,930	18,606	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	237,902
1994	19,806	19,960	20,592	20,408	23,917	17,648	17,601	18,277	18,083	19,831	17,371	18,445	231,938
1995	18,836	19,131	19,781	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	241,685
1996	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
1997	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1998	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
1999	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2000	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2001	19,806	19,960	20,592	21,061	24,507	18,356	18,349	19,668	19,592	21,456	18,965	19,848	242,161
2002	19,639	19,816	20,452	20,688	24,170	17,951	17,921	18,873	18,729	20,527	18,054	19,046	235,865
2003	19,180	19,424	20,068	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	242,609
2004	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
2005	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2006	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2007	19,806	19,960	20,592	21,114	24,554	18,413	18,409	19,780	19,714	21,587	19,093	19,961	242,981
2008	19,703	19,871	20,505	19,264	23,343	16,406	16,290	15,840	15,439	16,984	14,580	15,986	214,212
2009	17,430	17,930	18,606	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	237,902
2010	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2011	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2012	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
2013	19,806	19,960	20,592	20,653	24,139	17,914	17,882	18,800	18,650	20,442	17,970	18,972	235,779
2014	19,138	19,388	20,033	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	212,231
2015	17,430	17,930	18,606	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	207,637
2016	17,430	17,930	18,606	20,114	24,139	17,329	17,264	17,652	17,405	19,101	16,655	17,814	221,438
2017	18,475	18,823	19,479	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	240,714
2018	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2019	19,806	19,960	20,592	21,198	24,630	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,295
2020	19,806	19,960	20,592	21,198	25,153	18,504	18,505	19,959	19,908	21,796	19,298	20,141	244,817
2021	19,806	19,960	20,592	20,231	23,757	17,455	17,398	17,899	17,673	19,390	16,939	18,064	229,162
Ave	19,293	19,376	20,103	20,909	24,407	18,048	18,010	19,039	18,910	20,721	18,244	19,214	236,274
Max	19,806	19,960	20,592	30,919	27,927	19,365	18,505	19,959	19,908	21,796	19,298	20,141	244,817
Min	17,430	8,084	14,573	19,264	22,883	16,406	16,290	15,840	15,439	16,984	14,580	15,986	207,637

TABLE D14
MOCASIM - EBMUD's Mokelumne Aqueducts Diversion Max WR Case
(AF)

Water Year	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
1954	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1955	24,985	24,394	24,930	24,213	27,354	21,758	21,946	23,364	23,602	25,767	23,198	23,571	289,081
1956	23,486	23,114	23,677	25,433	28,924	23,271	23,344	25,962	26,420	28,802	26,174	26,192	304,797
1957	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1958	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1959	24,985	24,394	24,930	24,213	27,354	21,758	21,946	23,364	23,602	25,767	23,198	23,571	289,081
1960	23,486	23,114	23,677	22,993	26,832	20,435	20,549	20,766	20,783	22,733	20,222	20,951	266,540
1961	21,987	21,833	22,425	22,993	26,252	20,435	20,549	20,766	20,783	22,733	20,222	20,951	261,927
1962	21,987	21,833	22,425	9,670	27,927	30,919	21,712	20,766	20,783	22,733	20,222	20,951	261,927
1963	21,987	21,833	22,425	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	300,106
1964	24,985	24,394	24,930	24,213	27,973	21,758	21,946	23,364	23,602	25,767	23,198	23,571	289,701
1965	23,486	23,114	23,677	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	304,138
1966	24,985	24,394	24,930	24,777	27,863	22,370	22,593	24,566	24,906	27,171	24,575	24,784	297,915
1967	24,180	23,706	24,257	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	306,004
1968	24,985	24,394	24,930	24,325	28,078	21,880	22,075	23,603	23,861	26,046	23,472	23,813	291,462
1969	23,624	23,231	23,793	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	304,509
1970	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1971	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1972	24,985	24,394	24,930	25,322	28,924	23,048	23,217	25,726	26,164	28,526	25,904	25,954	307,093
1973	24,849	24,278	24,816	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	307,804
1974	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1975	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1976	24,985	24,394	24,930	24,213	27,973	21,758	21,946	23,364	23,602	25,767	23,198	23,571	289,701
1977	23,486	23,114	23,677	16,613	3,426	4,609	10,375	14,034	11,160	11,231	6,604	1,547	149,875
1978	0	0	12,601	30,919	27,927	30,919	29,922	30,919	29,922	30,919	30,919	29,922	284,888
1979	30,919	29,922	30,919	30,919	27,927	30,919	29,922	26,629	26,420	28,802	26,174	26,192	345,662
1980	24,985	24,394	24,930	25,433	28,924	23,271	23,344	25,962	26,420	28,802	26,174	26,192	308,829
1981	24,985	24,394	24,930	24,213	27,354	21,758	21,946	23,364	23,602	25,767	23,198	23,571	289,081
1982	23,486	23,114	23,677	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	304,138
1983	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1984	24,985	24,394	24,930	25,433	28,924	23,271	23,344	25,962	26,420	28,802	26,174	26,192	308,829
1985	24,985	24,394	24,930	24,721	27,813	22,309	22,529	24,447	24,777	27,032	24,439	24,664	297,038
1986	24,111	23,647	24,199	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	305,819
1987	24,985	24,394	24,930	24,213	27,354	21,758	21,946	23,364	23,602	25,767	23,198	23,571	289,081
1988	23,486	23,114	23,677	22,993	26,832	20,435	20,549	20,766	20,783	22,733	20,222	20,951	266,540
1989	5,598	2,813	2,192	3,372	5,364	30,919	29,922	30,919	29,922	30,919	30,919	29,922	232,780
1990	30,919	29,922	30,919	26,626	19,102	22,278	8,269	15,249	11,689	8,124	7,280	13,363	223,739
1991	19,942	0	354	0	0	19,204	10,300	11,918	20,215	8,858	7,892	13,912	112,594
1992	21,460	23,946	20,377	12,578	25,185	27,770	8,337	3,179	0	5,509	8,132	4,804	161,277
1993	7,555	4,820	13,435	30,919	27,927	30,919	29,922	30,919	29,922	30,919	30,919	29,922	298,097
1994	30,919	29,922	30,919	30,919	27,927	30,919	25,810	20,766	20,783	22,733	20,222	20,951	312,789
1995	21,987	21,833	22,425	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	300,106
1996	24,985	24,394	24,930	25,433	28,924	23,271	23,344	25,962	26,420	28,802	26,174	26,192	308,829
1997	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1998	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
1999	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
2000	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
2001	24,985	24,394	24,930	24,333	27,462	21,888	22,083	23,619	23,878	26,065	23,490	23,828	290,953
2002	23,633	23,239	23,800	22,993	26,252	20,435	20,549	20,766	20,783	22,733	20,222	20,951	266,355
2003	21,987	21,833	22,425	23,734	26,921	21,238	21,397	22,343	22,494	24,575	22,029	22,542	273,517
2004	22,897	22,611	23,185	22,993	26,832	20,435	20,549	20,766	20,783	22,733	20,222	20,951	264,956
2005	21,987	21,833	22,425	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	300,106
2006	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
2007	24,985	24,394	24,930	24,426	27,546	21,989	22,191	23,818	24,094	26,297	23,718	24,029	292,417
2008	23,748	23,337	23,896	22,993	26,832	20,435	20,549	20,766	20,783	22,733	20,222	20,951	267,245
2009	21,987	21,833	22,425	22,993	26,252	20,435	20,549	20,766	20,783	22,733	20,222	20,951	261,927
2010	21,987	21,833	22,425	25,014	27,927	22,777	22,864	25,069	25,452	27,759	25,152	25,292	293,549
2011	24,470	23,954	24,500	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	306,785
2012	24,985	24,394	24,930	24,371	28,121	21,929	22,127	23,700	23,967	26,160	23,583	23,911	292,177
2013	23,680	23,279	23,839	22,993	26,252	20,435	20,549	20,766	20,783	22,733	20,222	20,951	266,482
2014	21,987	21,833	22,425	22,993	26,252	20,435	20,549	20,766	20,783	22,733	20,222	20,951	261,927
2015	21,987	21,833	22,425	22,993	26,252	13,203	15,247	9,140	6,210	0	0	0	159,291
2016	0	0	17,204	30,919	28,924	30,919	29,922	30,919	29,922	30,919	30,919	29,922	290,488
2017	30,919	29,922	30,919	28,697	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	328,885
2018	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
2019	24,985	24,394	24,930	25,433	27,927	23,609	23,344	25,962	26,420	28,802	26,174	26,192	308,170
2020	24,985	24,394	24,930	24,383	28,133	21,943	22,142	23,727	23,996	26,191	23,614	23,938	292,374
2021	23,695	23,293	23,852	22,993	26,252	20,435	20,549	20,766	20,783	22,733	20,222	20,951	266,523
Ave	23,197	22,404	23,442	24,019	26,451	23,040	22,211	23,716	23,861	25,639	23,335	23,542	284,857
Max	30,919	29,922	30,919	30,919	28,924	30,919	29,922	30,919	29,922	30,919	30,919	29,922	345,662
Min	0	0	354	0	0	4,609	8,269	3,179	0	0	0	0	112,594

TABLE D15
WAAT- Water available for diversion by WID 2050 LOD Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	10,000	10,000	20,000
1957	0	0	0	0	0	6,218	6,017	12,235
1958	0	0	0	0	0	10,000	10,000	20,000
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	10,000	10,000	20,000
1964	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	10,000	10,000	20,000
1966	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	10,000	10,000	20,000
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	10,000	10,000	20,000
1970	0	0	0	0	0	5,995	5,801	11,796
1971	0	0	0	0	0	10,000	10,000	20,000
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	10,000	10,000	20,000
1974	0	0	0	0	0	10,000	10,000	20,000
1975	0	0	0	0	0	10,000	10,000	20,000
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	940	910	1,850
1979	0	0	0	0	0	10,000	10,000	20,000
1980	0	0	0	0	0	10,000	10,000	20,000
1981	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	10,000	10,000	20,000
1983	0	0	0	0	0	10,000	10,000	20,000
1984	0	0	0	0	0	10,000	10,000	20,000
1985	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	10,000	10,000	20,000
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	10,000	10,000	20,000
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	10,000	10,000	20,000
1996	0	0	0	0	0	10,000	10,000	20,000
1997	0	0	0	0	0	2,948	2,853	5,802
1998	0	0	0	0	0	10,000	10,000	20,000
1999	0	0	0	0	0	10,000	10,000	20,000
2000	0	0	0	0	0	10,000	10,000	20,000
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	10,000	10,000	20,000
2006	0	0	0	0	0	10,000	10,000	20,000
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	10,000	10,000	20,000
2011	0	0	0	0	0	10,000	10,000	20,000
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	10,000	10,000	20,000
2018	0	0	0	0	0	248	240	487
2019	0	0	0	0	0	10,000	10,000	20,000
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	0	0	0	0	0	4,358	4,350	8,708
Max	0	0	0	0	0	10,000	10,000	20,000
Min	0	0	0	0	0	0	0	0

TABLE D16
WAAT- Water available for diversion by WID Max WR Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	0	0	0	0	0	10,000	10,000	20,000
1957	0	0	0	0	0	0	0	0
1958	0	0	0	0	0	10,000	10,000	20,000
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	5,003	4,842	9,845
1964	0	0	0	0	0	0	0	0
1965	0	0	0	0	0	10,000	10,000	20,000
1966	0	0	0	0	0	0	0	0
1967	0	0	0	0	0	10,000	10,000	20,000
1968	0	0	0	0	0	0	0	0
1969	0	0	0	0	0	10,000	10,000	20,000
1970	0	0	0	0	0	0	0	0
1971	0	0	0	0	0	9,071	8,778	17,849
1972	0	0	0	0	0	0	0	0
1973	0	0	0	0	0	10,000	10,000	20,000
1974	0	0	0	0	0	10,000	10,000	20,000
1975	0	0	0	0	0	10,000	10,000	20,000
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	0	0	0	0	10,000	10,000	20,000
1981	0	0	0	0	0	0	0	0
1982	0	0	0	0	0	10,000	10,000	20,000
1983	0	0	0	0	0	10,000	10,000	20,000
1984	0	0	0	0	0	8,416	8,144	16,560
1985	0	0	0	0	0	0	0	0
1986	0	0	0	0	0	10,000	10,000	20,000
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	0	10,000	10,000	20,000
1996	0	0	0	0	0	10,000	10,000	20,000
1997	0	0	0	0	0	0	0	0
1998	0	0	0	0	0	10,000	10,000	20,000
1999	0	0	0	0	0	10,000	10,000	20,000
2000	0	0	0	0	0	2,562	2,480	5,042
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	10,000	10,000	20,000
2006	0	0	0	0	0	10,000	10,000	20,000
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0
2011	0	0	0	0	0	10,000	10,000	20,000
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	0	0	0	10,000	10,000	20,000
2018	0	0	0	0	0	0	0	0
2019	0	0	0	0	0	10,000	10,000	20,000
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	0	0	0	0	0	3,457	3,445	6,901
Max	0	0	0	0	0	10,000	10,000	20,000
Min	0	0	0	0	0	0	0	0

TABLE D17
WAAT- Water available for diversion by EBMUD
2050 LOD Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	1,903	1,903	1,780	1,903	0	1,903	1,841	11,232
1957	0	0	0	0	0	0	0	0
1958	0	0	1,719	1,903	1,841	1,903	1,841	9,207
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	1,719	0	0	1,903	1,841	5,463
1964	0	0	0	0	0	0	0	0
1965	1,903	1,903	1,719	0	0	1,903	1,841	9,268
1966	1,903	1,903	0	0	0	0	0	3,805
1967	0	1,903	1,719	1,903	1,841	1,903	1,841	11,109
1968	0	0	0	0	0	0	0	0
1969	0	1,903	1,719	1,903	1,841	1,903	1,841	11,109
1970	1,903	1,903	1,719	1,903	0	0	0	7,427
1971	1,903	1,903	1,719	1,903	0	1,903	1,841	11,171
1972	1,903	0	0	0	0	0	0	1,903
1973	0	1,903	1,719	1,903	0	1,903	1,841	9,268
1974	1,903	1,903	0	1,903	1,841	1,903	1,841	11,293
1975	0	0	0	0	0	1,903	1,841	3,744
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	1,719	1,903	0	1,903	1,841	7,365
1980	0	1,903	1,780	1,903	0	1,903	1,841	9,329
1981	0	0	0	0	0	0	0	0
1982	1,903	1,903	1,719	1,903	1,841	1,903	1,841	13,012
1983	1,903	1,903	1,719	1,903	1,841	1,903	1,841	13,012
1984	1,903	1,903	1,780	1,903	0	1,903	1,841	11,232
1985	510	0	0	0	0	0	0	510
1986	0	0	1,719	1,903	0	1,903	1,841	7,365
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	1,903	1,841	3,744
1994	0	0	0	0	0	0	0	0
1995	0	0	0	1,903	1,841	1,903	1,841	7,488
1996	0	0	1,780	1,903	0	1,903	1,841	7,427
1997	1,903	1,903	1,719	1,903	0	0	0	7,427
1998	0	1,903	1,719	1,903	1,841	1,903	1,841	11,109
1999	0	1,903	1,719	1,903	0	1,903	1,841	9,268
2000	0	0	1,780	1,903	0	1,903	1,841	7,427
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	622	1,903	0	0	0	2,525
2005	0	0	445	1,903	1,841	1,903	1,841	7,933
2006	1,903	1,903	1,719	1,903	1,841	1,903	1,841	13,012
2007	1,903	0	0	0	0	0	0	1,903
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	1,903	1,841	3,744
2011	1,903	1,903	1,719	1,903	1,841	1,903	1,841	13,012
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	1,903	1,719	1,903	1,841	1,903	1,841	11,109
2018	0	0	0	1,903	1,841	0	0	3,744
2019	0	0	1,719	1,903	1,841	1,903	1,841	9,207
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	399	532	627	756	379	784	758	4,234
Max	1,903	1,903	1,780	1,903	1,841	1,903	1,841	13,012
Min	0	0	0	0	0	0	0	0

TABLE D18
WAAT- Water available for diversion by EBMUD
Max WR Case
(AF)

Water Year	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
1954	0	0	0	0	0	0	0	0
1955	0	0	0	0	0	0	0	0
1956	0	4,757	4,450	4,629	0	4,757	4,603	23,196
1957	0	0	0	0	0	0	0	0
1958	0	0	306	4,757	4,603	4,757	4,603	19,026
1959	0	0	0	0	0	0	0	0
1960	0	0	0	0	0	0	0	0
1961	0	0	0	0	0	0	0	0
1962	0	0	0	0	0	0	0	0
1963	0	0	0	0	0	0	0	0
1964	0	0	0	0	0	0	0	0
1965	4,757	4,757	4,296	0	0	4,757	4,603	23,170
1966	0	0	0	0	0	0	0	0
1967	0	0	0	0	4,603	4,757	4,603	13,963
1968	0	0	0	0	0	0	0	0
1969	0	0	4,296	4,757	4,603	4,757	4,603	23,017
1970	0	4,757	4,296	4,757	0	0	0	13,810
1971	4,757	4,757	4,296	4,757	0	0	0	18,567
1972	0	0	0	0	0	0	0	0
1973	0	0	0	4,757	0	2,065	1,676	8,498
1974	4,757	4,757	0	4,757	383	4,757	4,603	24,014
1975	0	0	0	0	0	4,757	4,603	9,360
1976	0	0	0	0	0	0	0	0
1977	0	0	0	0	0	0	0	0
1978	0	0	0	0	0	0	0	0
1979	0	0	0	0	0	0	0	0
1980	0	4,757	4,450	4,757	0	4,757	4,603	23,324
1981	0	0	0	0	0	0	0	0
1982	0	0	4,296	4,757	4,603	4,757	4,603	23,017
1983	4,757	4,757	4,296	4,757	4,603	4,757	4,603	32,530
1984	4,757	4,757	4,450	1,362	0	0	0	15,325
1985	0	0	0	0	0	0	0	0
1986	0	0	4,296	4,757	0	4,757	4,603	18,413
1987	0	0	0	0	0	0	0	0
1988	0	0	0	0	0	0	0	0
1989	0	0	0	0	0	0	0	0
1990	0	0	0	0	0	0	0	0
1991	0	0	0	0	0	0	0	0
1992	0	0	0	0	0	0	0	0
1993	0	0	0	0	0	0	0	0
1994	0	0	0	0	0	0	0	0
1995	0	0	0	0	4,603	4,757	4,603	13,963
1996	0	0	4,450	4,757	0	4,757	4,478	18,441
1997	4,757	4,757	4,296	4,757	0	0	0	18,567
1998	0	4,757	4,296	4,757	4,603	4,757	4,603	27,773
1999	0	2,550	4,296	4,757	0	4,757	4,603	20,963
2000	0	0	4,450	4,757	0	0	0	9,207
2001	0	0	0	0	0	0	0	0
2002	0	0	0	0	0	0	0	0
2003	0	0	0	0	0	0	0	0
2004	0	0	0	0	0	0	0	0
2005	0	0	0	0	0	4,757	4,603	9,360
2006	4,757	4,757	4,296	4,757	4,603	4,757	4,603	32,530
2007	0	0	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0
2009	0	0	0	0	0	0	0	0
2010	0	0	0	0	0	0	0	0
2011	4,757	4,757	4,296	4,757	4,603	4,757	4,603	32,530
2012	0	0	0	0	0	0	0	0
2013	0	0	0	0	0	0	0	0
2014	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0
2017	0	0	4,296	4,757	4,603	4,757	4,603	23,017
2018	0	0	0	0	4,603	0	0	4,603
2019	0	0	4,296	4,757	4,603	4,757	4,603	23,017
2020	0	0	0	0	0	0	0	0
2021	0	0	0	0	0	0	0	0
Ave	560	877	1,216	1,417	818	1,429	1,377	7,694
Max	4,757	4,757	4,450	4,757	4,603	4,757	4,603	32,530
Min	0	0	0	0	0	0	0	0

APPENDIX E

Draft Strategic Plan for the Proposed Agreements to Support Healthy Rivers and Landscapes, Appendix E - Flow Accounting

Draft Strategic Plan Appendix E – Flow Accounting

Date of Flow Accounting Procedure Compilation: October 10, 2024

Introduction and Overview for Appendix E

As described in Section 2.1.4 of the Strategic Plan, flow accounting involves verifying that Flow Measure commitments in the Strategic Plan have been met. This appendix expands on the narrative description of flow accounting provided in Table 7 of the Strategic Plan by providing a compilation of flow accounting procedures for nine water sources that are supplying Flow Measures for the Agreements to Support Healthy Rivers and Landscapes (Friant, Tuolumne, Sacramento, Feather, Yuba, American, Mokelumne, Putah, Export reductions). These flow accounting procedures are also included or referenced in Implementing Agreements and Enforcement Agreements as appropriate. The flow accounting procedures for each water source have three core components:

1. **Quantification of reference flow** - a description of the procedures and/or tools that will be used to quantify the reference operation and resulting reference flow, which is the flow that would have occurred without the Flow Measures.

2. **Measurement of Flow Measure deployment above reference flow** - a description of the procedures and/or tools for measuring the Flow Measure in relation to the reference flow, including the station where flows are measured.

3. **Verification of additionality** - a description of how the additionality of water will be verified relative to the reference operation.

In addition to the flow accounting procedures specific to each water source, Appendix E also includes accounting procedures that have cross-cutting relevance across all or a subset of water sources. These procedures are referred to generally as “Delta Accounting Procedures” and describe the following:

1. how the CVP/SWP reference operation will be determined (which is the reference operation and resulting reference flow for the Sacramento, Feather, American, and export reduction water sources);
2. how CVP/SWP operations will avoid the export of Flow Measures; and,
3. how the potential losses to the system will be addressed through identification of initial assumptions and refinement.

Definitions of terms that are cross-cutting across all flow accounting procedures and additional to the definitions in the Strategic Plan are provided below.

Real-water verification – procedures for verifying that additional water has been added relative to the reference operation.

Reference flow and reference operation - the flow or operation that would occur without Flow Measures from the Agreements to Support Healthy Rivers and Landscapes.

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Friant Draft Quantitative Flow Accounting Procedures

Date Drafted: August 1, 2024

Drafted by: FWA and Reclamation

1 Definitions

Restoration Flows = Releases from Friant Dam pursuant to the San Joaquin River Restoration Settlement and dedicated for in-stream use for purpose of fish and wildlife (§ 1707) from Friant Dam through the Sacramento-San Joaquin Delta. Restoration Flows consist of water allocated from CVP supply in Millerton Lake, Acquired Water, and Buffer Flows.

Acquired Water = water acquired by the Secretary of Interior either purchased from willing sellers or returned from an Unreleased Restoration Flow exchange under the Settlement, beyond those flows required by the Restoration Allocation and Buffer Flows.

Buffer Flows = Additional Restoration Flow releases from Friant Dam up to an additional 10 percent of the applicable Restoration Flow hydrograph.

HR&L = Agreements Supporting Healthy Rivers and Landscapes

Restoration Flows reaching Vernalis = those flows tracked from their release from Friant Dam, with no accretions allowed, only losses as measured by 7 gauges between Friant Dam and the confluence with the Merced River. This approach has been vetted with the State Board and is calculated daily by spreadsheet. Then beyond the Merced Confluence are estimated using the currently accepted loss factor of 10%. This 10% loss factor will be consistent with any loss factor developed by DWR and Reclamation for this section of the river as new data and analysis become available. Restoration Flows are dedicated for instream use only except when recaptured by the San Joaquin River Restoration Program pursuant to the Settlement. Absent recapture and after losses, Restoration Flows should become Delta outflow.

Restoration Flows eligible for Recapture = those Restoration Flows in either the Lower San Joaquin River or in the Delta shall be calculated as the Restoration Flows reaching the point of diversion (i.e. typically taken as Restoration Flows reaching Vernalis) minus a 10% uncertainty factor. This uncertainty factor is incorporated to ensure that SJRRP recapture operations do not infringe upon other water rights which might otherwise occur due to normal operational precision and flow measurement accuracy and to buffer any operational errors that may occur. This 10% uncertainty factor does not mean that Restoration Flows are not fully present — it is only applied to recapture.

Settlement = Stipulation of Settlement in NRDC, et al. v. Kirk Rodgers, et al. (San Joaquin River Restoration Settlement)

SJRRP = San Joaquin River Restoration Program

TAF = thousand acre-feet

Unreleased Restoration Flows = Restoration Flows that cannot be released into the San Joaquin River under the Restoration Administrator's recommended schedule for any reason.

2 Flow Measures

Except for those year types determined to be Critical-High or Critical-Low under the Settlement (on a rolling basis as described in the Restoration Flow Guidelines), Reclamation, in consultation with Friant Water Authority, will reduce the recapture of Restoration Flows to the extent necessary to achieve a goal

of contributing 50,000 acre-feet toward Delta outflows derived from all Friant releases during the period of February and May (Delta Outflow Goal). The maximum amount of reduced recapture in any month during the period of February through May will be up to 50% of the total Restoration Flows eligible for recapture (i.e. “recapturable”) for such month.

3 Flow Measure Accounting

3.1 Operative Flow

San Joaquin River flows without releases from Friant Dam, including flood management releases. This reference operation would not be quantified, but instead the flows from Friant contributing to Delta Outflow would be quantified as described below.

3.2 Measuring HR&L Flow Deployment above Operative Flow

Consistent with existing water rights permits requirements for the San Joaquin River Restoration Program (SJRRP), Reclamation provides accounting of daily Friant Dam releases and Restoration Flows, including key gaging stations and points of rediversion. Current downstream points of permitted rediversion include Mendota Pool, Patterson Irrigation District, Banta-Carbona Irrigation District, and Jones and Banks Pumping Plants.

Flows contributing to the Friant HR&L would be any flows released from Friant Dam measured entering the Delta at Vernalis (VNS) minus recapture that is occurring below Vernalis. The accounting of these flows is premised on the existing accounting procedures for SJRRP and as reported daily in the SJRRP Operations Spreadsheet. As the SJRRP accounting procedures are continually refined with the State Board and by potential future water right orders, they will govern and supersede. Whenever these flows are not projected to meet the Delta Outflow Goal as measured at Vernalis (VNS), recapture would be reduced up to a maximum of 50% of the eligible Restoration Flows as measured at the downstream points of rediversion listed above.

At times when Friant Dam makes releases for flood management, flows contributing to the Friant HR&L will be the proportion of Vernalis (VNS) flows attributable to Friant releases which will be calculated by flows passing Gravely Ford (GRF) relative (i.e. proportional) to all flows passing James Bypass (JBP), San Joaquin River at Stevinson (SJS) minus Chowchilla Bypass (CBP) minus SJR Below Bifurcation (SJB), Merced River near Stevinson (MST), Tuolumne River at Tuolumne City (TRT), and Stanislaus River at Koetitz (KOT) minus any recapture that is occurring. Appropriate time lags and daily average flow rates would be used in this calculation.

Consistent with the Implementing Agreement, it is understood that in some years there will not be sufficient Restoration Flows to meet the Delta Outflow Goal due certain conditions which may include, but are not limited to, channel constraints, construction, schedule of Restoration Flows, and/or deliveries to satisfy the Exchange Contract. Restoration Flows that cannot be released are accounted for and sold to Friant Contractors as Unreleased Restoration Flows consistent with the Settlement. These flows will be accounted for separately from those flows contributing to the Friant HR&L for context in future ability in meeting the Delta Outflow Goal as these constraints are alleviated.

3.2.1 Monitoring of HR&L Flow Deployment

Restoration Flows and releases from Friant Dam are reported daily by Reclamation with data incorporated from DWR and USGS on a weekly basis. This is through an email distribution of PDF and Microsoft Excel documents. Additionally, Reclamation posts key Friant Dam and Restoration Flow data on the SacPAS

website (starting September 2024), with updates made on daily and weekly basis depending on the source of data.

The San Joaquin River Restoration Program's Restoration Flow Guidelines is a living document that describes the procedures for measuring, monitoring, and reporting flows from Friant Dam, including Restoration Flows, and other guidelines to comply with the Settlement. Additionally, Reclamation is developing an updated Flow Monitoring and Management Plan to comply with existing water rights orders from the State Board and is anticipated in 2024.

Monitoring of flows below Friant Dam is already mandatory as defined in the Settlement and existing water rights orders, and locations are summarized in Table 1 below. This list is non-exhaustive of existing water rights orders and tracking performed by the SJRRP Operations spreadsheet and is subject to change pursuant to future water rights orders. Occasionally, flow gauges may be relocated, renamed, or replaced. Per existing water rights conditions, Reclamation informs the State Board of any malfunctions at gauges and provides a plan for return to operation.

Table 1. Friant HR&L Flow Monitoring Locations

Flow Monitoring Location	Settlement Reach	Gauge	CDEC Code	Operating Agency
Immediately Below Friant Dam	Head of Reach 1	Friant Dam (Millerton)	MIL	USBR
Gravelly Ford	Head of Reach 2A	SJR at Gravelly Ford	GRF	USBR
Immediately below Chowchilla Bifurcation Structure	Head of Reach 2B	Below Chowchilla Bifurcation Structure	SJB	USBR
Top of Chowchilla Bypass	N/A	Chowchilla Bypass Headworks	CBP	SLDMWA
James Bypass upstream of SJR	N/A	James Bypass	JBP	Reclamation District 1606
Below Mendota Dam	Head of Reach 3	SJR near Mendota	MEN	USBR
Below Sack Dam	Head of Reach 4A	SJR near Dos Palos	SDP	DWR
Head of Sand Slough Bypass	Head of Reach 4B and Head of Sand Slough Bypass	SJR near Washington Road	SWA	DWR
Eastside Bypass	Head of Lower Eastside Bypass	Eastside Bypass Below Mariposa Bypass	EBM	DWR
Below Lower Eastside Bypass	Head of Reach 5	SJR near Stevinson	SJS	DWR
Merced River upstream of SJR	N/A	Merced River near Stevinson	MST	DWR
At the confluence of the Merced River	Tail of Reach 5	SJR above Merced River near Newman	SMN (the lessor of a synthetic flow rate utilizing multiple gages)	USGS
Near Patterson	N/A	SJR near Patterson	SJP	DWR

Flow Monitoring Location	Settlement Reach	Gauge	CDEC Code	Operating Agency
Tuolumne River upstream of SJR	N/A	Tuolumne River at Tuolumne City	TRT	DWR
Stanislaus River upstream of SJR	N/A	Stanislaus River at Koetitz	KOT	DWR
Near Vernalis	N/A	SJR near Vernalis	VNS	USGS

Key:
DWR = California Department of Water Resources
N/A = Not Applicable
SLDMWA = San Luis and Delta-Mendota Water Authority
SJR = San Joaquin River
USBR = U.S. Bureau of Reclamation

Reclamation ensures that operational data (provisional data prior to QA/QC review) is available in real-time at the mandatory reporting locations and other locations as necessary. Additionally, Reclamation provides a regular distribution of data which tracks Friant releases, Restoration Flows, gauge error, and other flows and accretion/depletions at each of the mandatory locations. Estimated travel time and losses between gauges are detailed in the Restoration Flow Guidelines and upcoming Flow Monitoring and Management Plan. Losses between gauges are continually being refined with the State Board.

Restoration Flows are accounted for such that no accretions are incorporated. At each of the above monitoring locations, Restoration Flows are supported by an equal or greater rate of Restoration Flows at the next upstream gauge. All Restoration Flows are sourced from Friant Dam. For portions of the San Joaquin River, a pre-determined loss factor is applied when gauging does not provide adequate accuracy. Between SJB and SDP, a standardized loss factor developed between Reclamation and the San Luis Delta-Mendota Water Authority is applied. Between SMN and SJP, and SJP and VNS, a loss factor developed between Reclamation and DWR is applied. Where appropriate, additional loss factor buffers are included for conservatism where there is uncertainty. When QA/QC data is available, it is retroactively applied to Restoration Flow rates to utilize the best available information.

3.2.2 Examples of Measuring HR&L Flow Deployment

The following examples describe actual operations of SJRRP and how HR&L would result in flows under different conditions. Note that 2023, 2021, 2019, and 2017 are not shown because these years were either Wet or Critical year types, and do not have flow measures as part of the HR&L program; however, under Wet years there would still be Friant releases contributing to the Delta outflow. Additionally, these historical flows do not account for potential changes in the ability to recapture (i.e., redivert flows) in the Delta and lower San Joaquin River under existing and future permits, which may increase the action to reduce recapture of Restoration Flows as part of the HR&L program. Additionally, they do not consider changes in downstream capacity for Restoration Flows, which will increase towards the end of the first eight years of the HR&L program. Additional examples are under development to demonstrate the future conditions, and will be detailed, along with the examples below, in an attachment to be developed.

3.2.2.1 2024 – Normal-Wet

If the Friant HR&L program were implemented in 2024, the HR&L flow deployment would've been measured as approximately 48 TAF in February through May. The Restoration Year Type was Normal-Wet and the Restoration Allocation totaled 329,026 AF at Gravelly Ford in addition to 4,447 AF of Buffer Flows and 8,700 AF of Acquired Water, however, only 191,699 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 41,267 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta)

in February through May. 15,042 AF was recaptured during this same period in the lower San Joaquin River (13,471 AF) and Mendota Pool (1,570 AF) without the HR&L program. With the HR&L program, only flows in the lower San Joaquin River would've been reduced as Mendota Pool recapture is only done when flow can't be released further downstream. With the HR&L program, recapture of Restoration Flows would be reduced up to 50% per month if the 50 TAF target cannot be met. As such, recapture would've been reduced in the lower San Joaquin River by 6,736 AF (approximately 886 AF in February, 2,473 AF in March, 2,605 AF in April, and 773 AF in May), maxing out the 50% threshold every month and resulting in total HR&L flow deployment of approximately 48 TAF.

3.2.2.2 2022 – Normal-Dry

If the Friant HR&L program were implemented in 2022, the HR&L flow deployment would've been measured as approximately 25 TAF in February through May. The Restoration Year Type was Normal-Dry and the Restoration Allocation totaled 232,470 AF at Gravelly Ford in addition to 3,500 AF of Acquired Water, however, only 141,364 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 24,962 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 469 AF was recaptured during this period in the lower San Joaquin River (145 AF) and Mendota Pool (324 AF) without the HR&L program. Again, only flows in the lower San Joaquin River would've been reduced, and by 72 AF only in February (there was no recapture in other months during this period), maxing out the 50% threshold and resulting in total HR&L flow deployment of approximately 25 TAF.

3.2.2.3 2020 – Dry

If the Friant HR&L program were implemented in 2020, the HR&L flow deployment would've been measured as approximately 22.5 TAF in February through May. The Restoration Year Type was Dry and the Restoration Allocation totaled 202,197 AF at Gravelly Ford in addition to 1,517 of Buffer Flows, however, only 139,517 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 20,460 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 4,420 AF was recaptured during this period in the lower San Joaquin River (4,089 AF) and Mendota Pool (332 AF) without the HR&L program. Again, only flows in the lower San Joaquin River would've been reduced, and by 2,044 AF (approximately 900 AF in February, 210 AF in March, 343 AF in April, and 592 AF in May), maxing out the 50% threshold every month and resulting in total HR&L flow deployment of approximately 22.5 TAF.

3.2.2.4 2018 – Normal-Dry

If the Friant HR&L program were implemented in 2018, the HR&L flow deployment would've been measured as approximately 18 TAF in February through May. The Restoration Year Type was Normal-Dry and the Restoration Allocation totaled 280,258 AF at Gravelly Ford in addition to 2,129 of Acquired Water, however, only 158,003 AF was released from Friant for Restoration Flows due to downstream capacity constraints. The SJRRP Operations Spreadsheet accounted for 9,794 AF of remaining Restoration Flows after downstream recapture (i.e. flows at Vernalis entering the Delta) in February through May. 18,112 AF was recaptured during this period in the lower San Joaquin River (16,207 AF) and Mendota Pool (1,905 AF) without the HR&L program. Again, only flows in the lower San Joaquin River would've been reduced, and by 8,069 AF (approximately 2,460 AF in February, 1,555 AF in March, 2,100 AF in April, and 1,954 AF in May), maxing out the 50% threshold every month and resulting in total HR&L flow deployment of approximately 18 TAF.

3.3 Real Water Verification

Real water released from Friant Dam and entering the Delta will be tracked consistent with existing water rights permits and tracking of Restoration Flows available for recapture, and reporting of those flows that are diverted for recapture. It is anticipated there is a low chance of redirected impacts to other water users due to requirements under existing water rights permits, existing protections of those flows, and the Settlement. Accounting of Restoration Flows through the Delta and methodology for Delta recapture is continuing to be refined with DWR and State Board, and it is anticipated these HR&L flows will result in low risk of redirected impact. If redirected impacts are identified, then reimbursement will be provided through a mutually agreeable method.

Sacramento Draft Quantitative Flow Accounting Procedures

Draft Revised: October 3, 2024

Drafted by: Thaddeus Bettner and Lee Bergfeld

1 Definitions

Biological Opinions – Current 2019 Biological Opinions and as they may be updated under the current USBR Re-initiation of Consultation process.

CDFW – California Department of Fish and Wildlife

CVO – Central Valley Project Operations

CVP – Central Valley Project

ETAW – Evapotranspiration of applied water

FAW – Flow Accounting Workgroup comprised of representatives of HRL participants, DWR, USBR, CDFW, and SWRCB staff.

HRL – Agreements Supporting Healthy Rivers and Landscapes (generally known as Voluntary Agreements/VAs)

NMFS – National Marine Fishery Service

Reference Condition – the flow, release, diversion, or operation that would occur without the HRL action.

SRSC – Sacramento River Settlement Contractors

SWRCB – State Water Resources Control Board

TAF – thousand acre-feet

USBR – United States Bureau of Reclamation

USFWS – United States Fish and Wildlife Service

WY – water year

2 Flow Measures

For the Healthy Rivers and Landscapes Program Flow Measure (Flow Measure) sourced from the mainstem Sacramento River system, below are the primary quantitative procedures for (1) measuring the deployment of the Flow Measure; and (2) confirming the Flow Measure contributions were made available or verified based on fallowing and groundwater substitution.

Sacramento River Flow Measures will occur in Dry, Below Normal, and Above Normal years based on the Sacramento Valley Water Year Hydrologic Classification for a total quantity of up to 100 TAF from the SRSC. Pursuant to the Draft Strategic Plan, the default deployment of these Flow Measures will be during April and May, assuming the deployment will not compromise temperature management on the upper Sacramento River. Flow Measure deployment and operations will be coordinated with USBR. Water will be made available through fallowing and groundwater substitution. The SRSC expect all fallowed lands and groundwater wells will be identified and enrolled prior to the commencement of the Healthy Rivers and Landscapes Program, as well as the completion of the appropriate environmental documentation.

3 Flow Measure Accounting

For the Sacramento River Flow Measures, the governance entities (Sacramento River Governance and Systemwide Governance Committee) and SRSC, as a member, will coordinate with USBR for the release of flow from Keswick Dam during the spring months starting as early as March. Coordination will be needed to assess real-time data such as near-term/long-term hydrological forecasts, storage conditions and releases, water year classification, fish surveys/conditions, SRSC's Reference diversions, and regulatory/operational limitations to forecast the required Reference Keswick release.

3.1 Reference Flow

Reference Keswick releases are the flows resulting from meeting either minimum flow requirements, water supply including Delta requirements, or storage management for flood control, in absence of the Flow Measure. Reference Keswick releases include the resulting flows from meeting the following:

1. Minimum flows below Keswick Dam including those for temperature management,
2. Sacramento River diversions including those by the SRSC and other CVP contractors,
3. Operational target flows for the Sacramento River at Wilkins Slough,
4. Flows needed to meet the SWRCB's D1641 Bay-Delta water quality and outflow requirements, Delta exports, and Biological Opinions.
5. Flood risk reduction requirements (USACE's Water Control Manual) and other commitments.

CVP Operations prepares a forecast of monthly Reference Keswick releases for the upcoming 12-month period and this forecast will be the starting point for defining the Reference Keswick release. The Reference Condition will be defined by CVP operators and discussed at Flow Operations Team (FOT) meetings. The FOT will begin meeting each year in January to discuss hydrology and water operations forecasts and will meet as needed until decisions are made to deploy Flow Measures. The FOT will begin weekly meetings approximately one week prior to deployment of any HRL Flow Measure and will continue weekly meetings until all Flow Measures are deployed for the year. Weekly meetings of the FOT will provide opportunities to discuss Flow Measure deployments and accounting for the prior week and update Reference Conditions for the coming week to ensure that the water made available under the HRL is above what would have been available absent the HRL. The State Water Board and CDFW staff will participate in weekly FOT meetings. During periods when Reference Keswick releases are changing or forecast to change during the coming week, e.g. as diversions increase and tributary flows decrease or during storage management operations for flood control, short-term forecasts and the SRSC Web Portal may be used to forecast daily Reference Keswick releases. The SRSC Web Portal includes data on observed releases, flows, diversions, and forecasts of daily Sacramento River operations.

3.2 Measuring Sacramento River Flow Measure Deployment above Reference Flow

<u>SRSC Flow Measure Deployment in Spring Measured as Shasta Reservoir/Sacramento River Release:</u>

As described in the Sacramento Mainstem Implementation Agreement, Healthy Rivers and Landscapes Program (Program) governance entities (Sacramento River Governance and Systemwide Governance Committee) will decide on a recommended Spring Action based on the framework in the Strategic Plan. An evaluation of Shasta Cold Water Pool will be completed to ensure any spring action does not impact winter-run salmon cold water temperature requirements that align with the applicable Biological Opinions and SWRCB water right requirements.

Weekly Flow Measure deployment coordination with USBR biologists, and Sacramento River Governance will start at least one month in advance of deployment and no later than February 1. These weekly coordination meetings are intended to allow for real-time data assessment including, but not limited to, updates on the monthly WY classification, current storage and releases, fish survey data, downstream demands, and any operational limitations.

Prior to February 1st, meetings will occur monthly, or as needed, to review fall/winter operations, ensure assets are in place for the coming year, and evaluate potential actions. Similar meetings will be occurring for the implementation of the Biological Opinions.

There are three options for Sacramento Flow Measure deployment in coordination with USBR operations. USBR will track the Flow Measures, Reference flows, and will coordinate with DWR to track Flow Measures to and through the Delta, in coordination with the Flow Operations Team. The Strategic Plan includes the default plan and flexibility brackets for each deployment. The following table describes key components for each option.

Table 1. Key Flow Accounting Components for Sacramento River HRL Flow Deployment Options

Deployment Option	Measurement Location	Reference Flow	Sacramento Flow Measure
Spring Pulse Release	Keswick	Weekly CVO forecast of Keswick release without Flow Measure	$Keswick_{actual} > Keswick_{reference}$ During pulse period
Summer, Fall, or Irrigation Pattern Release	Keswick	Seasonal CVO Keswick Release forecast updated weekly without Flow Measure	$Keswick_{actual} > Keswick_{reference}$ During specified period
Carryover for Cold-Water	SRSC Diversions	Scheduled SRSC diversions plus additional diversions that would occur absent fallowing and groundwater substitution	$SRSC\ Diversions_{actual} < SRSC\ Diversions_{reference}$ April to October

The flow gauge to be used for Sacramento Flow Measure accounting is Keswick Reservoir outflow, California Data Exchange Center station KES. An alternative flow gauge is the USGS 11370500, Sacramento River at Keswick located approximately a half mile downstream from Keswick Dam. The following sections provide additional descriptions of the process and accounting for each deployment option.

<u>Spring Pulse Release – Default Plan:</u>

1. Pursuant to the Draft Strategic Plan, pulse flows released from Keswick Dam will be targeted for the April-May timeframe to achieve specific flow targets at specific locations to provide a short-duration pulse (4-7 days).
2. Prior to any pulse flow, the Reference Keswick release for the pulse period will be identified by USBR. The Reference Keswick release will be determined weekly and discussed with the FOT.
3. USBR will make an additional release from Keswick Dam with associated ramping rates to go above and return to the Reference Keswick release.
4. The Flow Measure will be calculated as the difference between the actual Keswick Release and the Reference Keswick release for the pulse and associated ramping period.
5. The SRSC will schedule and maintain their diversion rates during the pulse period to ensure the pulse flow moves down the Sacramento River.
6. The SRSC will schedule and maintain diversion rates during the irrigation season and those diversions will be reduced by the fallowing and groundwater actions. Reduced SRSC diversions will result in reductions to actual Keswick releases during the irrigation season and a recovery of storage in Shasta Lake. USBR and SRSC will perform the real water verification described in Section 3.1.3.

The following figure is an example of a Spring Pulse Release deployment with a Reference Keswick release and Actual Keswick release less than the Reference Keswick release throughout the remainder of the irrigation season.

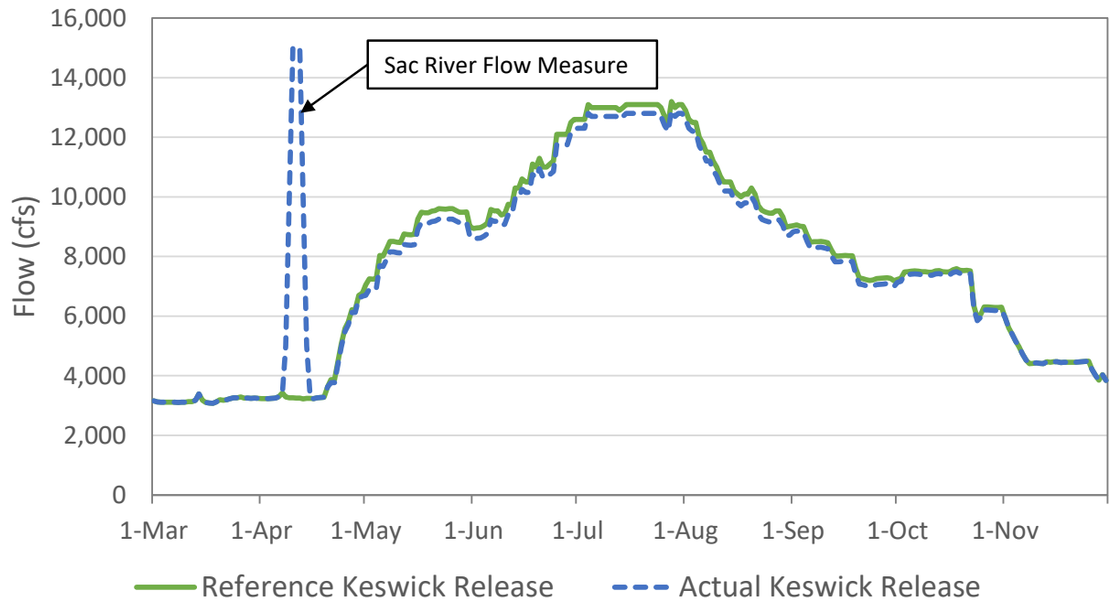


Figure 1. Example Refence and Actual Keswick Release for Spring Pulse Deployment Option

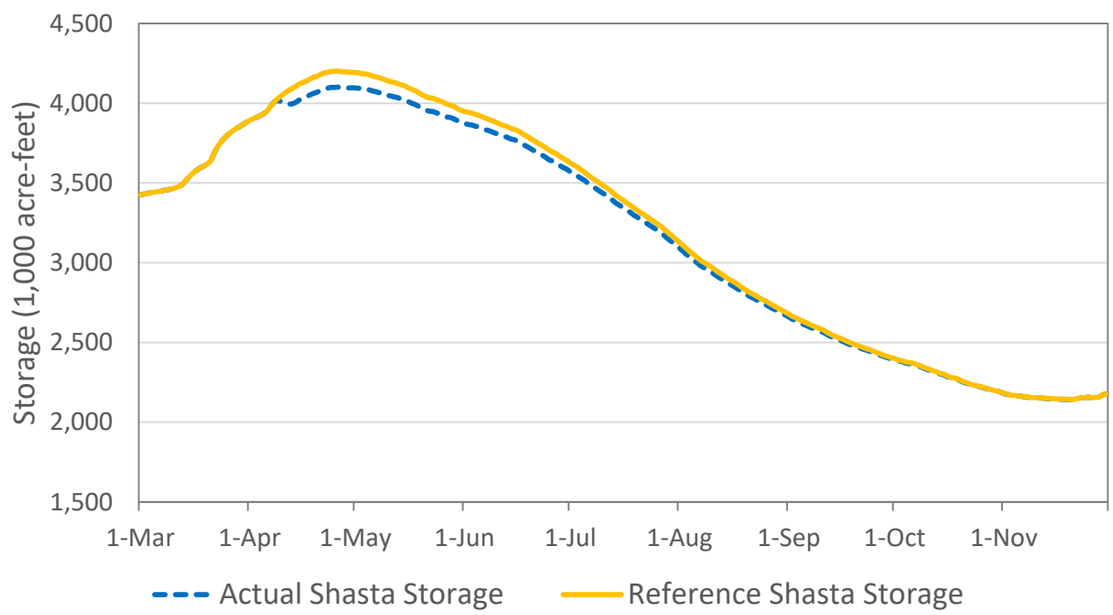


Figure 2. Example Reference and Actual Shasta Storage with Spring Pulse Release

There may be years when a Spring Pulse release occurs prior to or during storage management operations for flood control purposes. The Spring Pulse release may assist in storage management but is not additional water to the system if releases after the Spring Pulse are reduced and the reservoir fills to capacity by the end of the flood management season. During these years, the FOT will continue to meet after the Spring Pulse to discuss the post-pulse Reference releases and storage conditions to ensure the Spring Pulse release is additional water to the system during that year's flood management season. Flow measures occurring prior to flood control operations will be demonstrated as additive through a reduction in peak storage that reflects the remaining volume of recovery water from reduced local diversions.

<u>Summer, Fall, or Irrigation Pattern Release – within the Flexibility Bracket:</u>

The Summer, Fall, or Irrigation Pattern Release accounting will be dependent on the timing and duration of the release. Accounting will be simpler for shorter duration releases during periods of stable CVP operations, but the accounting process will be the same as for a Spring Pulse release. USBR will identify the weekly Reference Keswick release and discuss with the FOT. The Reference Keswick release will be closer in magnitude to the actual Keswick release for longer duration deployments. Reference SRSC diversions calculated as described below for the Carryover option will inform development of the Reference Keswick release schedule. USBR will make an additional release from Keswick Dam to go above the Reference Keswick release. The Flow Measure will be calculated as the difference between

the actual Keswick Release and the Reference Keswick release for the period of flow asset deployment. The SRSC will schedule and maintain their diversion rates during the deployment period to ensure the Flow Measure moves down the Sacramento River. The approvals needed for this action are described in the Strategic Plan, Section 2.3.

The following figure is an example of the Reference Keswick release and the actual Keswick release for an irrigation season deployment.

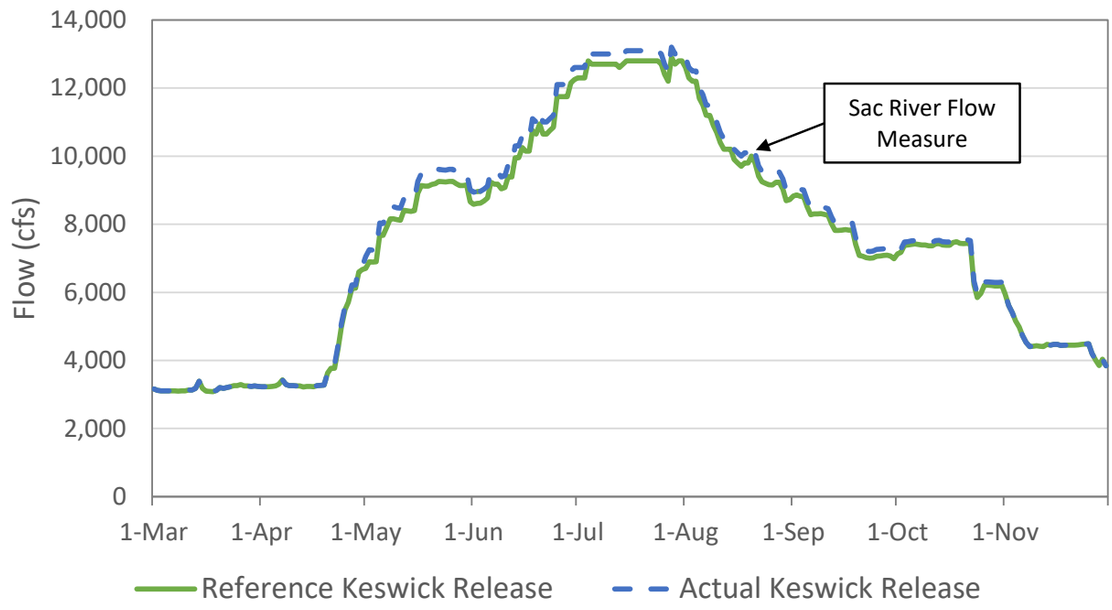


Figure 3. Example Refence and Actual Keswick Release for Irrigation Season Deployment Option

Carryover for Cold-Water:

1. SRSC will coordinate with USBR, NMFS, CDFW, and SWRCB to determine if the best use of the Sacramento Flow Measure is to maintain storage in Shasta Lake for cold water management and to increase carryover storage for future years. The Carryover deployment option will be considered when the 90 percent exceedance, March CVO forecast for Shasta Lake end of September storage is less than 2,100 TAF.
2. The approvals needed for this action are described in the Strategic Plan, Section 2.3.
3. Under the Carryover option, the actual Keswick release is expected to be less than the Reference release throughout the April through October period. Keswick release will be less by approximately the reduction in SRSC diversions due to fallowing and groundwater substitution actions.
4. The SRSC will schedule diversions during the irrigation season and those diversions will be reduced by the fallowing and groundwater substitution actions. The SRSC Reference diversion will be calculated as the scheduled diversion plus an additional diversion that would have occurred absent the fallowing and groundwater substitution. A diversion of 6 acre-feet per acre will be used to calculate the total volume of additional diversion by multiplying by the fallow and groundwater substitution acres. The additional diversion is assumed to occur on the same pattern as the actual, scheduled SRSC diversions.
5. The Flow Measure asset held in Shasta Lake will be calculated by multiplying the ETAW and decomposition credit (4.3 acre-feet per acre) by the fallowed acres and groundwater substitution pumping.
6. Sacramento Flow Measure assets carried over in storage in Shasta Lake will be subject to spill in the winter. Flow Measure assets not spilled will be available to be deployed on one of the other release patterns in the following year, in addition to any Flow Measure provided in the following year.

The following figure is an example of a Carryover deployment with a Reference Keswick release that exceeds the Actual Keswick release throughout the April through October period.

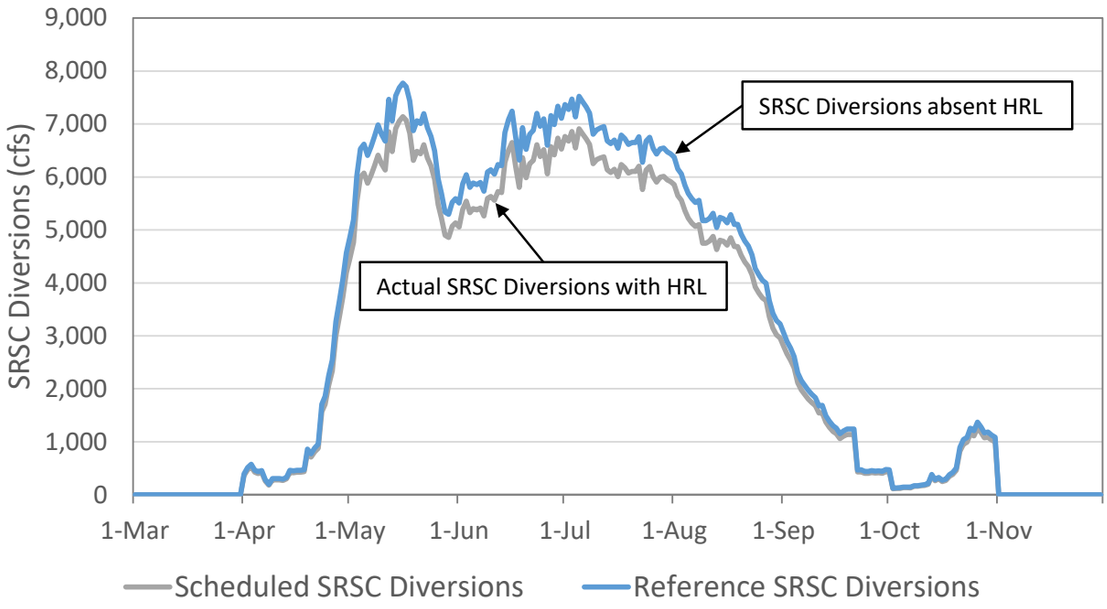


Figure 4. Example Scheduled and Reference SRSC Diversions for the Carryover Option

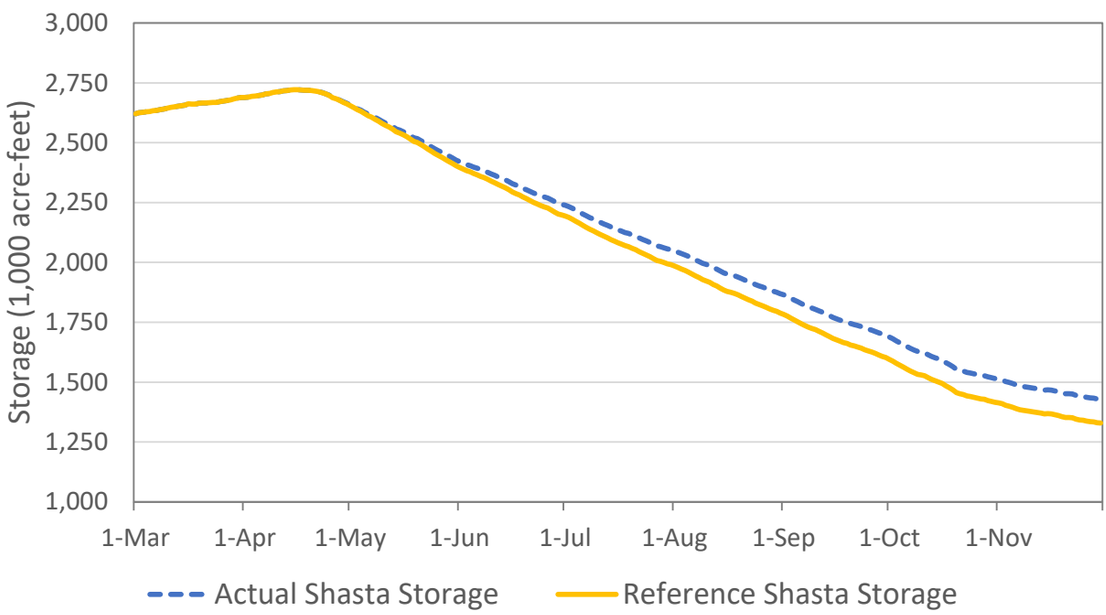


Figure 5. Example Reference and Actual Shasta Storage with Carryover for Cold-Water

Sacramento Flow Measures will be protected for Delta outflow in accordance with the Delta accounting methodologies for all deployment options.

3.3 Sacramento River HRL Real Water Verification

In general, all real water verification procedures will follow established and agreed upon methods prepared by DWR and USBR in coordination with SWRCB.

SRSC HRL Flow Contribution Measured using Cropland Fallowing:

1. Up to 100 TAF of HRL flows may be pre-released from Shasta Reservoir during spring months and then made up through reduced releases and diversions during the spring-fall irrigation and rice straw decomposition season.
2. The SRSC HRL flow contribution is presumed to be based on fallowed rice lands or other annual crops.
3. SRSC will identify parcels to be fallowed by March 1st. The SRSC will establish a long-term agreement for the fallowed parcels for the duration of the program upon adoption of the HRL Alternative by the SWRCB and completion of the environmental document.

4. The following steps are needed to verify the SRSC HRL contribution from fallowed lands each year.
    a. Reference cropland planting (without HRL) conditions – estimate crop acreages without HRL flow based on prior year crop acreage.
    b. Determine the fallowed acres by crop and calculate water made available as fallowed acres multiplied by the crop ETAW. It is assumed the majority of fallowed acres will be rice lands. For the purpose of HRL, the agreed upon ETAW for rice is 3.3 acre-feet per acre plus 1 acre-foot per acre credit for rice straw decomposition.
    c. Reporting – during the irrigation season, SRSC will report the fallowing activities to USBR including current year crop acreage.
    d. Monitoring and verification – SRSC and USBR will agree on the monitoring program; SRSC will provide crop maps and access to fields; SRSC, member agencies, and USBR will conduct the field monitoring activities.
5. To minimize the socioeconomic effects on local areas, the eligible fallowed cropland acreage is limited to no more than 20% of land within the SRSC.
6. Other environmental considerations need to be assessed for the fallowed lands and irrigation/drainage ditches in the SRSC to provide forage and habitat for terrestrial wildlife and waterfowl, including the giant garter snake listed as a threatened species under ESA/CESA.

<u>SRSC HRL Flow Contribution Measured using Groundwater Substitution:</u>

1. SRSC HRL contributions from groundwater substitution can be used to supplement up to 20 TAF (20%) of the SRSC contribution from the Sacramento River.
2. To account for the HRL water made available through groundwater substitution, SRSCs will identify and coordinate with USBR on the following:
    a. The amount of increased pumping to provide HRL flow.
    b. Location and characteristics of the groundwater wells used.
    c. Historical groundwater pumping records for identified wells to establish a reference groundwater pumping volume that would occur absent the HR.
    d. A monitoring plan to assess the effects of groundwater pumping for the HRL.
    e. Mutually agreed value for the streamflow depletion factor between the SRSC, USBR, and DWR for HRL.
3. Consistency with the applicable Groundwater Sustainability Plans (GSPs) under the Sustainable Groundwater Management Act (SGMA) is crucial for the groundwater basin or nearby subbasins and the SRSCs will work with their local Groundwater Sustainability Agencies on HRL implementation.

Feather Draft Quantitative Flow Accounting Procedures

Last Updated: October 2, 2024

Drafted by: DWR

1 Definitions

Oroville Complex – The facilities include Oroville Dam, Hyatt Powerplant, Thermalito Diversion Dam, Power Canal, Forebay, Powerplant, and Afterbay. The total releases to the Feather River downstream of Oroville Complex are provisionally displayed on California Data Exchange Center website (https://cdec.water.ca.gov/dynamicapp/QueryF?s=oro) and labeled as RIV REL. It is the aggregated released flows from the Fish Barrier Dam, Fish Hatchery, and Thermalito Afterbay River Outlet.

2 Flow Measures

For Healthy Rivers and Landscapes Flow Measures (Flow Measures) sourced from the Feather River system, below are the preliminary quantitative procedures for (1) measuring Flow Measure deployment; and (2) confirming Flow Measures were made available or verified based on Feather River Service Area (FRSA) and upstream contributions through fallowing, groundwater substitution, and reservoir re-operation, consistent with the 2019 Draft Technical Information for Preparing for Water Transfer Proposal (Water Transfer White Paper) framework.

Feather Flow Measures will occur in Dry, Below Normal, and Above Normal years for a total quantity of up to 60 TAF per year, anticipated to be approximately 50 TAF from FRSA and up to 10 TAF from upstream of Lake Oroville made available by reservoir re-operation (e.g., South Feather Water and Power Agency or South Feather). Up to approximately 20% of the 60 TAF may be derived from groundwater substitution, consistent with applicable legal requirements. The proposed deployment of Feather Flow Measures will be provided during March through May from the Oroville Complex with the FRSA/South Feather supporting contribution made available through fallowing, groundwater substitution, and reservoir re-operation, and verified throughout the remainder of the water year (WY).

3 Flow Measure Accounting

For Flow Measures associated with fallowing, groundwater substitution, and upstream reservoir re-operation, DWR will release the flow from Oroville Complex during the spring months starting as early as March. Coordination is needed to assess real-time data such as near-term/long-term hydrological forecasts, storage conditions and releases, water year classification, fish surveys/conditions, and regulatory/operational limitations to determine the required reference release and then add the proposed Flow Measures above the necessary releases to meet the SWP's obligation.

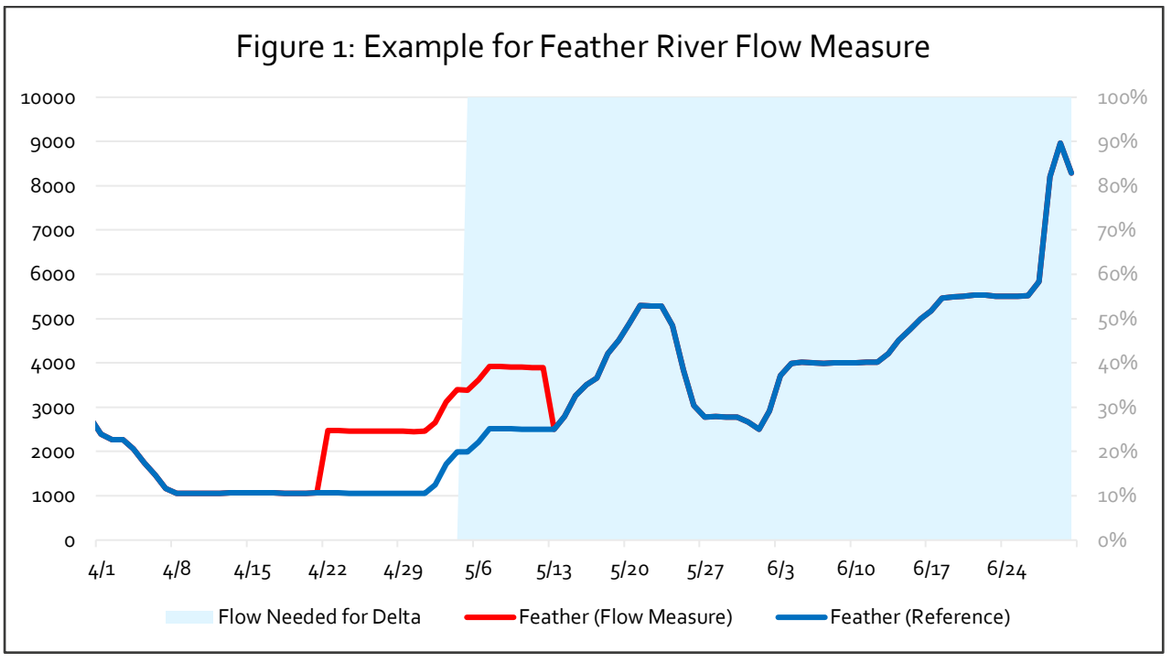
To compensate for DWR's Oroville Complex releases for deploying the Flow Measures, DWR will verify FRSA fallowing and groundwater substitution actions supporting the deployment during the irrigation period following the framework outlined in the Water Transfer White Paper.

The timing of the Flow Measure contributions from upstream reservoirs associated with reservoir re-operation will typically occur the following summer and early fall months after the Flow Measure deployment to the Feather River is made from Oroville. In such cases, DWR will release the volume associated with re-operation from the Oroville Complex during the spring months starting as early as March. To compensate for DWR's releases associated with such flows, DWR will verify the upstream reservoir re-operation consistent with the Water Transfer White Paper. Decisions for reservoir re-operation to release the Flow Measure contribution flow from Ponderosa Dam into Lake Oroville are primarily dependent on the South Feather's reservoir operational criteria. Flows required by other agreements such as the Water Storage Investment Program are not intended to count towards the Feather River Flow Measures.

3.1 Reference Flow

Reference flows are the flows resulting from meeting requirements of either flood control or water supply including Delta requirements absent the Feather Flow Measure. Any changes in the flow are in accordance with the United States Army Corps of Engineers (USACE) Water Control Manual and the 1983 Department of Fish and Wildlife (DFW) Agreement. Reference flow includes the following:

6. Flows needed to meet the SWRCB's D1641 Bay-Delta water quality and outflow requirements, Delta exports, Biological Opinions, and Incidental Take Permits.
7. Flows needed to meet DFW's Feather River instream requirements.
8. Flood risk reduction requirements (USACE's Water Control Manual) and other commitments.



3.2 Measuring Feather Flow Measure Deployment above Reference Flow

<u>Flow Measure Deployment in Spring Measured as Oroville Release:</u>

1. Weekly Flow Measure deployment coordination with DWR biologists, water transfer team, and Feather River Tributary Governance will start in advance of deployment and no later than January 15. These weekly coordination meetings are intended to allow for real-time data assessment including, but not limited to, updates on the monthly WY classification, current storage and releases, fish survey data, downstream demands, and any operational limitations. At the same time, DWR will meet with CDFW regarding planned flow deployment to ensure compliance with the Incidental Take Permit for Long-term State Water Project Operations in the Delta and Suisun Marsh.
2. DWR will deploy the Flow Measure, including flows associated with upstream reservoir re-operation, through an increase in the release of water from Oroville Complex during the spring months starting as early as March which is typically prior to the complete verification of the Flow Measure. The repayment of the deployment will follow the water transfer framework described in the Water Transfer White Paper. During the drier months, the Flow Measure could be temporarily stored in Lake Oroville prior to its deployment.
3. The Flow Measure will be deployed above the reference flows and will be demonstrated as an increase to the total Feather River releases from the Oroville Complex. DWR will track the total releases that includes the Feather River reference flow and Flow Measure flow and will coordinate with DWR/USBR's Delta tracking of the Flow Measure deployments.
    a. Demonstrate Flow Measure deployments.
        i. Prior to any Flow Measure deployment, an identification of the reference flow will be performed.

ii. An additional release increase will demonstrate Flow Measure deployment and will include associated ramping rates above the reference flow.

b. Demonstrate Flow Measure deployment flows in accordance with the Delta Accounting Procedures.

c. Flow measures occurring prior to flood control operations, will be demonstrated as additive through a reduction in peak storage that reflects the remaining volume of recovery water from reduced local diversions.

3.3 Feather Flow Measure Real Water Verification

In general, all real water verification procedures follow the water transfer framework described in the Water Transfer White Paper which were prepared by DWR and USBR in coordination with the State Water Board.

Flow Measures using Cropland Fallowing:

1. The Feather Flow Measure from the FRSA is presumed to be based on fallowed rice fields.
2. To account for the water made available through cropland fallowing, FRSA contractors must provide the following by March 1st:
    a. Identify the parcels to be fallowed.
    b. A mutually agreeable methodology for reimbursement, in the event of any volume shortage determined after the final verification.
3. The following steps are needed to verify that the Feather Flow Measure was made available from FRSA fallowed rice fields during the typical irrigation season:
    a. Cropland with planting (without Flow Measure) conditions – estimate crop acreages without Flow Measure.
    b. Verify available water – based on the acreage to volume relationship as mutually agreed.
    c. Reporting – during the typical irrigation period, FRSA contractor(s) must report the fallowing activities to DWR.
4. Monitoring and verification – FRSA contractor(s) and DWR agree on the monitoring program; FRSA will provide crop maps and access to fields, and DWR will conduct the field monitoring activities. To minimize the socioeconomic effects on local areas, the eligible fallowed cropland acreage is limited to 20% of recent harvested crop acreage by FRSA contractors.
5. Other environmental considerations need to be assessed for the rice fields and irrigation/drainage ditches in FRSA to provide forage and habitat for terrestrial wildlife and waterfowls, including the giant garter snake listed as a threatened species under ESA/CESA.

Flow Measures using Groundwater Substitution:

1. To account for the Flow Measure made available through groundwater substitution, FRSA contractor(s) must provide the following by March 1st:
    a. The proposed amount of increased groundwater pumping to provide Flow Measure for spring deployment.
    b. A mutually agreeable value for the streamflow depletion factor.
    c. A mutually agreeable methodology for reimbursement, in the event of any volume shortage determined after the final verification.
2. Consistency with the applicable Groundwater Sustainability Plans (GSPs) under the Sustainable Groundwater Management Act (SGMA) is crucial for the groundwater basin or nearby subbasins.
3. Other components needed to verify Flow Measure contribution:
    a. Documentation of surface water rights to the quantity the amount of surface water diversion forgone by additional groundwater pumping.

b. Location and characteristics of the groundwater wells used.
c. Historic groundwater pumping records to establish an appropriate baseline groundwater pumping volumes that would occur absent the Flow Measure.
d. During the typical irrigation period, FRSA contractor(s) must report the flow meter measurements to DWR.
e. A monitoring plan designed to assess the Flow Measure effects.
f. A mitigation plan designed to alleviate possible injury to other legal users of water.

Flow Measures using Reservoir Re-Operation:

1. Flow Measures associated with upstream reservoir re-operation will be made available at upstream reservoirs when that reservoir releases water in excess of what would be released annually under normal operations. The Flow Measure must be released at a time when the flow can be re-released through Oroville Complex for downstream benefits.
2. To account for the water made available through reservoir re-operation, upstream reservoirs operators must provide the following by March 1st:
    a. An upstream reservoir operations baseline includes normal operating conditions, normal end-of-season storage, and typical release patterns.
    b. Factors such as annual hydrology, agency demand, and instream requirements are needed to develop a variety of hydrologic baseline conditions.
    c. Information needs to be provided to ensure the quantity of Flow Measure water as the additional storage is released.
    d. Other information includes but not limited to recent years' reservoir operating data, historic and forecast inflows and water demands, instream requirements, and flood control diagram.
3. Reservoir release, storage data, and gauge records downstream of reservoir will be required during the deployment period to verify the Flow Measure.
4. Refill criteria are required to ensure that the refill of vacated space from a Flow Measure does not injure other legal users of water. The refill can take place during conditions in agreement with DWR and USBR. Typically, refill occurs during periods when any downstream reservoir has filled or reached flood control operations and when Delta is in excess condition. The refill period can span several years if the hydrology in subsequent years is insufficient to allow refill.

Yuba Draft Quantitative Flow Accounting Procedures

Date Drafted: 12/20/2023

Revised 02/12/2024, 07/23/24

Drafted by: S. Grinnell

1 Definitions

“Accord Accounting” means the flow accounting defined in Exhibit 1 “Accounting Principles” of the WPA.

“**HRL**” means the Healthy Rivers and Landscapes Program

"HRL Reference Flows” mean (1) the Yuba River flow at the Marysville Gage that would have been present without any YWA HRL Component B operations; or (2) “Baseline Flow” in the Accord Accounting for use when determining YWA’s HRL Component A deployment.

“Released Transfer Water” means the average daily flows measured at the Marysville Gage that are greater than the Accord Baseline Flows. “Released Transfer Water” is further described in Section **Error! Reference source not found.** of the Accord Accounting along with a description of Accord Baseline Flows

“Refill” is a condition of reduced releases from New Bullards Bar Reservoir as a result of the release of YWA HRL Component A or B flows as compared with the releases that would occur with YWA operations for HRL Reference Flows. These reduced releases typically result from diversions to New Bullards Bar Reservoir storage to fill space evacuated as a result of HRL releases.

“**SVI**” means the Sacramento Valley Index as Published by DWR in Bulletin 120

“**VA Component A**” means the Released Transfer Water that occurs during April, May and June and is not accounted as Delivered Transfer Water nor accounted as backed into Project storage as defined in the Accord Accounting

“**VA Component B**” means water that is made available under the YWA Implementation Agreement through releases of stored water from New Bullards Bar Reservoir to achieve an end of September Storage of 600,000 AF and which are not releases to comply with the Accord required instream flows other water right terms, FERC license requirements and USACE required releases.

“WPA” means the WA-DWR Yuba Accord Water Purchase Agreement, as amended.

“YRDP” means the Yuba River Development Project.

“**Yuba Accord**” means the Lower Yuba River Accord consisting of the WPA, a Fishery Agreement as implemented by SWRCB Water Right Order 2008-0025, and Conjunctive Use Agreements between YWA and its Member Units.

2 Flow Measures

The YWA HRL Implementation Agreement includes two quantifiable water components:

- VA Component A, Accord Released Transfer Water occurring in April, May and June that cannot be backed into SWP or CVP storage upstream from the Delta or exported by DWR; and
- VA Component B, storage releases from New Bullards Bar Reservoir that occur by operating to a new target storage level for September 30th of 600,000 AF, 50,000 AF below the Accord target storage of 650,000 AF and which are not releases to comply with the Accord required instream flows, other water right terms and FERC license requirements.

Both HRL Components are to be provided in SVI Above Normal, Below Normal and Dry water year types and will be accounted for three flow conditions based on mean daily flow at USGS Gage 11421000, Yuba River near Marysville:

- Accord Baseline flows (the baseline used for Accord transfer releases and described in the Accord Accounting
- VA Reference Flows (the flows that occur with operation to the Yuba Accord required flows that are the Reference flow for HRL storage releases
- Recorded flows at the gage that includes the HRL storage releases.

3 Flow Measure Accounting

3.1 Reference Flows

VA operations are intended to be supplemental to the Yuba Accord flows and YRDP operations. The YWA Reference Flow includes two sets of flows for comparison to HRL deployment flows. The reason for two sets of Reference flows is to account for the two types (Components A and B) of YWA HRL Program flows.

YWA HRL Program Component A flows are accounted against the HRL Reference Flow ("Baseline" in Accord Accounting terms) for the Yuba Accord, which include the following and are more fully described In Exhibit 1 to the WPA–

- RD-1644 Interim required flows (Water Right Order 2003-0016);
- Target storage in New Bullards Bar Reservoir for 9/30 of no more than 705 TAF;
- FERC license-required flows and operational terms for Project 2246
- New Bullards Bar Reservoir Water Control Manual;
- Water Service Agreements to the eight Member Units, and
- Forecasted uncontrolled flows from the Middle and South Yuba Rivers

YWA HRL Program Component B flows are accounted against the HRL Reference Flows that would occur absent a YWA HRL deployment, which include –

- Yuba Accord Required Flows (SWRCB Water Right Order 2008-0025);
- Target storage in New Bullards Bar Reservoir for 9/30 of 650TAF;
- FERC license required flows and operational terms for Project 2246;
- New Bullards Bar Reservoir Water Control Manual;
- Water Service Agreements to the eight Member Units; and
- Forecasted uncontrolled flows from the Middle and South Yuba Rivers

3.2 Measuring YWA HRL Deployment above Reference Flow

VA Component A flows are Released Transfer Water under the Accord in April, May and June that cannot be backed into north-of-Delta CVP or SWP storage or exported from the Delta. HRL Component B flows are deployed by releasing water from New Bullards Bar Reservoir that would otherwise remain in storage at the end of September between 650,000 AF and 600,000 AF (elevation 1,881.45 ft msl and elevation 1,867.63 ft msl), resulting in an end of September storage to achieve a total of 50,000 AF to contribute to Delta outflow. The YWA HRL proposal includes accounting for refill of storage releases for both the YWA Components A and B that are compensated volumes and are determined to have impacted CVP and SWP water supplies. However, refilling of YWA HRL Component A evacuated storage will be tracked and calculated in the Yuba Accord accounting while YWA HRL Component B refill will be tracked using a separate refill accounting specific to the Component B releases. Refill impacts will be repaid with future YRDP storage releases.

Accord Released Transfer Water flows dedicated to Delta outflow (YWA HRL Flow Component A Water) accounting principles are already documented in the Yuba Accord Exhibit 1 Accounting Principles except for specific terms listed below to provide for the differences between the YWA HRL Program flows and the Accord transfer program. The Yuba Accord transfer program accounting is meant to ensure that only water that is released and exported for delivery to a participating water user is accounted, while HRL program accounting is intended to determine volumes of water exiting the Yuba River that will result in Delta outflow (with the cooperation of the CDWR and the USBR). The specific terms applicable to YWA HRL Component A flows compared to Yuba Accord Delivered Transfer Water are,

- YWA HRL Component A flows will meet the requirements of Accord Released Transfer Water
- YWA HRL Component A flows are Released Transfer Water that occur only in April, May and June
- YWA HRL Component A flows can be accounted for in Balanced Conditions, Excess Conditions or under Excess with Restrictions

- YWA Component A flows are accounted for on the day the flow occurs and do not include any backing of this water into north-of-Delta CVP or SWP storage for later release

Scheduling of HRL Component B releases will be based on the information available at the time releases are scheduled and may need to be adjusted through the springtime for changing conditions. YWA will prepare forecasts of operations of the YRDP and resulting flows for release of HRL water. These forecasts will be compared to forecasts that are prepared for Yuba Accord operations (including Accord baseline operations) to determine the additional storage releases that are accounted for HRL purposes. Springtime Accord Released Transfer Water (as defined in the WPA accounting) will also be forecast as required in the WPA and will be accounted as HRL Component A through the Accord accounting.

YWA will prepare preliminary operations plans for release of HRL water in coordination with DWR, USBR and CDFW and as required for coordination with other HRL agreements. Prior to April 1, the earliest possible date for release of HRL Component B water, YWA will meet with CDFW, DWR and USBR to discuss and formulate the preliminary operations plan using information provided by DWR and USBR on Delta conditions and SWP and CVP forecasted operations. YWA may begin a release from New Bullards Bar Reservoir for HRL purposes as early as April 1 based on this planning. YWA will revise the plan as new forecast information is available but will finalize the plan in most years no later than May 15th.

3.3 Real Water Verification

As described above, HRL Component A releases to meet the requirements for Accord Released Transfer Water (as determined by DWR, with concurrence by USBR), have been affirmed by the SWRCB to be new water to the system that meets the requirements of Water Code section 1736 to not result in injury to legal users of water. HRL Component B will also meet the requirements of Released Transfer Water. Verification for both components will be done through submission to DWR and USBR of the previously used Accord Accounting spreadsheets and supporting documentation, augmented to include HRL flow tracking and accounting.

Released Transfer Water is detailed in the Accord Accounting, through the definition of a Baseline (VA Reference Flow is the term used herein), without transfer flow determination that employs two control points: (1) end-of-day New Bullards Bar Reservoir storage recorded by YWA and reported on the California Data Exchange Center (CDEC) website; and (2) Mean daily flows calculated (for HRL reference flow determination) and measured and reported at the USGS Gage 11421000 Yuba River near Marysville.

Two measurements are used to determine the Reference Flow condition (Baseline flows in Accord Accounting terms):

- The end-of-September New Bullards Bar Reservoir storage of 705 TAF, originally included as a term in the YWA-PG&E Power Purchase Contract that ran from 1966 to 2016, defines the storage condition for calculating the YWA HRL Component A deployment reference flow.
- The Mean Daily Flow at the USGS Gage 11421000 Yuba River near Marysville, with YWA operations to comply with SWRCB Decision 1644 Interim flow requirements. In some instances, the USGS Gage “Yuba River Below Englebright Dam Near Smartsville” #11418000 is also used for calculating Reference Flow conditions

Different measurements, at the same control points are used to determine the HRL Reference Flow for YWA HRL Component B deployment:

- An end-of-September New Bullards Bar Reservoir storage of 650TAF, as used for the Yuba Accord WPA, defines the storage condition for calculating the HRL Component B deployment reference flow. YWA HRL Component B deployment will be determined as the amount of storage evacuated, if, without the YWA HRL Component B deployment, end-of-September New Bullards Bar Reservoir storage would have been between 650TAF to 600TAF.
- The mean daily flow at USGS gage 11421000, Yuba River near Marysville, with YWA operations to comply with the Accord required instream flows, as implemented by SWRCB Order 2008-0025.

American Draft Quantitative Flow Accounting Procedures

Date Drafted: January 9, 2024

Updated: July 29, 2024

Drafted by: Michelle Banonis, Regional Water Authority

1 Definitions

Call Year: a year type in which outflow will be provided and "called for" after assessing operational conditions and constraints and conferral among the American River Parties, in coordination with Reclamation. Call years will occur in three out of eight AN or BN year and three out of eight D or C year types. Therefore, depending on resulting water year types over the eight-year term of the HR&LP, there could be six call years.

HR&LP Releases: The amount of water released by Reclamation out of Folsom Reservoir for the purpose of meeting the American River HR&LP flow commitments.

Replenishment: The amount of water made available by American River Parties made equal to the amount of HR&LP releases by Reclamation out of Folsom Reservoir.

Master Flow Ledger (MFL): A document that will be updated regularly to keep an accounting of HR&LP Releases and Replenishment and will serve as a ledger that will tally and summarize the total amount of HR&LP releases by Reclamation and replenishment provided by each American River Party during the current reporting period and the total over the term of the HR&LP. It is anticipated that the accounting will look similar to what has been reported in the past for water transfers. During flow deployment and replenishment, this information will be provided on a monthly basis.

Reference Flow and/or Reference Operation: The flow or operation that would normally occur without HR&LP flow measures.

2 Flow Measures

Folsom Reservoir Releases

Reclamation, which operates Folsom Reservoir, will operate the reservoir to provide the American River Parties' flow contributions to the Lower American River in March through May of a call year. This will include the quantities below for the identified water year types.

Upstream Reservoir Releases

American River Parties with reservoirs upstream of Folsom Reservoir will operate their reservoirs to collectively contribute 10 TAF per year to augment Lower American River (LAR) flows in Above Normal (AN) and Below Normal (BN) water years[1]. Calls for this water will be made in a total of three AN or BN water years during the eight-year term of the HR&LP, provided that recommendations from the American River Parties, in coordination with Reclamation, warrant a call year.

Groundwater Contributions

American River Parties with groundwater pumping capabilities will collectively contribute 30 TAF per year to augment LAR flows in Dry (D) and (Critical) C water years. Calls for this water will be made in a total of three C or D water years during the eight-year term of the HR&LP, provided that recommendations from the American River Parties, in coordination with Reclamation, warrant a call year.

Dry Year Water from Either or Both Upstream Reservoir Operation and Groundwater

Provided funding is made available, replenishment of an additional 10 TAF per year to augment LAR flows in D years may occur from upstream reservoir operation, groundwater, or both, in a total of 3 years.

These flow measures are also discussed in Section 2.6.1 of the Draft Strategic Plan.

[1] Based on the Sacramento River Index.

3 Flow Measure Accounting

3.1 Reference Flow

Lower American River

Reference flow releases in the Lower American River are the flows resulting from meeting either flood control or water supply including Delta requirements in absence of the American River Flow Measure, and are controlled by Reclamation through the operation of Folsom Reservoir. The reference Folsom releases include the resulting flows from meeting the following:

1. Flows needed to meet the SWRCB's D1641 Bay-Delta water quality and outflow requirements, Delta exports, and Biological Opinions.
2. Flood risk reduction requirements (USACE's Water Control Manual) and other commitments.
3. The March 29, 2021 Memorandum of Understanding between the United States of America Department of the Interior, Bureau of Reclamation and Sacramento Water Forum for Coordination of Communication and Information-Sharing Activities Related to Lower American River Operations (Water Forum-Reclamation MOU).
4. SWRCB's D893 Decision on Major Applications to Appropriate Water from American River System.

Upstream Reservoirs

Reservoirs upstream of Folsom Reservoir are managed by upstream water providers, and Reference Flow releases are made to meet many existing requirements including but not limited to:

1. Consumptive demands within their service territories.
2. Non-consumptive (hydropower) uses.
3. Terms and conditions of applicable water rights (i.e. points and seasons of diversion, places of use, etc.).
4. Federal Energy Regulatory Commission (FERC) licenses, including, as applicable, water quality certifications, minimum instream flow requirements, recreational flow or lake level requirements, etc.
5. California Department of Fish and Wildlife Streamflow Modification Agreements
6. Division of Safety of Dams requirements.
7. Applicable contractual or legally binding agreements

The reservoir operators regularly update their projected operational and spill releases primarily based on an ensemble of hydrologic projections. Those reservoir operators that provide hydropower generation must also consider energy market forecasts in their ensemble projections. Early in the water year the range of hydrologic and energy market projections vary widely. By the summertime, the hydrologic factors are well established, but energy markets will still fluctuate widely depending on a number of influencing factors such as heat waves, high energy demands, transmission outages, or supply constraints.

A key factor for determining Reference Flows is a carryover storage target that the modeling and constraints described above must consider. A volume and pattern of release is estimated for each scenario to achieve a certain carryover target. Those projections must be regularly updated to account for uncertainties and observed conditions. The HR&LP flow commitments are modeled in addition to the Reference Flows and generally result in a lower carryover storage than would have otherwise been targeted absent those added releases. The future daily anticipated Reference Flows and additional HR&LP Flows would be included in an accounting sheet and updated monthly with the observed values as well as the updated deterministic projections.

Groundwater

Groundwater suppliers in the American River region provide water through conjunctive use, meaning the aquifer is recharged and surface water diversions are used during times of plentiful water supply, and groundwater is pumped during dry times. Therefore, conditions that create a referenced baseline[2] consists of groundwater production in D and C years, along with used surface water entitlements. This program of conjunctive use is made consistent with permits and regulatory requirements, including:

[2] Groundwater use in combination with reduced surface diversions are not deemed "reference flow" for this purposes of this document. This is because there is variability of where groundwater is pumped and where surface water diversions are reduced and depending on whether an agency is upstream or downstream of Folsom Reservoir (discussed in 3.1.3).

1. Sustainable Groundwater Management Act.
2. State Water Resources Control Board – Department of Drinking Water permits, Public Water System Number 3410020, permit number 01-09-06-PER-003 and subsequent amendments.
3. Department of Toxic Substance & Control permits through California Environmental Protection Agency.
4. Total Coliform Rule.

3.2 HR&LP Flow Deployment above Reference Flow

Deployment, Folsom Reservoir Releases

In March through May, provided it is a call year, Reclamation will provide a spring pulse flow release of from Folsom Reservoir, based on the water year type identified, measured at Nimbus Dam, in addition to releases required to meet Central Valley Project obligations.

Deployment and Replenishment, Upstream Reservoir Releases

In March through September, operators upstream of Folsom Reservoir will replenish the flows made by Reclamation at Folsom Dam by making additional releases from reservoirs, beyond Reference Flow to meet existing instream flow obligations above Folsom Reservoir, consumptive demands and other requirements described above. Replenishment releases above Reference Flow would have otherwise remained in upstream storage and will be documented in the MFL as set forth below in section 3.1.3.

Deployment and Replenishment, Groundwater Contributions

Starting as early as March, American River Parties will pump groundwater to replenish the flows made by Reclamation and Replenishment will be complete within 12 months following the date that water is called for. The amount of additional groundwater pumped beyond baseline (explained further in 3.1.3) will provide an equivalent reduction in diversions, which will result in the same amount of outflow in the American River. In addition, there may be pumping beyond that identified for the HR&LP for water transfers, which would not be included in the baseline or accounting discussed here.

In Dry years, the additional 10TAF of deployment and replenishment will follow one or both of the processes outlined above.

3.3 Measurement and Real Water Verification

Deployment, Folsom Reservoir Releases

- All Reference and HR&LP Releases from Folsom Reservoir will be measured at the lowest point of control by Reclamation at Nimbus Dam.
- Prior to the HR&LP Flow Deployment from Folsom Reservoir, Reclamation will provide their anticipated operational releases (Operations Plan) for both the Reference and HR&LP Release scenarios. This operations plan will be an estimate of releases and is intended to be a best guess of future conditions. Actual releases will vary from the Operations Plan depending on hydrology, upstream operations, flood management, consumptive demands, and instream flow requirements.
- To verify the deployment of HR&LP flow measures on a monthly basis, Reclamation will provide accounting of Reference and HR&LP releases on a daily time step, specific to the American River Parties' contributions.
- This monthly accounting will include the Reference Flow prior to the commencement of, and at the conclusion of, the spring HR&LP Releases.
- Reclamation will confirm the flow releases and regularly provide it in writing to the American River Parties for inclusion in the MFL.
- Flow measures occurring prior to flood control operations will be demonstrated as additive through a reduction in peak storage that reflects the remaining volume of replenished water from local HR&LP flow actions.

Deployment and Replenishment, Upstream Reservoir Releases

- All Reference and HR&LP Releases from Upstream Reservoirs will be measured at existing gauge or meter locations at the lowest point of control by the Upstream Reservoir Operators. (We will provide these as needed. For example Placer County Water Agency releases and measures at Oxbow Powerhouse on the Middle Fork American River).

- Prior to the HR&LP Flow Deployment from Upstream Reservoirs, the operators will provide their anticipated operational releases (Operations Plan) for both the Reference and HR&LP Release scenarios. This Operations Plan will be an estimate of releases and is intended to be a best guess of future conditions. Actual releases will vary from the Operations Plan depending on hydrology, flood management, consumptive demands, energy demands, and instream flow requirements.
- To verify the deployment of HR&LP flow measures, the operators will provide accounting of Reference and HR&LP releases, specific to the American River Parties' contributions. This will be tallied in a spreadsheet such as is provided in Section 4.
- This monthly accounting will include the Reference Flow prior to the commencement of, and at the conclusion of, the spring HR&LP Releases.
- The Upstream Operators will confirm the flow releases and regularly provide it in writing to the American River Parties for inclusion in the MFL.
- Flow released from upstream reservoirs for Replenishment will appear in Folsom Reservoir as storage to replenish prior releases from Folsom Reservoir to meet the HR&LP Flow Deployment.
- At the conclusion of the Replenishment period, upstream operators, in coordination with the Reclamation, will confirm the Replenishment that was provided and put the final tally in the MFL.

Deployment and Replenishment, Groundwater Contributions

- Prior to foregoing surface water diversions and increasing groundwater pumping in a call year for Replenishment, American River Parties with groundwater pumping capabilities, in coordination with Reclamation, will determine baseline groundwater pumping for the participating agencies.
- Baseline groundwater pumping will be determined for each participating agency by averaging the most recent three years of groundwater pumping in non-groundwater substitution (transfer) years and non-curtailment years. Unless an outstanding issue makes this three-year average unreasonable, in which case the participating agency will propose an alternative to Reclamation and seek agreement. If a year is determined to be unrepresentative, American River Parties will request it be removed from the three-year average.
- Baseline determinations will not include groundwater well maintenance pumping actions.
- Credit for replenishment will be given for groundwater pumping that exceeds baseline groundwater pumping.
- Groundwater providers will show a regular accounting of pumping above their baseline and will provide this information in the MFL.
- Groundwater providers will use existing monitoring well loggers to measure and account for well production and will provide this information for inclusion in the MFL.
- Increasing groundwater pumping and foregoing surface water diversions below Folsom Reservoir will result in increased outflow from the Lower American River. In order for replenishment to be realized, Reclamation would reduce releases from Folsom Reservoir by an equivalent amount of foregone diversions.
- Increasing groundwater pumping and foregoing surface water diversions at or above Folsom Reservoir will result in increased storage in Folsom Reservoir. This would provide direct replenishment of flows to the reservoir, which would be accounted for by those groundwater providers and Reclamation.
- Total surface water entitlements will be compared with groundwater replenishment made available to determine foregone diversions.
- Groundwater replenishment through pumping is a direct reduction observed through surface water diversions. The accounting will indicate what actual diversions were and the pumping will be added to that total to show what diversions would have been in absence of the HR&LP contribution.
- At the conclusion of the Replenishment period, groundwater providers, in coordination with the ORG, will confirm the Replenishment that was provided for inclusion in the MFL.

4 Supplemental Information

Below is an example accounting tracker spreadsheet. This is the type of spreadsheet that would be used to report out on reservoir operations to make outflow available for the HR&LP[3]. The column headings provide the following information:

Upstream Reservoirs[4] Heading:
Upstream Reoperation: The quantification of upstream water providers' additional release of flows from upstream reservoirs to Folsom Reservoir to replenish flows released by Reclamation to meet HR&LP needs.

Cumulative Upstream Reoperation: The total amount of additional flow released by upstream water providers to Folsom Reservoir as of the specified date.

Upstream Reservoir Storage (Reference): The planned storage at the specified upstream reservoir absent releases made to replenish Folsom Reservoir for the HR&LP. This reference operation may be variable depending on water year type, local conditions, power demands, operational constraints, or other circumstances.

Upstream Reservoir Storage (HRLP): The storage at the specified upstream reservoir including evacuated storage made to replenish Folsom Reservoir for the HR&LP.

[3] This tracking spreadsheet should be highly coordinated with Reclamation's tracking spreadsheet.

[4] Upstream reservoirs for the American River that may make flows available to Folsom Reservoir for the HR&LP may include Hell Hole (PCWA), French Meadows (PCWA), Jenkinson (EID), Weber (EID), Stumpy Meadows (GDPUD), and Sugar Pine (FPUD). The specific reservoir names will be provided in the tracking spreadsheet but are not included here as this is intended to be an example only.

Upstream Reservoir Reoperation for the Healthy Rivers and Landscapes Program (EXAMPLE ACCOUNTING TRACKER)

Units in Acre-Feet

	Upstream Reservoirs			
Date	Upstream Reoperation	Cumulative Upstream Reoperation	Upstream Reservoir Storage (Reference)	Upstream Reservoir Storage (HRLP)
31-Mar	0	0	216,900	216,900
1-Apr	0	0	219,400	219,400
2-Apr	0	0	221,900	221,900
3-Apr	0	0	224,300	224,300
4-Apr	0	0	226,000	226,000
5-Apr	0	0	228,500	228,500
6-Apr	0	0	237,300	237,300
7-Apr	0	0	258,500	258,500
8-Apr	0	0	264,000	264,000
9-Apr	0	0	267,000	267,000
10-Apr	0	0	269,200	269,200
11-Apr	0	0	270,900	270,900
12-Apr	0	0	271,900	271,900
13-Apr	0	0	272,200	272,200
14-Apr	0	0	272,800	272,800
15-Apr	0	0	273,600	273,600
16-Apr	0	0	274,200	274,200
17-Apr	0	0	274,400	274,400
18-Apr	0	0	275,100	275,100
19-Apr	0	0	275,400	275,400
20-Apr	0	0	275,200	275,200
21-Apr	0	0	275,600	275,600
22-Apr	0	0	276,500	276,500
23-Apr	0	0	277,600	277,600
24-Apr	0	0	278,700	278,700
25-Apr	0	0	280,100	280,100
26-Apr	0	0	281,700	281,700
27-Apr	0	0	283,400	283,400
28-Apr	0	0	284,700	284,700
29-Apr	0	0	285,600	285,600
30-Apr	0	0	285,500	285,500
1-May	0	0	285,700	285,700
2-May	0	0	285,900	285,900
3-May	0	0	286,100	286,100
4-May	0	0	287,100	287,100
5-May	0	0	287,900	287,900
6-May	0	0	289,000	289,000
7-May	0	0	290,100	290,100
8-May	0	0	291,200	291,200
9-May	0	0	292,500	292,500
10-May	0	0	293,400	293,400
11-May	0	0	294,200	294,200
12-May	0	0	295,100	295,100
13-May	0	0	295,700	295,700
14-May	0	0	296,200	296,200
15-May	0	0	296,800	296,800
16-May	0	0	297,200	297,200
17-May	0	0	297,700	297,700
18-May	0	0	298,000	298,000
19-May	0	0	298,300	298,300
20-May	0	0	298,400	298,400
21-May	0	0	298,100	298,100
22-May	0	0	297,500	297,500
23-May	0	0	297,100	297,100
24-May	0	0	297,300	297,300
25-May	0	0	297,700	297,700
26-May	0	0	298,200	298,200
27-May	0	0	298,600	298,600
28-May	0	0	299,000	299,000

29-May	0	0	298,400	298,400
30-May	0	0	298,200	298,200
31-May	0	0	297,700	297,700
1-Jun	0	0	297,000	297,000
2-Jun	0	0	296,300	296,300
3-Jun	0	0	295,700	295,700
4-Jun	0	0	294,800	294,800
5-Jun	0	0	293,900	293,900
6-Jun	0	0	292,900	292,900
7-Jun	0	0	292,900	292,900
8-Jun	0	0	292,200	292,200
9-Jun	0	0	291,600	291,600
10-Jun	0	0	291,500	291,500
11-Jun	0	0	290,800	290,800
12-Jun	0	0	289,900	289,900
13-Jun	0	0	289,100	289,100
14-Jun	0	0	288,400	288,400
15-Jun	0	0	287,700	287,700
16-Jun	0	0	287,200	287,200
17-Jun	0	0	286,700	286,700
18-Jun	0	0	286,300	286,300
19-Jun	0	0	285,900	285,900
20-Jun	0	0	285,400	285,400
21-Jun	0	0	284,900	284,900
22-Jun	0	0	284,300	284,300
23-Jun	0	0	284,000	284,000
24-Jun	0	0	283,700	283,700
25-Jun	0	0	283,200	283,200
26-Jun	0	0	282,800	282,800
27-Jun	0	0	282,200	282,200
28-Jun	0	0	281,800	281,800
29-Jun	0	0	281,000	281,000
30-Jun	0	0	280,100	280,100
1-Jul	0	0	279,600	279,600
2-Jul	0	0	279,100	279,100
3-Jul	0	0	278,500	278,500
4-Jul	0	0	278,000	278,000
5-Jul	0	0	277,000	277,000
6-Jul	0	0	275,700	275,700
7-Jul	0	0	274,500	274,500
8-Jul	0	0	273,300	273,300
9-Jul	0	0	272,200	272,200
10-Jul	0	0	271,100	271,100
11-Jul	0	0	269,300	269,300
12-Jul	0	0	267,600	267,600
13-Jul	0	0	265,900	265,900
14-Jul	0	0	264,600	264,600
15-Jul	0	0	263,100	263,100
16-Jul	0	0	261,800	261,800
17-Jul	0	0	260,800	260,800
18-Jul	0	0	259,600	259,600
19-Jul	0	0	258,400	258,400
20-Jul	0	0	257,100	257,100
21-Jul	0	0	255,800	255,800
22-Jul	0	0	254,600	254,600
23-Jul	0	0	252,800	252,800
24-Jul	0	0	250,900	250,900
25-Jul	0	0	249,100	249,100
26-Jul	0	0	247,300	247,300
27-Jul	0	0	245,400	245,400
28-Jul	0	0	244,400	244,400
29-Jul	0	0	242,800	242,800
30-Jul	0	0	241,000	241,000
31-Jul	0	0	239,200	239,200
1-Aug	200	200	237,500	237,300
2-Aug	200	400	235,900	235,500
3-Aug	200	600	234,500	233,900

4-Aug	200	800	233,400	232,600
5-Aug	200	1,000	232,200	231,200
6-Aug	200	1,200	230,800	229,600
7-Aug	200	1,400	228,900	227,500
8-Aug	200	1,600	227,000	225,400
9-Aug	200	1,800	225,800	224,000
10-Aug	200	2,000	224,500	222,500
11-Aug	200	2,200	223,200	221,000
12-Aug	200	2,400	221,800	219,400
13-Aug	200	2,600	220,600	218,000
14-Aug	200	2,800	219,200	216,400
15-Aug	200	3,000	217,600	214,600
16-Aug	200	3,200	216,400	213,200
17-Aug	200	3,400	215,200	211,800
18-Aug	200	3,600	214,000	210,400
19-Aug	200	3,800	212,700	208,900
20-Aug	200	4,000	211,500	207,500
21-Aug	200	4,200	210,300	206,100
22-Aug	200	4,400	209,100	204,700
23-Aug	200	4,600	208,800	204,200
24-Aug	200	4,800	208,700	203,900
25-Aug	200	5,000	208,700	203,700
26-Aug	200	5,200	208,700	203,500
27-Aug	200	5,400	208,600	203,200
28-Aug	200	5,600	201,700	196,100
29-Aug	200	5,800	200,500	194,700
30-Aug	200	6,000	199,200	193,200
31-Aug	200	6,200	198,000	191,800
1-Sep	200	6,400	196,600	190,200
2-Sep	200	6,600	195,400	188,800
3-Sep	200	6,800	194,100	187,300
4-Sep	200	7,000	192,800	185,800
5-Sep	200	7,200	192,300	185,100
6-Sep	200	7,400	192,200	184,800
7-Sep	200	7,600	192,100	184,500
8-Sep	200	7,800	190,900	183,100
9-Sep	200	8,000	190,300	182,300
10-Sep	200	8,200	190,300	182,100
11-Sep	200	8,400	187,100	178,700
12-Sep	200	8,600	185,900	177,300
13-Sep	200	8,800	184,600	175,800
14-Sep	200	9,000	183,500	174,500
15-Sep	200	9,200	182,000	172,800
16-Sep	200	9,400	180,700	171,300
17-Sep	200	9,600	179,400	169,800
18-Sep	200	9,800	178,100	168,300
19-Sep	200	10,000	176,900	166,900
20-Sep	0	10,000	176,100	166,100

Mokelumne Draft Quantitative Flow Accounting Procedures

Date Updated: July 22, 2024

Drafted by: EBMUD

1 Definitions

EBMUD – East Bay Municipal Utility District, agency that operates Pardee and Camanche dams on the Mokelumne River.

Joint Settlement Agreement (JSA) – 1998 agreement between EBMUD, California Department of Fish and Wildlife, and U.S. Fish and Wildlife Service that set minimum flow requirements for the Mokelumne River. These flow requirements were incorporated into Revised Water Right Decision 1641 and thereby into the Mokelumne River water rights of EBMUD and Woodbridge Irrigation District (WID).

PCC – Mokelumne River Partnership Coordinating Committee. See Appendix 2 (Governance Procedures) for more detail.

SWGC – The Systemwide Governance Committee of the Healthy Rivers and Landscapes Program.

Other capitalized terms used in this Appendix are defined in Appendix 1.

2 Flow Measures

As described in Appendix 1, the Implementing Entities will provide the HRL Flow Contribution. The HRL Flow Contribution is defined in Section I.A.3 of Appendix 1. The HRL Flow Contribution is available in three Mokelumne HRL Year Types ("Dry", "Below Normal", and "Normal and Above"). The Mokelumne HRL Year Type index is defined in Appendix 1 in Section I.A.3(a) and Table 6. For purposes of implementing the HRL Flow Contribution, the PCC will be responsible for making the Mokelumne HRL Year Type determination in the manner set forth in Appendix 2, Section 3.

The Mokelumne River Implementation Agreement also includes a Delta Contribution, in the form of additional funding for the Water Purchase Program, as described in Section III.C of Appendix 1. More details on accounting for this component are included in Section 5 below.

3 Flow Measure Accounting

3.1 Existing Flow Requirements

The Mokelumne River HRL Flow Contribution will be additive to Existing Flow Requirements. "Existing Flow Requirements," which is defined in Section I.A.2 of Appendix 1, means the sum of the following: (1) the minimum regulatory flows specified by the JSA and D-1641 and Permit 10478, plus (2) any additional flows necessary to meet senior downstream water rights while simultaneously maintaining the minimum required regulatory flows.

3.1.1 Minimum Regulatory Flows Specified by the JSA and D-1641

In 1998, EBMUD entered into a long-term partnership with the CDFW and USFWS by signing the JSA for the Mokelumne River. Per the JSA, EBMUD must provide certain minimum regulatory flows specified in the JSA from Camanche Dam. The State Water Resources Control Board (SWRCB) amended EBMUD's Mokelumne River water rights to require it to provide specified flow requirements at Camanche Dam and made corresponding changes to the water rights of WID to ensure a specified portion of the Camanche Dam releases passed below Woodbridge Dam (Revised Water Rights Decision 1641, March 15, 2000 (D-1641), pp. 170-179.) The JSA and D-1641 flow requirements are incorporated into this Implementation Agreement without change; see Appendix 1, Tables 1, 2, 3, and 4 under the column heading of "Existing Flow Requirements (JSA / D-1641 Component)." The HRL flow accounting includes this water within the Existing Flow Requirements.

3.1.2 Additional Flows Necessary to Meet Downstream Water Rights (Diversions)

EBMUD needs to maintain the minimum regulatory flows described above and also simultaneously ensure sufficient flows are available to meet senior downstream water rights. To accomplish this, EBMUD releases additional flows from Camanche Dam for senior downstream diversions when and to the extent such additional releases are necessary to maintain the minimum regulatory flows at the compliance points designated in the JSA and D-1641. Water diverted by downstream riparian diverters and individual appropriators is not measured by EBMUD directly and is estimated based on historical

monthly average losses observed on the river. Figure 1 is a schematic representation of Mokelumne River diverters throughout the watershed. EBMUD estimates that there are more than 100 such diverters along the lower Mokelumne River between Camanche Dam and the confluence with the Consumnes River. The HRL flow accounting includes this water within the Existing Flow Requirements.

3.1.3 Buffer Water (Losses)

EBMUD also releases buffer water to assure that sufficient water reaches senior downstream users. Water is "lost" from river flows due to several factors such as direct evaporation from the water surface, evapotranspiration from riparian phreatophytes, and seepage from the stream bed into the groundwater basin. The net effect of these losses is generally referred to as channel losses or carriage water loss. The components that make up the losses are not directly measured. Furthermore, the quantity and rate of losses vary with soil properties and geology, groundwater levels, and total seasonal flow in the river. For the purposes of HRL flow accounting, EBMUD is estimating the channel losses between Camanche and Woodbridge Dams based on all available historical monthly average observed losses, by JSA year type. The HRL flow accounting includes this water within the Existing Flow Requirements.

3.1.4 Water Right Permit 10478 Term 20: Mitigation Measure Fish-1

Mitigation Measure Fish-1 (MMRP Fish-1), which is Term 20 of Permit 10478, was added by the State Water Board as a condition to EBMUD's Permit 10478 in its Order WR 2016-0019-EXEC dated August 2, 2016 ("*Order Approving A Petition For Extension Of Time Until 2040 And Approving Petitions For Changes In Place Of Use, Purpose Of Use, And Permit Terms And Issuing An Amended Permit")*. Term 20 requires that EBMUD release additional fishery flows, over and above the JSA flows, to ensure that flows remain in the Mokelumne River to maintain adequate water depths for salmon passage. EBMUD releases from Camanche Dam up to a total of 2,000 acre-feet of additional water above required releases during the September through February period in Below Normal and Dry JSA water year types to facilitate adult salmonid fish passage below Woodbridge Dam. The HRL flow accounting includes this water within the Existing Flow Requirements.

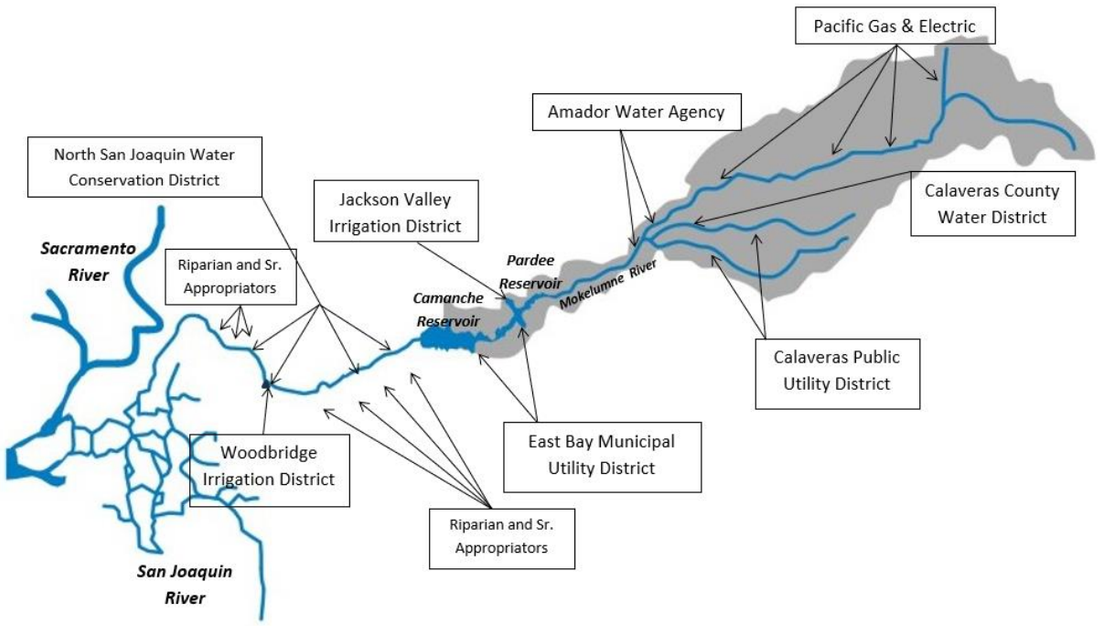


Figure 1. Mokelumne River Diverters

3.2 Decision Making Timeline, Adaptive Management, and Uncertainty

Figure 2 shows the timeline for decision making and deployment of flows on the Mokelumne River. Since the HRL Flow Contribution includes a Spring block of water in the March through May timeframe, but the ultimate HRL Year Type determination occurs in April (based on the April 1 Department of Water Resources [DWR] Bulletin 120 Report – see Appendix 2, Section 3.3.1), it is expected that the PCC will be making decisions about deployment of HRL flows while the final Mokelumne HRL Year Type designation

is still uncertain. Thus, there is a degree of uncertainty in the Spring, when the majority of the HRL Flow Contribution is required, regarding the ultimate year type designation, and correspondingly, what volume of HRL Flow Contribution will be required. In addition, evolving conditions on the Mokelumne River and coordination with Systemwide Governance could lead to changes in what deployment of flows is considered optimal for benefiting the ecosystem in a given year. The timeline shown in Figure 2 indicates how the Mokelumne River governance will adaptively manage flows to maximize ecosystem benefits while ensuring that the Mokelumne is providing its HRL Flow Contribution.

Figure 2. Timeline for Mokelumne River HRL Decision Making and Flow Releases

Month	Mokelumne HRL Year Type Determination	HRL Flow Asset Decision-Making	HRL Flow Measures Block Releases
February	The PCC will make an initial Mokelumne HRL Year Type determination based on available unimpaired runoff projections including EBMUD's own data and the February release of DWR Bulletin 120	By mid-February each year, the PCC will design and propose one or more daily flow schedules for the Spring Block release to apply in March through May, based on the Mokelumne HR&L Year Type initially determined using the best available estimates of runoff in the Mokelumne River. Draft proposals will be shared with SWGC for systemwide planning	
March	The PCC will make a revised Mokelumne HRL Year Type determination based on available unimpaired runoff projections including EBMUD's own data and the March release of DWR Bulletin 120	If the PCC determines that the Spring Block releases should begin in March or early April, the PCC will develop an interim daily flow schedule for the Spring Block release by early March. Draft proposals will be shared with SWGC for systemwide planning	Spring Block Release (if applicable)
April	The PCC will finalize the determination based on DWR's April 1st Bulletin 120 median unimpaired runoff forecast for the Mokelumne River	By mid-April each year, after release of DWR's April 1st Bulletin 120, the PCC will revise the proposed Spring Block release as necessary and designate a daily flow schedule for the Spring Block release to apply in April and /or May. Draft proposals will be shared with SWGC for systemwide planning. Last chance for SWGC input prior to submitting plan to SWRCB as final	Spring Block Release
May			Spring Block Release
September		In August-September of each year, the PCC will design and designate a daily flow schedule for the Fall Block release, using HR&L assets available for the Mokelumne HR&L Year Type defined by estimated runoff in the Mokelumne River in DWR's April 1st Bulletin 120, to apply in October. Draft proposals will be shared with SWGC for systemwide planning	
October			Fall Block Release

In the early Spring of each year, EBMUD will work with the PCC to develop daily release schedules that include both the Existing Flow Requirements under the applicable JSA Year Type and the HRL Flow for the Mokelumne HRL Year Type. EBMUD will assist the PCC in developing a baseflow projection corresponding to the applicable Mokelumne HRL Year Type designation (see Figures 3a and 3b that show hypothetical examples of base flow projections for "Normal and Above" and "Dry" Mokelumne HRL Year Types, respectively). The PCC may approve two or more alternative schedules that can be implemented based on changing conditions. For example, Figure 3d depicts two hypothetical alternative schedules in the "Dry" Mokelumne HRL Year Type example: the preferred Plan A represents a short duration six-day pulse, and the alternative contingency Plan B represents a longer pulse possible due to an increase in baseflow in May. Contingency plans may be necessary because of the uncertainty with how conditions in the spring may evolve and the uncertainty related to how much precipitation can still fall in late winter through spring.

Given uncertainty related to the year type designation, the PCC may also consider alternatives for different year types; for example, the PCC could meet in February and develop schedules for both "Dry" and "Normal and Above" HRL Year Types. As the water year unfolds and conditions change, the PCC can

then decide which schedule to implement. The PCC may also decide to make changes in response to SWGC recommendations, evolving conditions, or to shift flows to October for fall attraction pulses within the Flexible Range of Block Releases from Camanche Dam specified in Appendix 1, Tables 1 through 4.

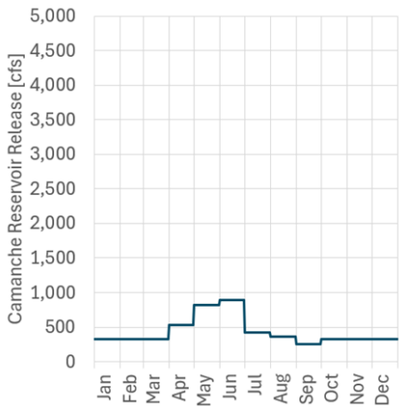
To provide some context, in Figure 3e an example “Normal and Above” year hydrograph from 2005 is plotted along with the hypothetical PCC preferred plan. The flood control releases depicted on the chart would not be accurately forecasted in the beginning of February when the PCC begins to plan deployment of the HRL Flow Contribution. Thus, to implement the preferred Plan A, releases would have ramped up earlier in April than actually occurred. Then the planned fall attraction pulses would still have been implemented, regardless of the volume of spring flood control releases.

Similarly, Figure 3f shows an actual hydrograph from a dry year, 2007, along with the hypothetical preferred Plan A. In this example, the preferred Plan A includes a short duration pulse at the end of April that would require additional releases from the reservoir above all other minimum required releases shown.

The final determination of Mokelumne HRL Year Type will be made in April based on the April 1 Bulletin 120 Report (see Appendix 2, Section 3.3.1). If the final HRL Year Type requires a greater volume of releases than had been previously planned, the PCC would reconvene to develop an adjusted flow plan for May and the fall to make necessary releases and ensure compliance.

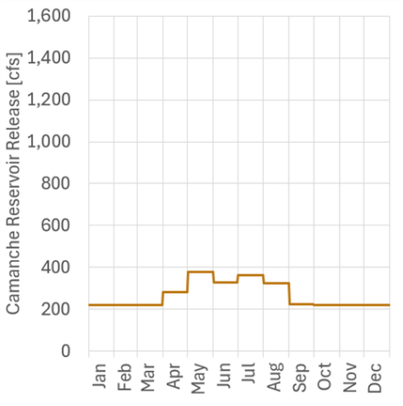
As the timeline shows, the fall block of releases would be made in October. The PCC will then submit an annual report, as described below, that demonstrates it has met both its Existing Flow Requirements and HRL Flow Contribution. This report will include information on the PCC decision making and plans for deployment of flows to demonstrate the intentionality of the HRL releases.

HRL Normal and Above Year Type

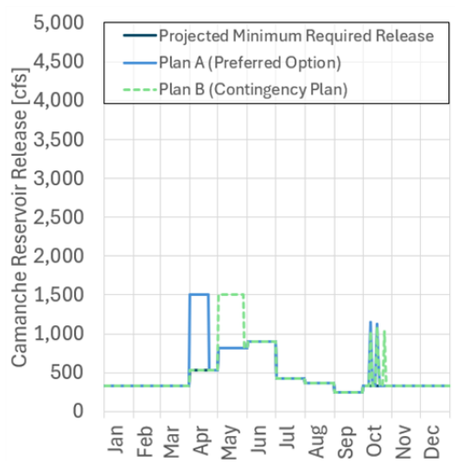


(a)

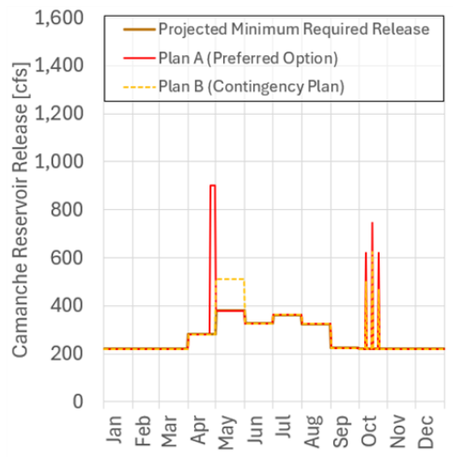
HRL Dry Year Type



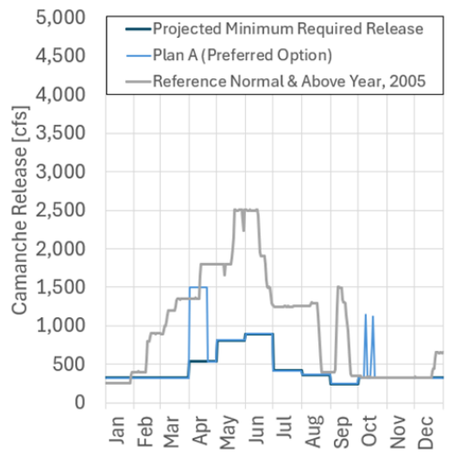
(b)



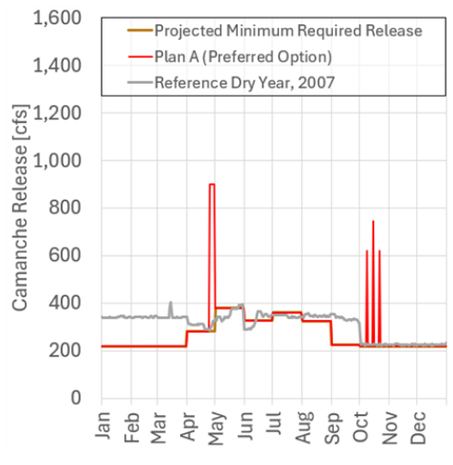
(c)



(d)



(e)



(f)

Figure 3. Example Graphics for hypothetical HRL Normal and Above and Dry Year Types demonstrating: Hypothetical Baseflow Projection (a) and (b); Possible PCC Plans shown (c) and (d); Historical Daily Average Flow Example in (e) Normal & Above Year 2005 and (f) Dry Year 2007 Provided for Reference.

3.3 Measuring HRL Flow Contribution above Existing Flow Requirements

The JSA and D-1641 establish a set of minimum release requirements from Camanche Dam, and a separate set of minimum expected flows below Woodbridge Dam. To provide the required flow below Woodbridge Dam, EBMUD coordinates with WID and releases sufficient water from Camanche Dam to satisfy the needs of diverters below Camanche Dam down to Woodbridge Dam, including WID's diversion, plus buffer water. Thus, during the irrigation season EBMUD may need to make higher releases from Camanche Dam to maintain minimum flows required below Woodbridge Dam because of diversions between Camanche and Woodbridge.

EBMUD has developed the attached spreadsheet, Table 1, to calculate the Existing Flow Requirements and to track the HRL Flow Contribution on a monthly basis. Table 1 includes a calculation of the required releases from Camanche Dam to satisfy both JSA flow requirements (Camanche Dam releases, and flow below Woodbridge Dam), accounting for senior downstream diversions, plus the Term 20 (MMRP Fish 1), all of which together constitute the Existing Flow Requirements. The table then shows the additional flow assets to be released as the HRL Flow Contribution, based on the direction of the PCC and in accordance with Appendix 1, Section I.B.

The total release from Camanche Dam necessary to meet Existing Flow Requirements plus the HRL Flow Contribution is then calculated, which can subsequently be compared against actual Camanche Dam releases on a seasonal (March-May; October) or annual time period to demonstrate that EBMUD released the full HRL Flow Contribution from Camanche Dam required during that time period as described in Section 3.1.3 below.

Following is additional detail on the columns in Table 1:

Year and month – the particular year and month during the HRL term.

Column [1] – ***JSA Year Type***. This column contains the JSA Year Type applicable during the month, determined as provided in Appendix 1, Table 5.

Column [2] – ***JSA/D-1641 Minimum Release from Camanche Dam in CFS***. This column contains the minimum required release from Camanche Dam. It matches the value in "Release from Camanche Dam (CFS)" column of Appendix 1, Tables 1 through 4, whichever table is applicable to the JSA Year Type in effect during the month as indicated in Column [1].

Column [3] – ***Additional JSA Releases in CFS***. Additional releases under the JSA may be required based on one or more of the following JSA provisions: (1) releases required by Footnote 5 of the Mokelumne River Minimum Flow Schedule which is Attachment 1 to the JSA, (2) releases required to meet the "gainsharing" obligation of Section F.2 of the JSA, or (3) adaptive management as authorized in D-1641.

Column [4] – ***JSA/D-1641 Flow Below Woodbridge Dam in CFS***. This column contains the required flow below Woodbridge Dam. It matches the values in the table on page 178 of D-1641 as applicable to the JSA Year Type in effect during the month as indicated in Column [1].

Column [5] – ***Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams in CFS.*** This column contains the estimated losses and riparian and senior appropriator diversions between Camanche and Woodbridge Dams that EBMUD must take into account to provide sufficient releases to reach Woodbridge Dam. It is based on average historical data and JSA year type.

Column [6] – ***Scheduled WID Diversions in CFS***. This column contains Woodbridge Irrigation District scheduled diversions which WID provides pursuant to its agreements with EBMUD. This column may be updated during the month as WID adjusts its schedule.

Column [7] – ***Calculated Camanche Dam Release Necessary to Meet JSA/D1641 and Prior Rights in CFS***. This column contains the total release from Camanche Dam needed to meet the minimum regulatory flows specified by the JSA and D-1641 in effect at a given time, plus any additional flows necessary to meet downstream senior water rights and associated carriage losses. This column contains the following calculations:

During Apr-Sep, the value is the greater of Columns [3]+[4]+[5]+[6] or Columns [2]+[3].

During Oct-Mar, the value is Columns [2]+[3].

Column [8] – ***Other Release Requirements – Water Right Permit 10478 Term 20 (MMRP FISH-1) in acre-feet.*** This column contains the required volume of additional releases from Camanche Dam, up to a total of 2,000 acre-feet, during the September through February period in "Below Normal" and "Dry" JSA Year Types to facilitate adult salmonid fish passage below Woodbridge Dam as required by Term 20 of EBMUD's Permit 10478.

Column [9] – ***Other Release Requirements – Water Right Permit 10478 Term 20 (MMRP FISH-1) in CFS.*** This column contains the rate of release required during a given month necessary to provide the total volume stated in Column [8].

Column [10] – ***Existing Flow Requirements in CFS.*** This column contains the Existing Flow Requirements defined in Appendix 1. It is calculated by adding the required releases to meet JSA/D-1641 requirements in Column [7] to EBMUD's Term 20 release requirements in Column [9].

Column [11] – ***Mokelumne HRL Year Type***. This column contains the Mokelumne HRL Year Type applicable during the month, determined as provided in Appendix 1, Table 6.

Column [12] – ***HRL Flow Contribution in acre-feet***. This column contains the volume of the applicable HRL Flow Contribution to be released during that month as determined by the PCC. It is based on and consistent with the values in the "HRL Flow Contribution" columns of Appendix 1, Tables 1 through 4, whichever table is applicable to the Mokelumne HRL Year Type in effect during the month as indicated in Column [11].

Column [13] – ***HRL Flow Contribution in CFS.*** This column contains the rate of release required during a given month necessary to provide the total volume stated in Column [12].

Column [14] – ***Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements and HRL Flow Contribution in CFS***. This column contains the calculation of the total flow necessary to release from Camanche Dam to include both the Existing Flow Requirements and the HRL Flow Contribution. This column is the sum of Columns [10]+[13].

Column [15] – ***Measured Camanche Dam Average Monthly Release in CFS***. This column contains the monthly average measured flow rate at Camanche Dam (USGS Gage # 11323500).

3.4 Real Water Verification

The Mokelumne River HRL compliance point for purposes of verifying the release of the HRL Flow Contribution will be Camanche Dam measured at USGS Gage #11323500. As described in Appendix 1, Section I.A.3.b, EBMUD will be responsible for meeting its HRL Flow Contribution during each of three time periods as indicated in the "Flexible Range of Block Releases from Camanche Dam": (1) a March through May time period; (2) an October time period; and (3) an annual time period.

For each year of the HRL Program term, EBMUD will prepare an annual report documenting its compliance with the HRL Flow Contribution for each of these three periods after accounting for any adaptive management approved by the SWRCB. The Annual Report will include a narrative discussion of how the HRL block flows were apportioned by the PCC, including lengths of time and flowrates for floodplain inundation in the Spring and a description of any fall pulse flows. The Annual Report will also include Tables 1, 2, and 3 to demonstrate compliance.

Table 1, Columns [1] through [14] are used to calculate the minimum Camanche Dam release and therefore will be completed before or concurrently with the release of flows from Camanche Dam during each successive month. Columns [1] through [10] will be used to calculate EBMUD's Existing Flow Requirements. Columns [11] through [13] will be used to calculate the HRL Flow Contribution. Columns [12] and [13] will state the total acre-feet and monthly average flow of the HRL Flow Contribution for each month as determined by the PCC and in accordance with the flow measure commitments as described in Appendix 1, Section I.B. Column [14] will state the total minimum Camanche Dam release on a monthly basis, inclusive of that month's Existing Flow Requirements and HRL Flow Contribution. Column [15] will be completed after each month concludes and will state the actual average monthly Camanche Dam release measured at USGS Gage #11323500.

Table 2 will be used to convert the monthly flow rates to monthly volumes in order to determine compliance. For each month in which HRL Flow Contribution releases are required, the monthly flow rates shown as "Measured Camanche Dam Average Monthly Release" (Column [15] of Table 1) and "Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements and HRL Flow Contribution" (Column [14] of Table 1) will be multiplied by the number of days in that month to calculate a total monthly volume for that month for each metric.

Next, Table 3 sums these monthly volumes into the three time periods used to determine compliance with HRL flow measures (March through May, October, and Annual). If the volume of actual measured releases for each of the three time periods is greater than the volume of required releases for the corresponding time period, then EBMUD is in compliance.

Examples

Following are two hypothetical examples, using hypothetical data, to demonstrate how the tables work in practice. The first example shows a year where the Mokelumne would be in compliance with its HRL Flow Commitments.

Table 1 calculates the Existing Flow Requirements and shows the HRL Flow Contribution, by month.

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Example 1: Table 1

Year	Month	JSA/D-1641 Release Requirements							Other Release Requirements			Mok. River HRL Flow Contribution					
		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	
		JSA Year Type	Minimum Release from Camanche Dam	Additional JSA Releases: (Footnote 5; Gainsharing; Adaptive Mgmt)	Flow Below Woodbridge Dam	Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams	Scheduled WID Diversion	Calculated Camanche Dam Release Necessary to Meet JSA / D1641 & Prior Rights	Water Right Permit 10478 Term 20 (MMRP Fish-1)		Existing Flow Requirements (Appx. 1, § I.A.2)	Mokelumne HRL Year Type (Appx. 1, Table 6)	HRL Flow Contribution (Appx. 1, § I.A.3)		Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution	Measured Camanche Dam Average Monthly Release (USGS Gage #11323500)	
			JSA/D1641	JSA/D1641	JSA/D1641	*Estimated DATA	*Scheduled / Planned DATA	Apr-Sep: =max([2] + [3] or [3] + [4] + [5] + [6]) Oct-Mar: = [2] + [3]			= [7] + [9]				= [10] + [13]	DATA
			(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(CFS)	(AF)	(CFS)	(CFS)		(AF)	(CFS)	(CFS)	(CFS)
	January	Normal	325		100	10.99	0.00	325.00			325.00				325.00	1445.00
	February	Normal	325		100	42.76	0.21	325.00			325.00				325.00	600.30
	March	Normal	325		100	64.88	0.00	325.00			325.00	Normal	3375.72	54.90	379.90	2017.00
	April	Normal	325	200	150	81.44	20.30	525.00			525.00	Normal	19470.04	327.20	852.20	3158.00
	May	Normal	325	100	300	24.89	97.23	522.12			522.12	Normal	16355.94	266.00	788.12	2243.00
	June	Normal	325		300	89.04	117.83	506.88			506.88				506.88	1923.00
	July	Normal	100		25	14.45	175.16	214.61			214.61				214.61	2187.00
	August	Normal	100		25	66.35	184.94	276.29			276.29				276.29	1073.00
	September	Normal	100		25	82.58	158.20	265.78			265.78				265.78	736.20
	October	Normal	325		100	22.46	99.39	325.00			325.00	Normal	5798.37	94.30	419.30	1235.00
	November	Normal	325		100	26.80	1.73	325.00			325.00				325.00	583.00
	December	Normal	325		100	63.33	0.00	325.00			325.00				325.00	331.10

Table 2 then converts the monthly flows to volumes.

Example 1: Table 2

		Measured Camanche Dam Average Monthly Release		Mokelumne River HRL Flow Contribution		Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution	
Month	**Days**	**Volume (AF)**	**Flow (cfs)**	**Volume (AF)**	**Flow (cfs)**	**Volume (AF)**	**Flow (cfs)**
January	31	88,850	1,445	0.00	0.00	19,984	325.00
February	28	33,339	600	0.00	0.00	18,050	325.00
March	31	124,021	2,017	3375.72	54.90	23,359	379.90
April	30	187,914	3,158	19470.04	327.20	50,710	852.20
May	31	137,917	2,243	16355.94	266.00	48,460	788.12
June	30	114,427	1,923	0.00	0.00	30,161	506.88
July	31	134,474	2,187	0.00	0.00	13,196	214.61
August	31	65,976	1,073	0.00	0.00	16,988	276.29
September	30	43,807	736	0.00	0.00	15,815	265.78
October	31	75,937	1,235	5798.37	94.30	25,782	419.30
November	30	34,691	583	0.00	0.00	19,339	325.00
December	31	20,359	331	0.00	0.00	19,984	325.00

Finally, Table 3 compares the measured releases to the required releases on a seasonal and annual basis and shows that the Mokelumne would be in compliance for that year.

Example 1: Table 3

COMPLIANCE DETERMINATION	**Measured**	**HRL Releases**	**Total Required Releases**	**Compliance?**
March-May	449,852	39201.7	122,528	YES
October	75,937	5798.366	25,782	YES
Annual	1,061,712	45000.06	300,050	YES

	HRL Flow Flexibility Range	Actual Percentage
Spring Block	70-90%	87%
Fall Block	10-30%	13%

The second example shows a year where the Mokelumne would not be in compliance. Again, this uses hypothetical data to demonstrate the function of the tables.

		[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]
Year	**Month**	**JSA/D-1641 Release Requirements**							**Other Release Requirements**			**Mok. River VA Flow Contribution**				
		JSA Year Type	**Minimum Release from Camanche Dam**	**Additional JSA Releases: (Footnote 5; Gainsharing; Adaptive Mgmt)**	**Flow Below Woodbridge Dam**	**Estimated Losses and Rip/Sr. Approp. Diversions Between Camanche and Woodbridge Dams**	**Scheduled WID Diversion**	**Calculated Camanche Dam Release Necessary to Meet JSA / D1641 & Prior Rights**	**Water Right Permit 10478 Term 20 (MMRP Fish-1)**		**Existing Flow Requirements (Appx. 1, § I.A.2)**	**Mokelumne VA Water Year Type (Appx. 1, Table B.X.1-F)**	**VA Flow Contribution (Appx. 1, § I.A.3)**		**Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & VA Flow Contribution**	**Measured Camanche Dam Average Monthly Release (USGS Gage #11323500)**
			JSA/D1641	**JSA/D1641**	**JSA/D1641**	***Estimated DATA**	***Scheduled / Planned DATA**	**Apr-Sep: =max([2] + [3] or [3] + [4] + [5] + [6]) Oct-Mar: = [2] + [3]**			**= [7] + [9]**				**= [10] + [13]**	**DATA**
			(CFS)	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(CFS)**	**(AF)**	**(CFS)**	**(CFS)**		**(AF)**	**(CFS)**	**(CFS)**	**(CFS)**
	January	Below Normal	250		100	43.28	4.95	250.00			250.00				250.00	342.20

February	Below Normal	250	100	50.25	0.64	250.00	250.00				250.00	270.10
March	Below Normal	250	100	56.16	52.16	250.00	250.00	Dry	1500.32	24.40	274.40	269.40
April	Dry	220	150	73.34	68.96	292.30	292.30	Dry	3373.93	56.70	349.00	315.10
May	Dry	220	150	90.22	126.83	367.06	367.06	Dry	2625.56	42.70	409.76	384.90
June	Dry	100	20	93.69	135.02	248.71	248.71				248.71	270.90
July	Dry	100	20	97.26	172.75	290.01	290.01				290.01	313.20
August	Dry	100	20	98.29	149.35	267.64	267.64				267.64	285.00
September	Dry	100	20	87.67	148.09	255.76	255.76				255.76	275.40
October	Below Normal	250	100	57.62	60.81	250.00	250.00	Dry	2502.58	40.70	290.70	325.20
November	Below Normal	250	100	48.71	4.24	250.00	250.00				250.00	265.90
December	Below Normal	250	100	58.30	3.76	250.00	250.00				250.00	255.20

Again, Table 2 converts the monthly flows to volumes.

Example 2: Table 2

Month	Days	Measured Camanche Dam Average Monthly Release		Mokelumne River HRL Flow Contribution		Calculated Total Camanche Dam Release Necessary to Meet Existing Flow Requirements & HRL Flow Contribution	
		Volume (AF)	Flow (cfs)	Volume (AF)	Flow (cfs)	Volume (AF)	Flow (cfs)
January	31	21,041	342	0	0	15,372	250
February	28	15,001	270	0	0	13,884	250
March	31	16,565	269	1500.319	24.4	16,872	274.4
April	30	18,750	315	3373.934	56.7	20,767	349
May	31	23,667	385	2625.559	42.7	25,195	409.7595
June	30	16,120	271	0	0	14,799	248.7075
July	31	19,258	313	0	0	17,832	290.0063
August	31	17,524	285	0	0	16,456	267.6369
September	30	16,387	275	0	0	15,219	255.7598
October	31	19,996	325	2502.582	40.7	17,874	290.7
November	30	15,822	266	0	0	14,876	250
December	31	15,692	255	0	0	15,372	250

Finally, Table 3 shows that in this example, the Mokelumne would need additional water released from Camanche Dam to be in compliance for the Spring HRL block because the measured releases are not greater than the total required releases.

Example 2: Table 3

COMPLIANCE DETERMINATION	Measured	HRL Releases	Total Required Releases	Compliance?
March-May	58,981	7499	62,834	NO
October	19,996	2502.	17,874	YES

Annual	215,822	10002.	204,519	YES

	HRL Flow Flexibility Range	Actual Percentage
Spring Block	70-90%	75%
Fall Block	10-30%	25%

3.5 Mokelumne River Delta Contribution

As described in Appendix 1, Section III.C, the Mokelumne River HRL program also includes a payment to the systemwide Water Purchase Program as part of its Delta contribution.

Appendix 1 of the Global Agreement establishes a Mokelumne Delta contribution of 5 TAF, 5 TAF, and 7 TAF in "dry," "below normal" and "above normal" Sacramento Valley Index year types, respectively. However, the Mokelumne River already has a separate, existing year type designation based on the JSA that does not perfectly align with the Sacramento Valley Index. In some cases, the release of HRL Flow Contributions during Mokelumne HRL dry years will coincide with Sacramento Valley Index critically dry years when no Mokelumne River HRL Delta inflows are required. Similarly, many JSA "normal and above" years correspond with Sacramento Valley Index "wet" years when no HRL Delta inflows are required. There are also challenges with measuring Mokelumne River inflows to the Delta due to tidal influences and other issues.

The Mokelumne HRL program includes several components to ensure that this Delta contribution is met. First, the PCC will coordinate with DWR and USBR regarding Delta conditions as it makes decisions on the deployment of the Mokelumne HRL Flow Contribution. The primary concern in allocating the HRL Flow Contribution will be maximizing ecological benefits; but all else being equal, the PCC will prioritize times when the Delta is expected to be in "excess" conditions rather than "balanced" conditions to ensure that more releases contribute to Delta outflow.

In addition, EBMUD has committed to provide additional funding to the Systemwide Water Purchase Program to obtain additional water for Delta inflow. Appendix 1 to the Global Agreement provides that if long-term modeling indicates the Mokelumne HRL Flow Contribution is expected to result in increased Delta outflows, relative to the pre-HRL Program baseline, of less than the Delta contribution (5 TAF, 5 TAF, and 7 TAF, in "dry," "below normal," and "above normal" years, respectively, determined by the Sacramento Valley Index), then EBMUD would make a payment to the SWGC to fund the purchase of the volume difference. EBMUD can also reduce the amount of water that must be purchased in "below normal" and "above normal" year types if the long-term modeling shows higher average flows in "dry" and "critically dry" years. Based on its modeling (described in more detail in Appendix 1, Section III.C), EBMUD has determined that such payments would be needed in below normal and above normal Sacramento Valley Index year types. More details on these payments can be found in Appendix 1, Section III.C.

Tuolumne Draft Quantitative Flow Accounting Procedures

Date Drafted: March 15, 2024

Drafted by: Tuolumne Parties (Modesto ID, SFPUC, Turlock ID)

1 Definitions

La Grange Diversion Dam – A diversion dam on the Tuolumne River downstream of Don Pedro Reservoir, located at approximately river mile 52. (Approximately 52 river miles upstream from the confluence of the Tuolumne and San Joaquin rivers.)

La Grange stream gage – USGS stream flow gage 11289650 on the Tuolumne River immediately downstream of La Grange Diversion Dam.

Infiltration Galleries (IGs) – Diversion structures in the Tuolumne River at approximately river mile 25.5, between La Grange and Modesto. One IG has been constructed; another is expected to be constructed by year 6 of the Tuolumne VA implementation. The IGs are expected to begin operation by year 6 of the Tuolumne VA implementation. See description of the operation of the IGs in 2.1.2 below.

1995 FERC settlement flows – The current minimum instream flow requirements included in the 1995 FERC Settlement Agreement for the Don Pedro Project. These are the current minimum flow requirements for the Don Pedro Project. The point of compliance for these flows is the La Grange stream gage.

Tuolumne VA required flows - The minimum instream flow requirements that are proposed for the Tuolumne VA. The Tuolumne VA required flows occur from January through June. The point of compliance for Tuolumne VA required flows is the La Grange stream gage. They also include a maximum diversion rate for the IGs in June, once the IGs become operational.

2 Flow Measures

2.1 Tuolumne VA Required Flows

The Tuolumne VA required flows are instream flow requirements that will be met at the La Grange stream gage on the Tuolumne River. Once the IGs become operational, the Tuolumne VA required flow requirements will also include a maximum diversion rate at the IGs. The schedule of required flows for the Tuolumne VA represents an increase over the 1995 FERC settlement flows during the January through June period. The current instream flow requirements are described in the 1995 Settlement Agreement and are included in the 1996 FERC license for the Don Pedro Project. The volume of required flow in the Tuolumne VA flow schedule that is greater than the volume of 1995 FERC settlement flows in the January through June period is the volume of the Tuolumne VA flow measures. The Tuolumne VA required flows and the 1995 FERC settlement flows are shown on Tables A through G.

2.2 Infiltration Galleries

The Infiltration Galleries (IGs) are diversion structures in the Tuolumne River at approximately river mile 25.9, between La Grange and Modesto. These are intended to be used as part of the updated FERC license from June through October 15th of each year. The June operation of the IGs is included in the Tuolumne VA. The IGs are not operational yet; they are expected to be operating by year 6 of the Tuolumne VA implementation. The IGs will be used to provide additional flow in the river between La Grange Diversion Dam and the IGs, while allowing diversion of that additional flow at the IGs for use within Turlock Irrigation District (TID). The operation of the IGs does not change the volume of irrigation

water delivered to TID; it moves the location of some diversion from La Grange Diversion Dam to the IGs, which allows greater flow in approximately the upper 26.5 miles of the Tuolumne River, which is the gravel-bedded reach; this is expected to create benefits for *O. mykiss* in this reach of the river. The flow volume described for the Tuolumne VA required flow is the same whether the IGs are operated or not.

2.3 FERC Relicensing

The Don Pedro Project is currently in the relicensing process with FERC, and the updated license is expected to include the Tuolumne VA required flow schedule from January through June, in addition to updated flow requirements from July through December. When the updated license takes effect, the 1995 FERC settlement flows from January through June will continue to be used as the reference operation for comparison to the volume of the Tuolumne VA required flow, as described in Section 3 below.

The July through December flows in the updated license are not included in the Tuolumne VA. The current FERC license for the Don Pedro Project also includes minimum flow requirements from July through December, and these flows are similarly not included in the Tuolumne VA. If the effective FERC license requires greater minimum flow than the Tuolumne VA during any period from January through June, the greater requirement will govern, unless FERC indicates otherwise.

2.4 Water Year Type Selection

The Tuolumne VA required flows are determined according to water year type using the five water year types (Wet, Above Normal, Below Normal, Dry and Critical) that are described in D-1641 for the San Joaquin Index (SJI). Each year, the water year type that is used to determine the required instream flows will be updated along with the hydrologic forecast in the period from February through May. Beginning each year with the February update to the SJI, the value associated with the 90% exceedance forecast will be used to choose the water year type for the Tuolumne VA for the month. The 90% exceedance values of the March and April SJI updates will be used to update the water year type for the Tuolumne VA. Then the 75% exceedance value of the May update to the SJI will determine the water year type used for the Tuolumne VA in May, June, and the following January, and will remain in effect until the following February SJI update is available.

Until the FERC relicensing of the Don Pedro Project is complete, water year type selection for the period from July through December of each year will be done as described for the 1995 FERC settlement flows. The water year type selection procedure in the updated license is expected to match that described for the Tuolumne VA.

3 Flow Measure Accounting

3.1 Reference Flow

The reference flow for comparison to the flow with the Tuolumne VA implemented is the estimated flow at the La Grange stream gage if the required flows in the 1995 FERC settlement flows were met, including required base flows and pulse flows from the 1995 FERC settlement flows and flood control releases that are estimated to occur along with those required flows. This reference flow will not be protected during implementation of the Tuolumne VA.

Interpolation water is a component of the 1995 FERC settlement flows that is released in the fall of years when it is required. Because it is does not occur in the period from January through June, interpolation water is not included in the reference flow that is used for comparison to the Tuolumne VA flow.

A spreadsheet model will be used to estimate the total flow at the La Grange stream gage using real-time inputs from measured hydrology and water supply deliveries while assuming that the required flows at the La Grange stream gage are the 1995 FERC required flows. The model inputs will include:

- Full Natural Flow (or unimpaired flow) of the Tuolumne River at La Grange
- Water deliveries in the Modesto and Turlock canals and the aqueduct from the Hetch Hetchy Reservoir to the San Francisco Bay Area
- Diversion from the Tuolumne River at the Infiltration Gallery

3.2 Measuring VA Flow Deployment above Reference Flow

During implementation of the Tuolumne VA, the actual flows at the La Grange stream gage (USGS gage 11289650) will be compared to those simulated for the reference operation as described in 3.1.1. Tuolumne VA flows will be assessed daily, and the volume of required flow in the Tuolumne VA that is greater than the simulated total reference flow will be identified for the day for downstream protection. If the simulated total reference flow is greater than the required Tuolumne VA flow, no protection will be applied for the day. If flood releases are made during implementation of the Tuolumne VA flow, no protection will be applied for the day.

The daily volumes to be protected may be summarized using a different timescale (i.e., weekly or monthly) for communication to the parties that are involved in protecting VA flow (e.g., DWR, Reclamation and SWRCB). Details related to the protection of VA flows are expected to be fully described by those parties in early 2024.

3.3 Real Water Verification

The real water contributions to flow at the La Grange stream gage that result from implementing the Tuolumne VA will be identified by comparison to the simulated reference operation, as described in 3.1.1 and 3.1.2 above. There is no additional action (e.g., fallowing or groundwater substitution) required to produce these flows.

The Tuolumne parties, DWR, Reclamation and other parties are currently discussing an accounting mechanism to determine the need for additional flow contributions, as defined and set forth in the MOU for the Tuolumne VA. The Tuolumne parties expect to use the finalized accounting mechanism annually to determine whether an additional voluntary flow contribution is indicated; In each year, Tuolumne parties expect to contribute either one third of the value that is indicated in the accounting, or the maximum value that is indicated by SJI water year type in the Tuolumne VA MOU, whichever is less. These additional voluntary flow contributions, when made, will be in addition to the Tuolumne VA flows, and will not be protected.

Putah Draft Quantitative Flow Accounting Procedures

Date Drafted: 7/9/2024

Drafted by: Alex Rabidoux

1 Definitions

Accord Flows: Means the instream flow requirements as stipulated in the Putah Creek Accord settlement as shown in Table 19 of the Draft VA Strategic Plan. The Accord Flows also include a spring pulse, fall pulse, and respective ramp down flows which are detailed in notes (a)-(d) in Table 19 of the Draft VA Strategic Plan.

Water Year: The water year is defined as October 1 of the prior year to September 30 of the current year. The annual flow component for Putah Creek will be accounted for on a water year basis.

Putah Creek VA Flows: Means the instream flow component in Section 2 (Flow Measures) that is distinct and applied on top of the existing Accord Flows.

Lower Putah Creek: Defined as the portion of Putah Creek starting at the Putah Diversion Dam and extending downstream to the confluence with the Toe Drain (Tule Canal) in the Yolo Bypass.

Drafting Note: Yolo County Flood Control & Water Conservation District (YCFC&WCD) has engaged the Department of Water Resources in substantive discussions about becoming a signatory to this Agreement through operations that would augment streamflows in Putah Creek. Those discussions have involved conceptual proposals that are described in the Yolo Attachment to the Enforcement Agreement but are not part of the Agreement as of March 29, 2024. Placeholders have been inserted to appropriately account for any Cache Creek VA Flows, should an Agreement with YCFC&WCD move forward.

Cache Creek VA Flows (*placeholder*): Means the potential flow component provided by the YCFC&WCD to Putah Creek, separate, from the Solano County Water Agency's (SCWA's) Putah Creek VA flow. The flow may be used to complement the Putah Creek VA flow, but it will be a separate and distinct volume of water (in addition to the 6-7 TAF volume for Putah Creek VA flow).

2 Flow Measures

The Putah Creek VA includes one quantifiable water component which is the addition of 6,000 – 7,000-AF per year of water during critical, dry, below normal, or above normal water years as shown in Table 1 of the Draft VA Strategic Plan.

All flows will be calculated as daily average flows (releases) into Putah Creek at the Putah Diversion Dam. The total flow into Lower Putah Creek will follow the equation below.

$Q_{Total} = Q_{AF} + Q_{PC_VA} + Q_{FLOOD}$

Q_{Total} = Daily average flow into Lower Putah Creek as measured at the Putah Diversion Dam.
Q_{AF} = Instream flow to meet the required Accord flows.
Q_{PC_VA} = Supplemental Putah Creek VA Flows that are in addition to the required Accord Flows.
Q_{FLOOD} = If flood releases are being released from Monticello Dam (Lake Berryessa), this will be included as a separate and distinct flow / pass-thru.
Q_{CC_VA} = Supplemental Cache Creek VA Flows (*placeholder)*, are a separate addition of flow from YCFC&WCD, distinct from the Accord and Putah Creek VA Flows.

3 Flow Measure Accounting

3.1 Reference Flow

The Reference Flow on Lower Putah Creek is determined by the Putah Creek Accord flow compliance points at the Putah Diversion Dam (PDD), Interstate 80 (I-80), and periodically at the Los Rios Check Dam (Check Dam) near the confluence with the Toe Drain. Table 1 below provides additional detail on how each flow compliance location is measured. Tables 2 and 3 show the required Accord Flows under Non-Drought and Drought Year classifications specific to Putah Creek. SCWA staff make daily corrections as needed, to ensure compliance with the Accord. In addition to the tables below, the Accord requires additional water for Spawning and Supplemental Flows, which are all part of the required Accord flows.

Table 1 – Flow Measurement for each Flow Compliance Locations

Location	Description of Flow Measurements
PDD	Standard USBR hydraulic charts and equations for (a) Venturi and (b) Radial Gate operations. Daily and near real-time (SCADA) instrumentation. Site is telemetered and reported on the SCWA website.
I-80	Stream gage station, with frequent (monthly-weekly) flow wading measurements. Rated only for compliance flows, up to 100-cfs. Site is telemetered and reported on the SCWA website.
Check Dam	Periodic observations and flow measurements. Stage sensor deployment at the upstream side of the check dam. Dam leakage is estimated at 1-5-cfs, depending on water height. Anticipate using weir equations to estimate low flow over the check dam. Site is telemetered (stage) and reported on the SCWA website.

Table 2 – Putah Creek Accord Flows (Non-Drought Year)

Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	20	25	25	25	16	26	46	43	43	43	34	20
I-80	5	10	10	15	15	25	30	20	15	15	10	5
Check Dam	> 0	5	5*	> 0	> 0	> 0	5	5	> 0	> 0	> 0	> 0

**The 5-cfs requirement is for December 1 – 15.*

Table 3 – Putah Creek Accord Flows (Drought Year)

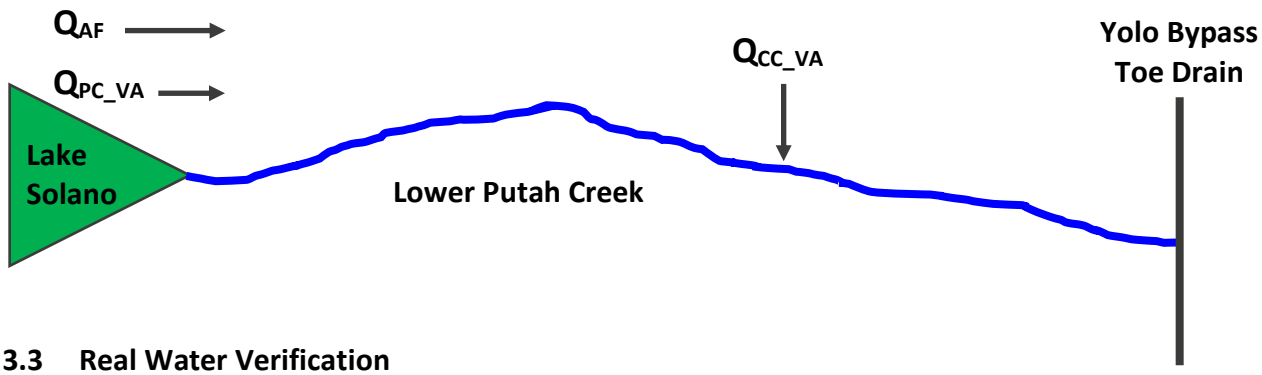
Location	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PDD	15	25	25	25	16	26	46	33	33	33	26	15
I-80	2	2	2	2	2	2	2	2	2	2	2	2

For Putah Creek a Drought Year is defined as total storage in Lake Berryessa less than 750,000-AF as of April 1.

3.2 Measuring VA Flow Deployment above Reference Flow

The Accord Flow and Putah Creek VA Flow will be measured at the PDD as Total Flow into Lower Putah Creek (Q_{Total}). All flows released from the PDD are measured using either a Venturi Meter for low flows (under 100-cfs) or using standard Radial Gate Equations for high flows (above 100-cfs). All measurements are recorded every 15-mins and provide the basis for calculating daily average flows. The Accord flows are checked daily, to ensure flow compliance at each of the downstream locations. Table 1 above lists the specific flow measurements conducted at each Putah Creek Accord compliance location. Putah Creek VA flows would be scheduled as supplemental flows on top of the Accord flows. SCWA will work in coordination with the VA Science Committee, CDFW, DWR, UC Davis, and other Putah Creek stakeholders to ensure the VA flows are used to maximize the environmental benefit to the region. In addition to the Putah Creek VA flows, YCFC&WCD may be contributing separate Cache Creek VA flows to Lower Putah Creek. The Cache Creek VA flows will be measured just upstream of their release into Lower Putah Creek. The exact location and measurements details are still being worked on by YCFC&WCD. However, SCWA and YCFC&WCD will closely coordinate the respective Putah and Cache VA flows, to maximize the environmental benefit to the Yolo-Solano region.

Figure 1 – Schematic of the Accord and VA Flows for Lower Putah Creek



3.3 Real Water Verification

As described above, flow measurements at the PDD are recorded every 15-mins and provide the basis for daily average flows. The total flow release at the PDD into Lower Putah Creek would be comprised of Q_{AF} (Putah Creek Accord Flows) and Q_{PC_VA} (Putah Creek Voluntary Agreement Flows). Total daily average flow values are then calculated and submitted to the US Bureau of Reclamation (USBR) as part of USBR's Reservoir Operations Monthly Reports. SCWA also stores this data in a SQL Server Database. The flow data is summed into a monthly Solano Project Water Accounting Spreadsheet, as part of our Water Rights Reporting to the State Water Resources Control Board (SWRCB). SCWA will amend our existing monthly Solano Project Water Accounting Spreadsheet, to track the supplemental Putah Creek VA flow. SCWA may also choose to modify our SQL Server Database, to show the daily supplement Putah Creek VA flow as well. The Cache Creek VA flow will be separately monitored and accounted for by YCFC&WCD, but in close coordination with SCWA.

4 Delta Water Accounting

4.1 Putah Creek Connectivity to the Delta

Lower Putah Creek enters the Sacramento – San Joaquin Delta at the western boundary of the Yolo Bypass. From the western boundary, water travels approximately 2-miles to the Los Rios Check Dam, a

seasonal dam on Lower Putah Creek that is owned by CDFW and operated by Los Rios Farms, an adjacent landowner and tenant farmer within CDFW's Yolo Bypass Wildlife Area. The Check Dam is typically operated from late April through mid-November and is a permanent barrier in Lower Putah Creek when in operation. When the Check Dam boards are removed, water travels 1 additional mile to the confluence of the Toe Drain. From the confluence of Lower Putah Creek and the Toe Drain, tidally connected water can travel 2.7-miles downstream to the Lisbon Weir. Lisbon Weir is a partial dam on the Toe Drain, also owned by CDFW within the Yolo Bypass Wildlife Area. Lisbon Weir allows for tidal connectivity during high tides but prevents draining of the upstream channel during low tides. The result is the Toe Drain upstream of Lisbon Weir is significantly tidally muted, in comparison to downstream conditions. The purpose of Lisbon Weir is to check-up water within the Yolo Bypass to support water conveyance within the Yolo Bypass Wildlife Area from upstream of I-80 down to Lisbon Weir, an area of over 10,000 acres. Downstream of Lisbon Weir, the Toe Drain continues for another 9-miles until reaching the Stair Step Region of the Cache Slough Complex. From the Stair Step Region, the Toe Drain tidally connects with Cache Slough and ultimately the Sacramento River at Rio Vista. The hydrological distance between Lower Putah Creek and the Sacramento River is approximately 25-miles, traversing through the Yolo Bypass and Delta tidal channels.

4.2 Putah Creek influence on CVP/SWP Operations

As discussed in Section 4.1.1 above, Lower Putah Creek has a complex and highly muted connection to the Sacramento River and Sacramento – San Joaquin Delta, traversing through 25-miles of Yolo Bypass and Delta tidal channels. Along both the Toe Drain and the Delta tidal channels, there are numerous water diversions for both agriculture as well as Fall flood up for the wildlife refuges, which significantly reduces the influence of Putah Creek to the Delta. DWR and USGS have tidal flow gages at the Toe Drain at Lisbon Weir and Cache Slough at Ryer Island, that show long periods of tidally averaged negative (upstream) flow during the summer and fall months, further reducing the influence of Putah Creek to the Delta. Putah Creek is also one of the smallest watersheds to the Sacramento River, representing about 1% of the Sacramento River outflow.

With regards to CVP/SWP (Project) Operations, Putah Creek's outflow is not currently included in the Net Delta Outflow Index (NDOI) as its contribution is within the error of the model. Even with the additional flows from the Healthy Rivers and Landscape Program (SCWA and YCFC&WCD), the contributions are still expected to be within the error of the model. Instead, the intended benefit of flow measures on Putah Creek will be to benefit salmonid and other native fish species in Lower Putah Creek as well as the Yolo Bypass. Within the Yolo Bypass, Lower Putah Creek is the only suitable watershed where salmonids can access both cold water and suitable habitat for spawning.

Delta Exports Draft Quantitative Flow Accounting Procedures

Updated: 10/1/2024 by DWR

1 Definitions

2019 BiOps – The operational requirements, terms and conditions from the United States Fish and Wildlife Service's Biological Opinion for the Reinitiation of Consultation on the Coordinated Operations of the Central Valley Project and State Water Project, Service File No. 08FBTD00-2019-F-0164 and the National Marine Fisheries Service's Biological Opinion on Long-term Operation of the Central Valley Project and the State Water Project, Consultation Tracking Number: WCRO-2016-00069 for the long-term operation of the CVP and SWP or concisely known as the 2019 biological opinions (BiOps) from USFWS and NMFS.

Exports – total combined pumping at the Jones Pumping Plant and the Clifton Court Forebay (CCF) inflow minus Byron-Bethany Irrigation District withdrawals.

Foregone Exports – Volume of water that could be exported under the Reference Operation but is not exported.

Projects – The combined facilities and operations of the State Water Project and the Central Valley Project.

Reference flow and reference operation - that flow or operation that would occur absent the Flow Measures set forth in the Agreements to Support Healthy Rivers and Landscapes.

Unstored flows – The volume of water available for Project export under the Bureau of Reclamation's and DWR's water rights that are in excess of storage withdrawals.

2 Flow Measures

A memorandum of understanding (MOU) dated March 29, 2022, outlined the Export Flow Measure volumes that the SWP and CVP (Projects) would provide to enhance Delta outflow through the Healthy Rivers and Landscapes Program (Program). These volumes are dependent on the Sacramento Valley Water Year Index and are summarized as follows:

Table 2: Export Flow Measure Volumes by Sacramento Valley Water Year Index

Critical	Dry	Below Normal	Above Normal	Wet
0 TAF	125 TAF	125 TAF	175 TAF	0 TAF

The primary window for the Export Flow Measure is the March through May period, where the initiation of the action may occur as early as March and will be based primarily on the most recent Bulletin 120 (B120) Forecast but may also include other forecasts of the Sacramento Valley Water Year Index (SVI). Projects will begin implementing the Export Flow Measure through reductions in exports based on the 90% exceedance hydrology in March and the 75% exceedance hydrology in April. The Flow Measure will transition to using the 50% exceedance hydrology in May, consistent with the final water year type determination.

To supply the volumes, the Projects will export less water from the Delta through Clifton Court Forebay and Jones Pumping Plant (exports) than compared to the Reference Operation (defined in Section 3.1.1).

Flows required by other agreements such as the Water Storage Investment Program are not intended to count towards the Export Flow Measure.

3 Flow Measure Accounting

3.1 Reference Operation

Section 4.1 in the Term Sheet to the 2022 MOU states that, "VA Flow Measures will be additive to the Delta outflows required by Revised Water Rights Decision 1641 (Revised D-1641) and resulting from the 2019 Biological Opinions (BiOps), although the 2019 Biological Opinions may be modified, including to resolve litigation concerning those opinions". The 2019 BiOps are in the process of being updated as the MOU anticipated. A Biological Assessment (BA) of the Proposed Action was released November 8, 2023. The Projects expect new BiOps to be issued by FWS and NMFS in 2024.

The Projects propose to use the 2024 BiOps as the Reference Operation for the Export Flow Measure. This means that the volumes in Table 1 would be additive to the flows resulting from the 2024 BiOps. This proposal is based on the following considerations:

- An expectation that the 2024 BiOps will be the same as the proposed action in the BA
- If that expectation is correct, the 2024 BiOps will rely almost exclusively on predetermined criteria based on biological or abiotic factors, with limited use of risk assessments and real-time decision making.
- Accounting for the Export Flow Measure will be facilitated by having a reference operation that is consistent with the regulations in place and being implemented at the time of the action.

In addition to being based on the BiOps and D-1641, the Reference Operation for the Export Flow Measure includes an accounting methodology to track the additional Delta inflow from upstream Healthy Rivers and Landscapes Flow Measures to ensure that exports do not divert any of the additional flow. This accounting methodology is fully described in the Delta Accounting Procedures (included in Appendix E to the Strategic Plan). A short summary is described below to provide the context for the Reference Operation upon which the Export Flow Measure will be additive.

As per the Delta Accounting Procedures, tributary Flow Measure deployment plans will be used to develop regulatory offsets that reflect the incremental flow and water quality differences that would occur with additional Program inflows. These offsets will be used during real-time Project operations to demonstrate that Program flows are not exported. The resulting export operation, including regulatory offsets, would become the reference operation from which the Export Flow Measure would be measured. The reference operation will provide a regulatory offset for each applicable requirement and will reflect water quality and flow changes expected with additional upstream Program flows entering the Delta, as described in the Delta Accounting Procedures. A breakdown of key operational criteria that will need to be evaluated to perform this calculation follows.

1. Available export capacity at Project export facilities.

    a. Physical capacity for Clifton Court Forebay (CCF) inflow and Jones pumping.

    b. The U.S. Army Corps of Engineers permit, which limits inflow to CCF.

2. Storage and facility limitations downstream of the export facilities, when applicable.

    a. Capacity of downstream canals and aqueducts.

    b. Available unused storage in San Luis Reservoir, O'Neill Forebay and the State Water Project's Southern Reservoirs.

    c. Direct demand at times when capacity or storage constraints limit the ability to store pumped water.

3. Old and Middle River Index requirements (OMRI) with applicable regulatory offset to reflect upstream Program contributions.

    a. A default OMRI of –5,000 cfs will be used, unless a prescriptive action (a Condition of Approval in the 2024 ITP, or a conservation measure in the 2024 BiOps) requires an OMRI less negative than –5,000 cfs.

    b. Any Export reductions for species not covered by the 2019 BiOps would be counted toward meeting the Export Flow Measure. In other words, for the 2024 BiOps, longfin export constraints would be excluded as a reference operation, and export reductions made for longfin would count toward the Export Flow Measure.

4. Requirements in SWRCB Decision 1641 (D-1641) with applicable regulatory offset to reflect upstream HR&L contributions.

    a. Habitat Protection Outflow Requirements (X2).

    b. Requirements for Percent of Inflow Diverted (E/I).

    c. Agricultural water quality requirements at Jersey Point and Emmaton.

    d. Water quality along the OMR corridor and Jersey Point and Bethel Island. These locations are used as guidance for compliance with the water quality objectives for M&I, requiring year-round 250 mg/l Chloride and a specific number of days of 150 mg/l Chloride.

    e. Curtailment of combined Project exports to no greater than the San Joaquin River flow at Vernalis for 30 days from mid-April to mid-May, or to no less than 1,500 cfs when the flow at Vernalis is below 1,500 cfs.

5. Minimum combined exports of 1,500 cfs .

6. Availability of Unstored water. Stored Project water will not be used for meeting the Export Flow Measure when in balanced conditions. No cuts to exports will be made for the Export Flow Measure when the Projects are making storage withdrawals to manage Delta requirements.

3.2 Measuring Export Flow Measure Deployment above Reference Operation

Flows for the Export Flow Measure will be made available through foregone exports, where foregone exports will be determined based on actual export volume and what could have been exported under the Reference Operation[5].

3.3 Real Water Verification

When Project exports are lower than the exports defined by the reference operation, the difference between those will represent the export contribution volumes the Projects have provided through export reduction.

The Delta Accounting Procedures section provides a methodology for developing regulatory offsets for daily operations and after-the-fact assessment and true-up. With this methodology, it is expected that any identified redirected impacts would be reimbursed through the true-up process.

[5] Maintenance and/or repair of facilities will be allowed during the Export Flow Measure action without affecting the determination of Reference Flow.

PWA Water Purchase Program

Last Updated: September 2024

Lead Drafter: Andy Chu, DWR

1 Definitions

2 Flow Measures

Flow Measures described in the Public Water Agency (PWA) Water Purchase Program will be obtained through a free market program for single-year transfers, subject to applicable law.

The table below shows the flow contributions in acre-feet from the PWA Water Purchase Program.

Water Year	**Critical**	**Dry**	**Below Normal**	**Above Normal**	**Wet**
Fixed Price	3	63.5	84.5	99.5	27
Sacramento Valley North of Delta		*10*	*10*	*10*	
Central Valley Project South of Delta		*17.5*	*31.5*	*40*	
Westland Water District South of Delta	*3*	*6*	*15*	*19.5*	*27*
State Water Project South of Delta		*30*	*30*	*30*	
Market Price	0	50	60	83	0

3 Flow Measure Accounting

In general, the water purchase through the PWA Water Purchase Program follows a typical water transfer transaction initiated by a willing seller who has legal water rights to a supply of water of interest to a potential buyer. The framework outlined in the Draft Technical Information for Preparing Water Transfer Proposals dated December 2019 (Water Transfer White Paper) provides helpful guidelines on flow accounting and real water verification for cropland idling, groundwater substitution, and reservoir reoperation types of water transfers. Flow purchases will be developed through a variety of mechanisms and generally follow typical water transfer protocols:

- Forgone Exports at the South Delta: For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in "Quantitative Flow Accounting Procedures for Delta Exports".
- Cropland idling water transfers, as described in the Water Transfer White Paper, make water available by reducing the consumptive use of surface water applied for crop irrigation. Examples of cropland idling flow accounting procedures can be found in the Feather and Sacramento Flow Measures description.

- Groundwater substitution water transfers, as described in the Water Transfer White Paper, make surface water available for transfer by increasing groundwater pumping to reduce surface water diversions. Examples of groundwater substitution flow accounting procedures can be found in the American, Feather, and Sacramento Flow Measures description.
- Reservoir Reoperation (or Storage Release) makes water available for transfer by increasing in reservoir release from the seller reservoir beyond the baseline release under normal operations. Examples of reservoir reoperation flow accounting procedures can be found in the Yuba and Feather Flow Measures description.

3.1 Reference Flow

For water sources listed in Appendix E of the Strategic Plan, the reference flow should be similar. Otherwise, the reference flow generally covers the following areas - minimum instream flow requirements, flood risk reduction needs, and other existing downstream demand without the Flow Measure.

3.2 Measuring Purchased Flow Deployment above Reference Flow

Flow contributions listed in the above table need to be measured above the reference flow at the established water source or gauging station. Necessary coordination is required for the timing of flow deployment.

3.3 HR&L Real Water Verification

In general, all real water verification procedures follow the water transfer framework described in the Water Transfer White Paper, which was prepared by DWR and USBR in coordination with SWRCB. For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in “Quantitative Flow Accounting Procedures for Delta Exports”.

References

Draft Technical Information for Preparing Water Transfer Proposals, dated December 2019, prepared by California Department of Water Resources and Bureau of Reclamation, California-Great Basin Region, https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf

State Water Purchase Program

Last Updated: September 2024

Lead Drafter: Erik Loboschefsky, DWR

4 Definitions

5 Flow Measures

Flow Measures described in the State Water Purchase Program will be obtained from willing sellers as further described in the State Water Purchase Program Memorandum of Understanding[6].

The table below shows the flow contributions in acre-feet from the State Water Purchase Program.

Water Year	Critical	Dry	Below Normal	Above Normal	Wet
State Water Purchases*	65	108	9	52	123

*State to permanently acquire 65TAF of water in all water year types to contribute to meeting the flow targets. After applying this 65TAF in all water years a gap of 43TAF will persist in D years and a gap of 58TAF will persist in W years; however, there will be a surplus of 56TAF in BN years and a surplus of 13TAF in AN years. D and W year gaps to filled by redistributing a portion of the PWA (Public Water Agency) water purchase contribution from BN and AN years, and through additional State water purchases in W years. (March 2022 MOU)

6 Flow Measure Accounting

In general, the State Water Purchase Program will fund water purchases to enhance instream flow that may include water right sales or water transfers, including long-term water transfers, from willing sellers who have legal rights to a supply of water. The framework outlined in the Draft Technical Information for Preparing Water Transfer Proposals dated December 2019 (Water Transfer White Paper) provides helpful guidelines on flow accounting and real water verification for cropland idling, groundwater substitution, and reservoir reoperation types of water transfers. The guidelines will inform accounting and real water verification protocols for any water transfers or water right sales from such sources. Flow purchases accounting will be developed through a variety of mechanisms including, where applicable, typical water transfer protocols:

- Cropland idling water transfers, as described in the Water Transfer White Paper, make water available by reducing the consumptive use of surface water applied for crop irrigation. Examples of cropland idling flow accounting procedures can be found in the Feather and Sacramento Flow Measures description.

[6] Memorandum of Understanding between the California State Water Resources Control Board, the California Natural Resources Agency, and the California Department of Water Resources for the purpose of specifying responsibilities for implementing the Healthy Rivers and Landscapes Program State Water Purchase flow measures.

- Groundwater substitution water transfers, as described in the Water Transfer White Paper, make surface water available for transfer by increasing groundwater pumping to reduce surface water diversions. Examples of groundwater substitution flow accounting procedures can be found in the American, Feather, and Sacramento Flow Measures description.
- Reservoir Reoperation (or Storage Release) makes water available for transfer by increasing in reservoir release from the seller reservoir beyond the baseline release under normal operations. Examples of reservoir reoperation flow accounting procedures can be found in the Yuba and Feather Flow Measures description.
- Forgone Exports at the South Delta: For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in "Quantitative Flow Accounting Procedures for Delta Exports".

6.1 Reference Flow

For water sources listed in Appendix E of the Strategic Plan, the reference flow should be similar. Otherwise, the reference flow generally covers the following areas - minimum instream flow requirements, flood risk reduction needs, and other existing downstream demand without the Flow Measure.

6.2 Measuring Purchased Flow Deployment above Reference Flow

Flow contributions listed in the above table need to be measured above the reference flow at the established water source or gauging station. Necessary coordination is required for the timing of flow deployment.

6.3 HR&L Real Water Verification

In general, all real water verification procedures follow the water transfer framework described in the Water Transfer White Paper, which was prepared by DWR and USBR in coordination with SWRCB. For any flow purchases achieved through export reductions, such accounting would be additive to and follow the flow accounting procedures described in "Quantitative Flow Accounting Procedures for Delta Exports".

References

Draft Technical Information for Preparing Water Transfer Proposals, dated December 2019, prepared by California Department of Water Resources and Bureau of Reclamation, California-Great Basin Region, https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/State-Water-Project/Management/Water-Transfers/Files/Draft_2019WTWhitePaper-012324.pdf

Delta Accounting Procedures

Last Updated: August 2, 2024

Drafted by: DWR and Reclamation

Introduction

The purpose of this document is to provide a foundation for a framework to account for and demonstrate that water made available under the Healthy Rivers and Landscapes Program (HRLP) is (1) "new" water to the system, (2) contributes to Delta Outflow. This demonstration method should not be interpreted as a commitment by the Central Valley Project (CVP) or State Water Project (SWP) to make up for any potential losses or illegal diversion of the "new" HRLP water to the system, either upstream of the Delta or in-Delta. Additional coordination is required with the State Water Board to identify mechanisms within its authority, any additional data needs, or other efforts that would be required to ensure protection of water being made available under the HRLP, consistent with the March 2022 MOU. This accounting document also does not fully address increased flows from the San Joaquin River that would occur with implementation of the Bay-Delta Water Quality Control Plan (WQCP) update.

Background

The SWP and CVP (collectively referred to as "Projects") play a substantial role in managing the Sacramento River and San Joaquin River systems. The Projects ensure "In-Basin Uses" are met before developing water supply for their respective water supply contractors. In-Basin Uses include many legal uses of water in the Sacramento Basin and specified DWR and Reclamation settlement contractors. The Projects also meet applicable Delta flow and water quality objectives pursuant to the WQCP before developing water supply for their contractors. The current WQCP, as implemented through Water Rights Decision 1641 (D-1641), requires the Projects to meet the quantitative Delta flow and water quality standards established by the State Water Board. As set forth below, the Projects are also required to meet standards and take actions to comply with the Endangered Species Act and California Endangered Species Act. DWR and Reclamation closely coordinate Project operations to meet their obligations.

The availability of unregulated flow for diversion by the water projects is determined based on whether the Delta is in "excess" or "balanced" conditions as defined under the Coordinated Operation Agreement. The Delta is in "balanced conditions" when releases from upstream reservoirs plus any unregulated flow approximately equals the water supply needed to meet Sacramento Valley In-Basin Uses, including applicable Delta Standards, plus exports. The Delta is considered to be in "excess conditions" when releases from upstream reservoirs plus unregulated flows exceed Sacramento Valley In-Basin Uses, including applicable Delta standards, plus exports.

Unregulated flows are first used to meet Sacramento Valley In-Basin Uses, including applicable Delta standards, then the Projects may divert any remaining flows. Operations on other upstream tributaries where CVP and SWP facilities do not exist within the Delta watershed can influence the amount of unregulated water available. In balanced conditions, when unregulated flows are insufficient to meet Sacramento Valley In-Basin Uses, including applicable Delta standards, the Projects release (pass through), reservoir inflows downstream. If this volume of flow is still insufficient to meet standards, then the Projects release previously stored Project Water. When stored Project water is released, this water is not available for diversion by water rights holders subject to Term 91.

In addition to Sacramento Valley In-Basin Uses, including applicable Delta standards, and the terms of their water rights permits, DWR and Reclamation operate the Projects pursuant to Biological Opinions (BiOps) issued by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service for the long-

term operation (LTO) of the CVP and SWP, pursuant to the Endangered Species Act (ESA). DWR also operates the SWP pursuant to an Incidental Take Permit (ITP) issued by the California Department of Fish and Wildlife for the long-term operations of the SWP. Together, the BiOps and the SWP-specific ITP require DWR and Reclamation to substantially alter the manner in which they jointly operate the SWP/CVP facilities for protection of listed species. Operating to the BiOps and ITP tends to limit the Project exports in the winter and spring and can further increase the occurrence of excess conditions due to these restrictions on exports.

Under most circumstances, flow volumes within the Delta are managed by the Projects, through meeting Delta standards and managing upstream storage withdrawals and exports. As the Projects are the water conveyance facilities with the greatest control over Delta flow volumes, the Projects will play a critical role in operating, consistent with the terms in the MOU, to account for the enhanced flows released under the HRLP to appear as Delta Outflow. This document explains the framework of a methodology that will demonstrate how the Projects are not diverting the enhanced HRLP flows, while giving operators a clear and defensible target as a basis for day-to day operational decisions.

Enhanced HRLP Flows Considered in this Document

This document only addresses the following HRLP flow contributions:

- Sacramento River
- Feather River
- Yuba River
- American River
- Mokelumne River
- Putah Creek
- Friant Division operations on Upper San Joaquin River
- Tuolumne River
- CVP/SWP Export Reduction
- Water purchases

Additional implementation and accounting methodology would be developed in the future for any flow contributions not listed above. The specific accounting approach for each HRLP water source is described in the Draft Strategic Plan – Appendix E (Flow Accounting). The accounting approach for any payback and avoidance of redirected impacts resulting from tributary-specific refill are described in tributary-specific Implementing Agreements.

The HRLP proposal includes flow contributions through several water purchase programs. The source for these water purchases could be reservoir reoperation, demand reduction (e.g., fallowing), groundwater substitution or export cuts. The Delta Accounting Framework addresses each of these sources separately as appropriate for their circumstances.

Accounting Framework Overview

Accounting of enhanced flow under the HRLP proposal generally consists of four fundamental components (Figure 1):

1. The accounting for enhanced Delta inflows from the contributing Delta tributaries.

2. Adjustments for losses and travel time
3. The accounting for enhanced tributary flows as increased Delta outflow (i.e. not exported by the Central Valley Project (CVP) or the State Water Project (SWP) or diverted by other in-Delta water diverters).
4. The accounting of enhanced Delta Outflow from export cuts under the Export VA

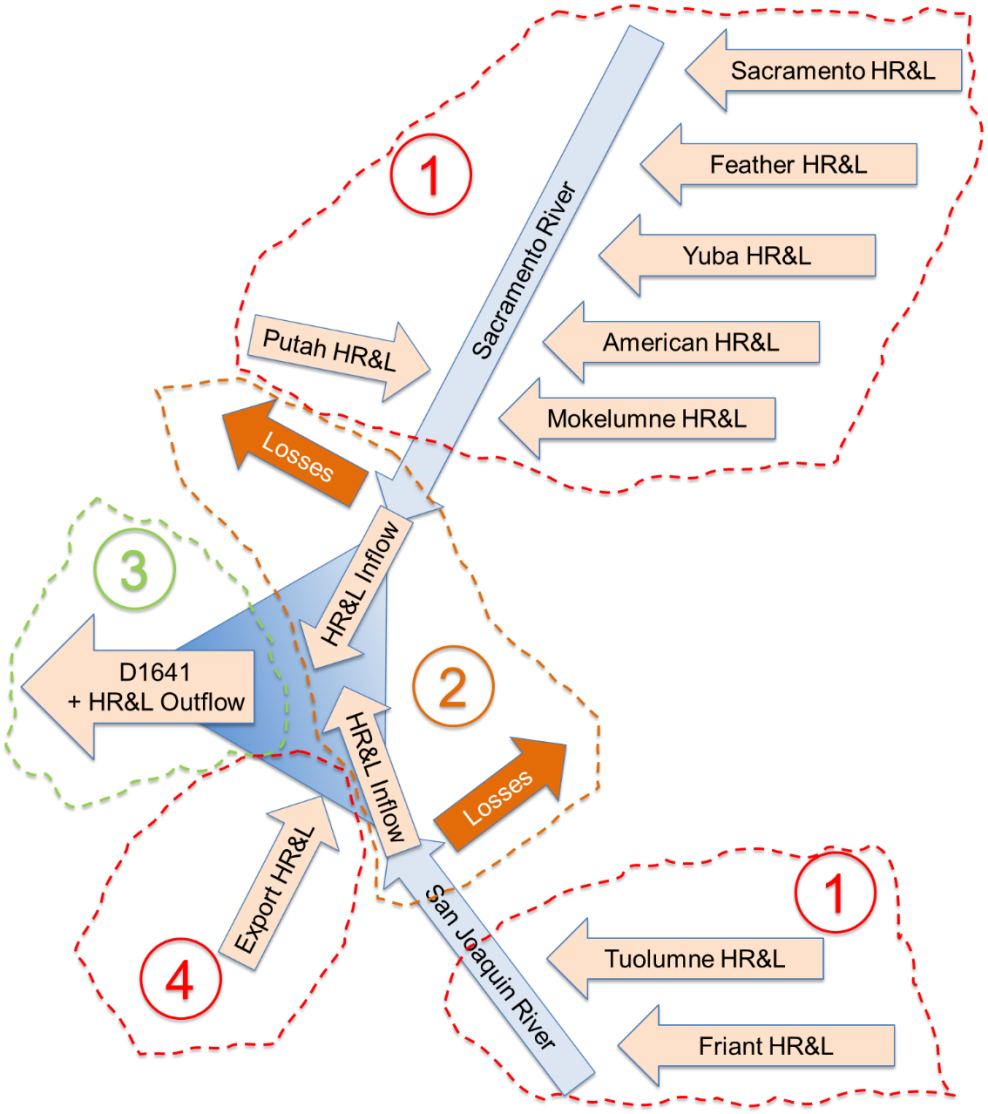


Figure 1: Four primary components of HR&L Accounting

This document primarily focuses on the second of these components and presents an operational method that will account for how water made available under the HRLP agreements contributes toward a greater outflow.

Most of the tributary contributions are measured at a downstream control point within the individual tributaries. The accounting methodology in this document requires several assumptions or methods/tools (e.g., groundwater depletions or other losses, any diversions between the downstream end of the tributary and the Delta inflow location, travel time/hydrologic routing, potential diversions in the Delta, salinity offsets etc.). If the actual conditions differ from the assumptions stated in this document, it may result in less Delta inflow and/or outflow and can have direct impact on the Project water supplies. Therefore, additional efforts are necessary to ensure the impact to the Project supplies is avoided.

This methodology makes simplifying assumptions in a complex system, however through implementation and gathering of additional data, adjustments may be warranted.

As part of the accounting, the HRLP program will coordinate with Water Board to develop a method for any additional surface water and groundwater monitoring to account for water lost to the environment, to be differentiated from water unlawfully diverted. The accounting methodology is developed to provide additional outflow of pre-determined quantities above that provided in the 2019 biological opinions baseline, which includes operations to the State Water Board D-1641 standards. As such, HRLP flows will not be included in the accounting of flow necessary to meet D-1641, or in the determination of D-1641 compliance locations that are variable based on flow or X2 location (i.e., winter-spring X2). Similarly, to protect HRLP flows from increased diversions, the HRLP flow will not be included in the calculations to determine available flow or water quality for Delta diversions (i.e., X2 requirements in the Contra Costa Water District (CCWD)-specific BiOps regarding CCWD's diversions or OMR requirements in the LTO BiOps at the Projects' south Delta).

For the Projects, day-to-day operational decisions must be made quickly, and often with limited or incomplete information. Most days, the planned operation of the Projects is settled before 9:00 a.m. Due to the complications of coordinating the enhanced flows associated with HRLP along the tributaries in real-time, the Projects are proposing a more aggregate method of accounting for these flows in real-time that would approximately meet the intended flows. This aggregate real-time method would then be followed up with a more detailed post-season accounting to "true up" and balance any unmet obligations.

The accounting methodology being proposed is based around developing a set of adjustments or "offsets" to each operational criteria that could control Project operations while the HRLP flows are being deployed during balanced Delta conditions. The Projects would then operate to each relevant operational criteria and its adjustment. A breakdown of the key steps in this framework follows.

1 Develop Projected Flow Schedule

At the beginning of the HRLP season, an initial forecast of HRLP tributary flows would be provided to the Projects from the tributary operators. The forecast should consist of a time-step aggregated average flow volumes, adjusted for losses to the Delta from each tributary operator. Tributary project operators would finalize a schedule prior to initiating the flow action and be obligated to adhere to this schedule and would immediately notify the Projects of any unavoidable deviations from the flow schedule. The flow projections would then be aggregated into Sacramento and San Joaquin River components.

2 Apply Losses and Travel Time Adjustments to Flow

The assumed time lag and losses for daily scheduled HRLP tributary flows entering the Delta are tabulated below. These assumptions will be updated as needed through periodic review and based on monitoring information.

Table 1: Tributary flow measure assumptions for Delta outflow

Contribution	**Downstream Control Point**	**Travel Time to Delta Outflow**	**Losses from Control Point to Delta Outflow**	**Flows Included in Regulatory Offsets**
Sacramento River	Keswick	5 days	0%	Yes
Feather River	Oroville Complex	3 days	0%	Yes

Contribution	Downstream Control Point	Travel Time to Delta Outflow	Losses from Control Point to Delta Outflow	Flows Included in Regulatory Offsets
Yuba River	Marysville Gauge	2 days	0%	Yes
American River	Nimbus	1 day	0%	Yes
Mokelumne River	Camanche Dam	1 day	0%	No
Putah Creek	Putah Diversion Dam	2 days	0%	No
Friant	Vernalis	1 day	0% (losses to Vernalis are part of recapture accounting)	Yes
Tuolumne River	La Grange	2 days	10%	Yes
CVP/SWP Exports	CCF/Jones PP	0 day	0%	No
Water Purchases	Varies	Varies	0% for Sacramento 10% for San Joaquin	Yes

Most tributary flow measures will be included in the development of regulatory offsets, where the Projects demonstrate that those flows are not benefiting the Projects (the following steps 3 to 6), however other flows measures (noted in Table 1) follow an alternative accounting approach. These alternative approaches are described in the Contributions with Alternative Approaches section below.

3 Develop Adjustments to Operational Objectives (Operational Regulatory Offsets)

Regulatory offsets would then be calculated based on this tributary flow schedule for the coming season. These offsets would be designed for the Projects to operate above the requirements in D-1641 and the BiOps by the incremental volume contributed by the enhanced HRLP flows (offset). These regulatory offsets, representing additional flows from HRLP contributions would result in operations that are more restrictive than the requirements under D-1641 and the BiOps. Project operators would use these operational offsets in addition to other project objectives in real-time operations. This would in turn give Project operators a defensible and transparent set of criteria to base their operations on while waiting for complete information to become available. Examples of how these enhanced operations for key criteria that would apply during deployment follows:

1. **D-1641 Agricultural Water Quality Standards**
    a. **Overview:** D-1641 contains several Agricultural Water Quality standards that apply April 1-August 15. The most likely to control Project operations are standards at Jersey Point on the San Joaquin River and Emmaton on the Sacramento River.
    b. **Operational Offset:** These standards could be adjusted to require a fresher water quality. The incremental improvement to quality would be based on the improvement to quality

associated with the addition of the enhanced HRLP Flows. DSM2 or other models could be used to determine this improvement to quality equivalent to an increment of flow.

c. **Example:** In a dry year, the Jersey point standard is 1670 mS/cm on a 14-day average. If 1000 cfs of enhanced HRLP flow were released in this month, DSM2 could be run to determine the incremental improvement to EC associated with this flow. For example, if this 1000 cfs flow is shown to offer an improvement of 350 mS/cm, this could be subtracted from the D-1641 standard and Project operators would meet a standard of 1320 mS/cm on a 14-day average.

2. Habitat Protection Outflow D-1641 Requirements (X2 Requirements):

a. **Overview:** The habitat protection outflow (X2) standard in D-1641 requires X2 be maintained at Port Chicago, Chipps Island or Collinsville. It can be maintained through either meeting an outflow requirement on a 3-day average basis (29,200 cfs, 11,400 cfs and 7,100 cfs for Port Chicago, Chipps and Collinsville respectively) or by meeting a water quality of 2,640 uohms/cm on either a daily or 14-day average basis.

b. **Operational Offset:** An offset could be determined to make adjustments to both the flow and EC requirements in X2. Flow criteria would be adjusted upward, while EC would be adjusted to a fresher criterion to account for the additional HRLP flows in the system.

c. **Example:** Each compliance location would be adjusted (Ex: for a 1000 cfs volume of enhanced HRLP flow and an equivalent EC offset of 300 mS/cm at Port Chicago and 250 mS/cm at Chipps could be met with 30,200 cfs outflow or an EC of 2340 mS/cm, Chipps could be met with 12,400 cfs or 2390 mS/cm, etc).

3. Percent of Inflow Diverted (EI Requirement):

a. Overview: D-1641 contains requirements for the ratio of how much of the total inflow into the Delta can be diverted by the Projects at their export facilities.

b. **Offset:** Because the Projects have some level of control over both the export and the inflow component of this requirement, it is not possible to directly calculate an offset from the anticipated HRLP flow contributions. Rather, the real-time compliance with this requirement would be based on reducing the calculated amount of Delta Inflows by the time-step averaged anticipated HRLP flows, before running the EI calculation.

c. **Example:** Total Delta inflow is at 10,000 cfs, which includes an enhanced HRLP flow of 1,000 cfs deployed per the pre-season flow schedule. Compliance with the EI requirement would be based on reduced inflow of 10,000-1,000 cfs or 9,000 cfs.

4. Old and Middle River Index Requirements.

a. **Overview:** A major operational target present in the Biological Opinions is the Old and Middle River flow index. This is an index approximating the aggregate flow in the Old and Middle Rivers in the central Delta. The index is a regression of the form:

i. **OMR** = *A****SJR** + *B****EXP**+*C*

ii. Where **OMR** is the Old and Middle River flow index, **SJR** Is the San Joaquin River flow at Vernalis, **EXP** is the combined Project Exports, and *A*, *B* and *C* are regression parameters.

b. **Operational Offset:** To determine an adjusted OMR target for the enhanced HRLP flow, the OMR required under the BiOp can be adjusted by adding the A term multiplied by the enhanced HRLP flow on the SJR tributaries. This can be demonstrated algebraically.

c. **Example:** if the BiOps require an OMR of -5000 cfs, and Grant Line Canal Barrier is not installed, the *A* coefficient is .471. If there is 500 cfs of enhanced HRLP tributary flow from the SJR tribs, the HRLP enhanced OMR requirement would be equal to -5000 + .471* 500 cfs or -4765 cfs.

4 SWP/CVP Operate to Regulations plus Offsets

After developing regulatory offsets based on anticipated additional HRLP inflows, the Projects demonstrate that the HRLP inflows are not exported by showing that existing regulations, plus the regulatory offsets, are being met. As long as the Projects have demonstrated that the flows are not being exported using the methods outlined above, the additional HRLP inflows will be deemed to result in Delta outflow.

The Projects will confirm that existing regulations would have been met without the HRLP flows in the system with a retrospective daily accounting.

5 Develop Retrospective Daily Accounting

After the daily volumes from each tributary operator are provided to the Projects, a more detailed accounting of obligations will take place. Though the exact timing of when this accounting will take place is yet to be determined, a rough draft of this could begin once the data is made available, then refined as more information becomes available until a final post season accounting is finalized. Each tributary operator will provide daily flows on a frequency as needed to support implementation. For this daily accounting, the aggregate daily HRLP flow for the Sacramento and San Joaquin Rivers would be deducted from the respective Delta inflow gages (Freeport and Vernalis for the Sacramento and San Joaquin respectively as well as any Eastside Streams components) for purposes of determining regulatory compliance. Then a hypothetical daily operation would be developed based on these adjusted flows (i.e., the actual Delta inflow less the HRLP contributions), where the Projects are operating to the un-adjusted standards and obligations, which will be used as a basis for demonstrating the daily HRLP outflow contribution.

Unlike the operational offsets, for the retrospective daily accounting, the adjustments will be made to the actual flow conditions, rather than to the operational targets. This is necessary to ensure the original intent of the HRLPs are met, while also giving Project operators a basis to operate to while waiting for complete information.

An example of how this adjustment would be approached follows:.

For a particular day, the HRLP flows can be aggregated as follows:

- Sacramento Component: 5000 cfs
- San Joaquin Component: 500 cfs

The flow volumes at Freeport and Vernalis would be reduced by these values such that the total flow for each side is recalculated without these components. A hypothetical set of reservoir releases and Project exports would then be calculated to see if compliance with the existing operational standards in D-1641 and the BiOps is met.

6 Reconcile Differences

While steps will be taken to ensure that the deployment of the HRLP water is passed through the Delta, some level of temporal mismatch is unavoidable. As a result of real-time conditions during implementation and reasons beyond control of the HRLP parties (such as summer energy emergencies where CalISO requests immediate hydropower releases), there may be discrepancies between the proposed added HRLP flow schedule and actual added HRLP flows that may not be apparent beforehand. These would ultimately lead to discrepancies in the flow accounting. Two key types of discrepancies can arise and are described as follows:

6.1 Scheduled HRLP Inflows to the Delta versus Actual HRLP Inflows

This type of discrepancy can be corrected as the season progresses. Once enough information becomes available, the daily accounting can be initiated, and a summation of the actual HRLP flows contributed can be calculated and compared to those in the flow schedule provided by the tributaries. Any discrepancy can be applied to the next month's operational offsets, by adjusting the proposed HRLP flow in the tributary flow schedule by this discrepancy. For example, if March numbers are finalized and a 20 TAF overshot discrepancy in the pre-season flow schedule compared to the obligation is calculated, this would be deducted from the flow schedule for the months of April and May, and the operational offsets would then be recalculated with this updated HRLP flow. Note that a downward adjustment would apply up to the point where the adjusted HRLP flow contribution is zero so as not to operate below existing standards. This may result in deficits that are not resolved but would be moved to the subsequent months.

6.2 Discrepancies due to HRLP party contribution mismatch and real-water determination

Some components of the HRLP flows will not be fully understood until after complete deployment and the end of the HRLP season. This applies mainly to water that will need to be verified through the real-water determination process. This type of reconciliation will require coordination between the Projects and the HRLP tributary parties. A reconciliation process has not yet been developed for all tributaries and will be developed following the April 24-26 SWB workshop.

Additional Considerations for D-1641 X2 Requirements

A couple of other considerations arise with this methodology. Due to the additional flows in the system associated with the HRLP, there is potential to trigger the Port Chicago X2 requirement when it would not have been triggered absent the additional HRLP flows. In the event this triggers only but for the additional HRLP flows, the requirement should not apply. Conversely, HRLP flow contributions should not be used when calculating the applicable carryover X2 days from one month into the next.

Project Reference Operation Overview

The SWP and CVP manage Project reservoirs (Shasta, Oroville, and Folsom) for developing water supply for later beneficial uses, while also being managed to ensure regulatory requirements are being met. In doing so, the control point may shift throughout the season depending on hydrology and regulatory requirements. These reservoirs generally have three categories of control 1) minimum in-stream flow requirement, 2) flood control requirements, and 3) downstream needs, including the Delta requirements and supporting exports.

As described in the individual tributary accounting documents for these Project reservoirs, during periods of minimum in-stream flow requirements and flood control, additional HRL flows will be demonstrated and verified in the tributary.

However, for conditions where the Project reservoirs are being operated to meet Delta requirements and exports the control becomes the Delta requirements for flow or water quality. During periods when offsets are applied to demonstrate additional HRL flows go as Delta outflow, the regulatory requirements plus the offsets, become the control point for the Project reservoir. With adding the HRL flows facilitated by the Project reservoirs to the offsets, the Projects are able to demonstrate additional flows from Project reservoirs by demonstrating that the regulatory requirements plus the offsets, including those for Project reservoirs, are met.

Overview of Balanced and Excess conditions under COA

As mentioned previously in this document, conditions in the Delta generally fall into one of two conditions, balanced and excess. These conditions depend on whether the system is being actively managed to meet in-basin use obligations and Project Exports or if the total water in the system is greater than what the Projects are able to make use of and thus export. Exact definitions of balanced and excess conditions follow, per the original 1986 agreement between the United States of America and the Department of Water Resources of the State of California for Coordinated operation of the Central Valley Project and State Water Project.

Balanced Delta Conditions: Periods when it is agreed by the Projects that releases from upstream reservoirs plus unregulated flow (approximately) equals the water supply needed to meet Sacramento Valley in-basin uses plus Project exports.

Excess Delta Conditions: Periods when it is agreed by the Projects that releases from upstream reservoirs plus unregulated flow exceed the water supply needed to meet Sacramento Valley in-basin uses plus Project exports.

While these conditions can be defined by these statements above as a binary, the reality of Delta conditions can take on many conditions that fall somewhere between the two. For example, in late spring there may be times when OMR is controlling exports, but water quality at the D1641 stations at JER and EMM are in a transitional zone, where they don't quite control operations, however operators understand that may change with even the slightest increase in exports. To give another example, there may be times where the X2 requirements are being met through outflow that is in excess of the requirements, however the extended weather outlook is exceedingly dry, and Project operators anticipate shifting to relying on the 14-day water quality to meet the requirement in a couple of weeks. Under these circumstances, Project operators may decide not to ramp up exports to get the outflow exactly at that which is required under X2 in the short term to maximize the benefit of the longer-term Water quality in meeting the same X2 requirement.

As a result of the type of complex Delta conditions described above that fall somewhere between balanced and excess, there can be no simple mathematical formulation for the determination of balanced and excess conditions. It is for this reason that this determination is left to the agreement of the Projects.

With the HRLP, the Projects will continue to make determinations of balanced and excess conditions, however when HRLP flows are in the system, this assessment and determination will recognize the additional requirements associated with the regulatory offsets.

Contributions with Alternative Approaches

Mokelumne River and Putah Creek flow measures

Currently, two tributary proposals will not be incorporated into the offset for Delta Outflow accounting. These are the Mokelumne River and Putah Creek. The flow contributions from these tributaries will not be incorporated into the accounting methodology described in this document and will not be incorporated into the offset calculations or protected from Project exports.

While not directly incorporated into the accounting methodology, the flows from these proposals may still contribute to enhanced Delta outflow, provided they come at times when the Delta is in excess conditions. As described in the previous section, under excess conditions, reservoir releases and unregulated flow are greater than water supply needed to meet in-basin use and Project exports. Thus, under these circumstances, the Projects would not be able to export the additional water made available from these proposals as there is already more water in the system than the Projects are able to utilize.

CVP/SWP Export flow measure

As described in the Export HRL Accounting, the reference operation from which the Export HRL flow is measured includes offsets associated with those tributaries identified in Table 1. The methodology described within this document demonstrates that the HRL flows from contributing tributaries are now exported and provides the basis for measuring the Export HRL flow measure. For this reason, the Export HRL flow measure would not be added into the regulatory offset.

To demonstrate that the Export HRL flow measure was additive, the Export HRL measure would be included in the Retrospective Daily Accounting (Step 5 above). This would demonstrate that export levels could have been at the calculated reference levels while meeting existing Delta requirements and would demonstrate that actual export levels were less and resulted in additional outflow.

Contributions through Water Purchases

Purchase of water for HRL program will follow the Transfer White Paper protocols for demonstration of new water and similar Flow Measure criteria listed in each source's Flow Accounting documents. Purchased water will be included in the regulatory offsets, adjusted for any losses and travel time associated with the source of the water being purchased.

Appendix C

Air Quality Model Outputs

Appendix C1

Assumptions

Table 3-12 Estimated Construction Schedule - NSJWCD

Part of Project	Work Months	Days	Years
North System	36	720	3
South System	28	560	2.33333333
Existing POD Flood-MAR	58	1160	4.83333333
ASR Wells	80	1600	6.66666667
Recharge Basins	100	2000	8.33333333

Table 3-13 Estimated Construction Schedule - SEWD

Part of Project	Work Months	Days	Years
Beckman ASR Well	4	80	1
West Linden Project	24	480	2
Recharge Basins	6	120	1

Table 3-14 Estimated Construction Schedule - WID

Part of Project	Work Months	Days	Years
Recharge Basins	30	600	2.5

Table 3-15 Estimated Construction Schedule – City of Stockton

Part of Project	Work Months	Days	Years
Dry Wells	4	80	1
Recharge Basins	30	600	2.5

Notes:

If the years are < 1, assumed 1 year for the purpose of converting lifetime emissions to annual averages

CalEEMod assumes 20 working days per month

Table 3-7: Estimated Construction Equipment Use - NSJWCD

Equipment			Part of Project – Equivalent Usage (Days)					
General Name	HP	Specific Name	North System	South System	PODs	ASR Wells	Recharge Basins	Total
Dozer	130	Catepillar D4, John Deere 650	0	0	0	0	840	840
Excavator (M)	200	John Deere 245G, 328D	175	148	106	150	1035	1614
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	125	83	180	0	0	388
Compactor	150	Catepillar CP-653E	254	186	286	150	195	1071
Loader (S)	80	John Deere 210LE	150	115	233	325	315	1128
Loader (L)	150	Volvo L120C	209	186	106	150	0	844
Telehandler	120	JLG 943	41	93	180	0	0	314
Water Truck	400	8000 gal.	150	93	233	325	2070	2871
Scraper	700	Catepillar 637E	0	0	0	0	2520	2520
Drill Rig	400	Estimated Ford truck F550 HP	0	0	0	250	0	250

Table 3-8: SEWD Estimated Construction Equipment Use - SEWD

Equipment			Part of Project – Equivalent Usage (Days)			
General Name	HP	Specific Name	West Linden Project	Mosher Creek	East Mosher Creek	Total
Dozer	130	Catepillar D4, John Deere 650	0	73	56	126
Excavator (M)	200	John Deere 245G, 328D	361	90	69	520
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	154	0	0	154
Compactor	150	Catepillar CP-653E	469	17	13	499
Loader (S)	80	John Deere 210LE	469	27	21	517
Loader (L)	150	Volvo L120C	364	0	0	364
Telehandler	120	JLG 943	128	0	0	128
Water Truck	400	8000 gal.	359	179	138	676
Scraper	700	Catepillar 637E	0	218	168	386
Drill Rig	400	Estimated Ford truck F550 HP	213	0	0	213

Table 3-9: Estimated Construction Equipment Use - WID

Equipment			Part of Project – Equivalent Usage (Days)		
General Name	HP	Specific Name	Storm Drain Basins	Recharge Basins	Total
Dozer	130	Catepillar D4, John Deere 650	63	245	308
Excavator (M)	200	John Deere 245G, 328D	78	302	380
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	0	0	0
Compactor	150	Catepillar CP-653E	15	57	72
Loader (S)	80	John Deere 210LE	24	92	116
Loader (L)	150	Volvo L120C	0	0	0
Telehandler	120	JLG 943	0	0	0
Water Truck	400	8000 gal.	156	604	760
Scraper	700	Catepillar 637E	189	735	924
Drill Rig	400	Estimated Ford truck F550 HP	0	0	0

Table 3-10: Estimated Construction Equipment Use – City of Stockton

Equipment			Part of Project – Equivalent Usage (Days)		
General Name	HP	Specific Name	Dry Wells	Recharge Basins	Total
Dozer	130	Catepillar D4, John Deere 650	0	245	245
Excavator (M)	200	John Deere 245G, 328D	18	302	320
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	8	0	8
Compactor	150	Catepillar CP-653E	24	57	81
Loader (S)	80	John Deere 210LE	24	92	116
Loader (L)	150	Volvo L120C	18	0	18
Telehandler	120	JLG 943	0	0	0
Water Truck	400	8000 gal.	18	604	622
Scraper	700	Catepillar 637E	0	735	735
Drill Rig	400	Estimated Ford truck F550 HP	12	0	12

Notes:

Drill rig will operate for 24 hours "for a limited period of time" - assumption applied to max daily emissions.

Table 3-11 Estimated Excavation for Various Pipe Sizes

Pipe Diameter (inches)	Typical Depth of Excavation (feet)	Max Expected Excavation (feet)	Width of Trenches (feet)
60	9	15	7
48	8	15	6
42	7.5	15	5.5
30	6.5	15	4.5
20	6	15	3.7
18	6	15	3.5
14	5.5	15	3.2

Table 3-4 NSJWCD Proposed Upgraded and New Pipelines

	Approximate Pipeline Length (ft)	Excavation Amounts (ft3)	Excavation Amounts (CY)	Pipeline Diameter (inches)
North and CalFed Systems	19,000	182,801	6,770	42
	1,300	12,507	463	42
	1,400	6,872	255	30
	1,400	1,497	55	14
	2,000	4,363	162	20
	20,000	62,832	2,327	24
	26,000	250,149	9,265	42
South System	11,500	225,802	8,363	60
	2,100	26,389	977	48
	16,000	201,062	7,447	48
	650	8,168	303	48
	50,000	157,080	5,818	24
Expanded Use of Private Pumps (PODs)	22,000	26,998	1,000	15
ASR Wells	11,000	34,558	1,280	24
	16,000	19,635	727	15

Table 3-5 SEWD Proposed New Pipelines

Approximate Pipeline Length (ft)	Excavation Amounts (ft3)	Excavation Amounts (CY)	Pipeline Diameter
66,000	1,295,907	47,997	60
7,000	137,445	5,091	60
7,000	137,445	5,091	60
10,000	17,671	654	18

Table 3-6 WID Proposed Lateral Pipelines

	Approximate Pipeline Length (ft)	Excavation Amounts (ft3)	Excavation Amounts (CY)	Pipeline Diameter
Lateral Pipelines	22,000	38,877	1,440	18

Notes:

No new pipelines are anticipated to be constructed for the City of Stockton

Excavation amounts for export were based on pipe area x length.

Excavation amounts were used to determine quantity of haul truck trips

CalEEMod Default

MASTER LIST				g/bhp-hr								
General Name	**CalEEMod Name**	**HP**	**Load Facto**	**ROG**	**NOx**	**CO**	**SO2**	**PM10E**	**PM2.5E**	**CO2**	**CH4**	**N2O**
Dozer	Rubber Tired Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004
Excavator (M)	Excavators	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004
Excavator (L)	Excavators	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004
Compactor	Plate Compactors	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005
Loader (S)	Tractors/Loaders/Backhoes	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004
Loader (L)	Tractors/Loaders/Backhoes	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004
Telehandler	Forklifts	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004
Water Truck	Off-Highway Trucks	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004
Scraper	Scrapers	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004
Drill Rig	Bore/Drill Rigs	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004
			HP Weighted EF:	0.219194	2.007985	2.112201	0.005224	0.085769	0.078638			

TIER 4

MASTER LIST				g/bhp-hr								
General Name	**CalEEMod Name**	**HP**	**Load Facto**	**ROG**	**NOx**	**CO**	**SO2**	**PM10E**	**PM2.5E**	**CO2**	**CH4**	**N2O**
Dozer	Rubber Tired Dozer	130	0.4	0.05	0.26	3.7	0.005	0.01	0.01	528	0.021	0.004
Excavator (M)	Excavators	200	0.38	0.05	0.26	2.6	0.005	0.01	0.01	528	0.021	0.004
Excavator (L)	Excavators	350	0.38	0.05	0.26	2.6	0.005	0.01	0.01	527	0.021	0.004
Compactor	Plate Compactors	150	0.43	0.05	0.26	3.7	0	0.01	0.01	0	0	0
Loader (S)	Tractors/Loaders/Backhoes	80	0.37	0.05	0.26	3.7	0.005	0.01	0.01	530	0.021	0.004
Loader (L)	Tractors/Loaders/Backhoes	150	0.37	0.05	0.26	3.7	0.005	0.01	0.01	526	0.021	0.004
Telehandler	Forklifts	120	0.2	0.05	0.26	3.7	0.005	0.01	0.01	527	0.021	0.004
Water Truck	Off-Highway Trucks	400	0.38	0.05	0.26	2.6	0.005	0.01	0.01	529	0.021	0.004
Scraper	Scrapers	700	0.48	0.05	0.26	2.6	0.005	0.01	0.01	528	0.021	0.004
Drill Rig	Bore/Drill Rigs	400	0.5	0.05	0.26	2.6	0.005	0.01	0.01	521	0.021	0.004
			HP Weighted EF:	0.05	0.26	2.858582	0.00472	0.01	0.01			
			% Reduction Tier 4:	77%	87%	-35%	10%	88%	87%			

Appendix C2

Unmitigated Emissions Summary

MICUP Construction
Air Quality Emissions
Unmitigated + Fleetwide Tier 4 Mitigated Analysis

Individual Project Summaries:		ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
NSJWCD		**lbs per day**						**Tons/year**					
Offroad Equipment	North System	1.89	13.54	17.18	0.05	0.52	0.48	0.06	0.42	0.50	0.00	0.02	0.01
	South System	1.89	13.54	17.18	0.05	0.52	0.48	0.06	0.40	0.50	0.00	0.02	0.01
	PODs	1.89	13.54	17.18	0.05	0.52	0.48	0.04	0.31	0.36	0.00	0.01	0.01
	ASR Wells	2.62	19.89	23.80	0.09	0.75	0.68	0.05	0.34	0.41	0.00	0.01	0.01
	Recharge Basins	3.50	34.67	31.48	0.07	1.48	1.36	0.35	3.84	3.41	0.01	0.16	0.15
Material Movement	North System	-	-	-	-	0.41	0.04	-	-	-	-	0.04	0.00
	South System	-	-	-	-	0.41	0.04	-	-	-	-	0.03	0.00
	PODs	-	-	-	-	0.41	0.04	-	-	-	-	0.04	0.00
	ASR Wells	-	-	-	-	0.41	0.04	-	-	-	-	0.05	0.01
	Recharge Basins	-	-	-	-	3.18	1.38	-	-	-	-	0.20	0.07
Hauling Emissions	North System	0.00	0.24	0.01	0.00	0.02	0.01	0.00	0.03	0.00	0.00	0.00	0.00
	South System	0.00	0.37	0.02	0.00	0.03	0.01	0.00	0.05	0.00	0.00	0.00	0.00
	PODs	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ASR Wells	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor Emissions	North System	0.01	0.61	0.02	0.01	0.05	0.02	0.00	0.08	0.00	0.00	0.01	0.00
	South System	0.01	0.61	0.02	0.01	0.05	0.02	0.00	0.08	0.00	0.00	0.01	0.00
	PODs	0.01	0.61	0.02	0.01	0.05	0.02	0.00	0.08	0.00	0.00	0.01	0.00
	ASR Wells	0.00	0.52	0.02	0.00	0.04	0.02	0.00	0.07	0.00	0.00	0.01	0.00
	Recharge Basins	0.00	0.52	0.02	0.00	0.04	0.02	0.00	0.07	0.00	0.00	0.01	0.00
Worker Emissions	North System	0.01	0.04	0.60	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00
	South System	0.01	0.04	0.60	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00
	PODs	0.01	0.04	0.60	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00
	ASR Wells	0.01	0.03	0.52	0.00	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00
	Recharge Basins	0.01	0.03	0.52	0.00	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Roadway Dust	North System	-	-	-	-	0.38	0.00	-	-	-	-	0.05	0.00
	South System	-	-	-	-	0.40	0.00	-	-	-	-	0.05	0.00
	PODs	-	-	-	-	0.33	0.00	-	-	-	-	0.04	0.00
	ASR Wells	-	-	-	-	0.29	0.00	-	-	-	-	0.04	0.00
Arch. Coatings	All	23.18	-	-	-	-		0.12	-	-	-	-	
Project Totals	**North System**	**25.09**	**14.43**	**17.82**	**0.06**	**1.40**	**0.56**	**0.18**	**0.53**	**0.58**	**0.00**	**0.11**	**0.02**
	South System	**25.09**	**14.56**	**17.82**	**0.06**	**1.43**	**0.57**	**0.17**	**0.53**	**0.58**	**0.00**	**0.11**	**0.02**
	PODs	**25.09**	**14.19**	**17.81**	**0.06**	**1.34**	**0.55**	**0.16**	**0.39**	**0.43**	**0.00**	**0.10**	**0.02**
	ASR Wells	**25.81**	**20.46**	**24.34**	**0.10**	**1.50**	**0.75**	**0.16**	**0.41**	**0.48**	**0.00**	**0.10**	**0.02**
	Recharge Basins	**26.69**	**35.22**	**32.02**	**0.07**	**4.72**	**2.77**	**0.47**	**3.91**	**3.48**	**0.01**	**0.36**	**0.22**
Max Emissions:		**26.69**	**35.22**	**32.02**	**0.10**	**4.72**	**2.77**	**0.47**	**3.91**	**3.48**	**0.01**	**0.36**	**0.22**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

MICUP Construction
Air Quality Emissions
Unmitigated + Fleetwide Tier 4 Mitigated Analysis

	SEWD	ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
		lbs per day						Tons/year					
Offroad Equipment	West Linden	2.97	22.27	27.58	0.10	0.84	0.77	0.19	1.40	1.69	0.01	0.05	0.05
	Mosher Creek	3.50	34.67	31.48	0.07	1.48	1.36	0.25	2.77	2.46	0.01	0.12	0.11
	East Mosher Creek	3.50	34.67	31.48	0.07	1.48	1.36	0.20	2.13	1.90	0.00	0.09	0.08
Material Movement	West Linden	-	-	-	-	0.41	0.04	-	-	-	-	0.09	0.01
	Mosher Creek	-	-	-	-	3.18	1.38	-	-	-	-	0.14	0.05
	East Mosher Creek	-	-	-	-	3.18	1.38	-	-	-	-	0.11	0.04
Hauling Emissions	All	0.01	0.79	0.03	0.01	0.07	0.03	0.00	0.10	0.00	0.00	0.01	0.00
Vendor Emissions	All	0.01	0.70	0.03	0.01	0.06	0.03	0.00	0.09	0.00	0.00	0.01	0.00
Worker Emissions	All	0.01	0.04	0.69	0.00	0.02	0.01	0.00	0.01	0.09	0.00	0.00	0.00
Roadway Dust	All	-	-	-	-	0.52	0.00	-	-	-	-	0.07	0.00
Arch. Coatings	All	23.18	-	-	-	-		0.12	-	-	-	-	
Project Totals	**West Linden Project**	**26.18**	**23.79**	**28.33**	**0.12**	**1.92**	**0.87**	**0.31**	**1.59**	**1.78**	**0.01**	**0.22**	**0.07**
	Mosher Creek	**26.70**	**36.19**	**32.23**	**0.08**	**5.33**	**2.80**	**0.37**	**2.96**	**2.55**	**0.01**	**0.34**	**0.17**
	East Mosher Creek	**26.70**	**36.19**	**32.23**	**0.08**	**5.33**	**2.80**	**0.31**	**2.32**	**1.99**	**0.01**	**0.28**	**0.13**
Max Emissions:		**26.70**	**36.19**	**32.23**	**0.12**	**5.33**	**2.80**	**0.37**	**2.96**	**2.55**	**0.01**	**0.34**	**0.17**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-		**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

	WID	ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
		lbs per day						Tons/year					
Offroad Equipment	Stormwater Basins	3.50	34.67	31.48	0.07	1.48	1.36	0.09	0.96	0.85	0.00	0.04	0.04
	Recharge Basins	3.50	34.67	31.48	0.07	1.48	1.36	0.09	0.96	0.85	0.00	0.04	0.04
Material Movement	Stormwater Basins	-	-	-	-	3.18	1.38	-	-	-	-	0.12	0.05
	Recharge Basins	-	-	-	-	3.18	1.38	-	-	-	-	0.12	0.05
Hauling Emissions	All	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor Emissions	All	0.00	0.52	0.02	0.00	0.04	0.02	0.00	0.07	0.00	0.00	0.01	0.00
Worker Emissions	All	0.01	0.03	0.52	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Roadway Dust	All	-	-	-	-	0.29	0.00	-	-	-	-	0.04	0.00
Arch. Coatings	All	23.18	-	-	-	-		0.12	-	-	-	-	
Project Totals	**Storm Drain Basins**	**26.69**	**35.24**	**32.02**	**0.07**	**5.00**	**2.77**	**0.21**	**1.03**	**0.92**	**0.00**	**0.21**	**0.09**
	Recharge Basins	**26.69**	**35.24**	**32.02**	**0.07**	**5.00**	**2.77**	**0.21**	**1.03**	**0.92**	**0.00**	**0.21**	**0.09**
Max Emissions:		**26.69**	**35.24**	**32.02**	**0.07**	**5.00**	**2.77**	**0.21**	**1.03**	**0.92**	**0.00**	**0.21**	**0.09**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-		**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

MICUP Construction
Air Quality Emissions
Unmitigated + Fleetwide Tier 4 Mitigated Analysis

City of Stockton		ROG	NOx	CO	SO2	PM10	PM2.5
		lbs per day					
Offroad Equipment	Dry Wells	2.89	21.56	26.24	0.10	0.80	0.73
	Recharge Basins	3.50	34.67	31.48	0.07	1.48	1.36
Material Movement	Dry Wells	-	-	-	-	0.41	0.04
	Recharge Basins	-	-	-	-	3.18	1.38
Hauling Emissions	All	0.00	0.00	0.00	0.00	0.00	0.00
Vendor Emissions	All	0.00	0.52	0.02	0.00	0.04	0.02
Worker Emissions	All	0.01	0.03	0.52	0.00	0.01	0.00
Roadway Dust	All	-	-	-	-	0.29	0.00
Arch. Coatings	All	23.18	-	-	-	-	
Project Totals	**Dry Wells**	**26.08**	**22.12**	**26.78**	**0.11**	**1.56**	**0.80**
	Recharge Basins	**26.69**	**35.22**	**32.02**	**0.07**	**5.00**	**2.77**
Max Emissions:		**26.69**	**35.22**	**32.02**	**0.11**	**5.00**	**2.77**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***

City of Stockton		ROG	NOx	CO	SO2	PM10	PM2.5
		Tons/year					
Offroad Equipment	Dry Wells	0.02	0.14	0.17	0.00	0.01	0.00
	Recharge Basins	0.34	3.73	3.32	0.01	0.16	0.14
Material Movement	Dry Wells	-	-	-	-	0.00	0.00
	Recharge Basins	-	-	-	-	0.47	0.18
Hauling Emissions	All	0.00	0.00	0.00	0.00	0.00	0.00
Vendor Emissions	All	0.00	0.07	0.00	0.00	0.01	0.00
Worker Emissions	All	0.00	0.00	0.06	0.00	0.00	0.00
Roadway Dust	All	-	-	-	-	0.04	0.00
Arch. Coatings	All	0.12	-	-	-	-	
Project Totals	**Dry Wells**	**0.14**	**0.21**	**0.24**	**0.00**	**0.05**	**0.01**
	Recharge Basins	**0.46**	**3.80**	**3.38**	**0.01**	**0.67**	**0.32**
Max Emissions:		**0.46**	**3.80**	**3.38**	**0.01**	**0.67**	**0.32**
SJVAPCD	**Significance Thresholds**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***No***	***No***	***No***	***No***	***No***	***No***

Overlapping Project Summaries:		ROG	NOx	CO	SO2	PM10	PM2.5
UNMITIGATED		lbs per day					
NSJWCD		127.77	98.85	109.80	0.35	10.39	5.20
SEWD		79.58	96.18	92.78	0.29	12.57	6.48
WID		53.38	70.49	64.03	0.15	10.00	5.53
City of Stockton		52.77	57.34	58.79	0.18	6.56	3.57
All Project Components		**313.50**	**322.86**	**325.41**	**0.97**	**39.52**	**20.78**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-
	Exceed SJVAPCD Threshold?	***YES***	***YES***	***YES***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***

UNMITIGATED		ROG	NOx	CO	SO2	PM10	PM2.5
		Tons/year					
NSJWCD		1.14	5.77	5.55	0.02	0.78	0.31
SEWD		1.00	6.87	6.32	0.02	0.84	0.36
WID		0.41	2.06	1.84	0.01	0.41	0.17
City of Stockton		0.60	4.01	3.62	0.01	0.73	0.33
All Project Components		**3.14**	**18.71**	**17.34**	**0.05**	**2.76**	**1.17**
SJVAPCD	**Significance Thresholds**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***YES***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***No***	***YES***	***No***	***No***	***No***	***No***

Notes:

Although the region is in attainment for SO2, because SO2 is a precursor for PM2.5, the PM2.5 General Conformity de minimis thresholds are used. For PM2.5 and SO2, the de minimis threshold for projects located in serious nonattainment areas are used because this threshold is lower than the 100 tons per year threshold for projects exclusively in moderate nonattainment areas.

Offroad emissions are based on the # of equipment days. The total lifetime project emissions for offroad equipment and material movement was calculated then divided by the project schedule for each component to obtain annual averages. The mobile emissions were assumed to occur over the duration of the total project schedule from the PD.

Appendix C3

Mitigated Emissions Summary, Fleetwide Average Tier 4 Final

MICUP Construction
Air Quality Emissions
Unmitigated + Fleetwide Tier 4 Mitigated Analysis

% Tier 4 Equipment:	55%

% Tier 4 Equipment:	55%

Overlapping Project Summaries:		ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
MITIGATED (Annual NOx Only)		lbs per day						Tons/year					
NSJWCD		73.53	51.52	131.14	0.34	5.34	2.70	0.66	3.00	6.63	0.02	0.40	0.16
SEWD		45.79	50.13	110.82	0.27	6.46	3.37	0.57	3.58	7.55	0.02	0.43	0.19
WID		30.72	36.74	76.48	0.14	5.14	2.88	0.24	1.08	2.20	0.00	0.21	0.09
City of Stockton		30.37	29.89	70.22	0.17	3.37	1.86	0.34	2.09	4.32	0.01	0.37	0.17
All Project Components		**180.41**	**168.28**	**388.66**	**0.92**	**20.32**	**10.80**	1.81	**9.75**	20.71	0.05	1.42	0.61
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	**-**	**-**	**-**	**-**	**-**	**-**	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***YES***	***YES***	***YES***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

Notes:

Mitigation was applied to criteria air pollutants using weighted average Tier 4 Final emission factors (based on equipment hp) to obtain a % reduction value for each pollutant. Then a "% Tier 4 Equipment" value was determined to estimate a fleetwide average Tier 4 % in order to reduce emissions below annual SJVAPCD significance thesholds.

Appendix C4

Mitigated Emissions Summary, Scraper Equipment Tier 4 Final

MICUP Construction
Air Quality Emissions
Mitigated Scraper Emissions

Individual Project Summaries:		ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
NSJWCD		**lbs per day**						**Tons/year**					
Offroad Equipment	North System	1.89	13.54	17.18	0.05	0.52	0.48	0.06	0.42	0.50	0.00	0.02	0.01
	South System	1.89	13.54	17.18	0.05	0.52	0.48	0.06	0.40	0.50	0.00	0.02	0.01
	PODs	1.89	13.54	17.18	0.05	0.52	0.48	0.04	0.31	0.36	0.00	0.01	0.01
	ASR Wells	2.62	19.89	23.80	0.09	0.75	0.68	0.05	0.34	0.41	0.00	0.01	0.01
	Recharge Basins	2.15	15.64	29.17	0.07	0.70	0.64	0.15	0.96	3.06	0.01	0.04	0.04
Material Movement	North System	-	-	-	-	0.41	0.04	-	-	-	-	0.04	0.00
	South System	-	-	-	-	0.41	0.04	-	-	-	-	0.03	0.00
	PODs	-	-	-	-	0.41	0.04	-	-	-	-	0.04	0.00
	ASR Wells	-	-	-	-	0.41	0.04	-	-	-	-	0.05	0.01
	Recharge Basins	-	-	-	-	3.18	1.38	-	-	-	-	0.20	0.07
Hauling Emissions	North System	0.00	0.24	0.01	0.00	0.02	0.01	0.00	0.03	0.00	0.00	0.00	0.00
	South System	0.00	0.37	0.02	0.00	0.03	0.01	0.00	0.05	0.00	0.00	0.00	0.00
	PODs	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	ASR Wells	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor Emissions	North System	0.01	0.61	0.02	0.01	0.05	0.02	0.00	0.08	0.00	0.00	0.01	0.00
	South System	0.01	0.61	0.02	0.01	0.05	0.02	0.00	0.08	0.00	0.00	0.01	0.00
	PODs	0.01	0.61	0.02	0.01	0.05	0.02	0.00	0.08	0.00	0.00	0.01	0.00
	ASR Wells	0.00	0.52	0.02	0.00	0.04	0.02	0.00	0.07	0.00	0.00	0.01	0.00
	Recharge Basins	0.00	0.52	0.02	0.00	0.04	0.02	0.00	0.07	0.00	0.00	0.01	0.00
Worker Emissions	North System	0.01	0.04	0.60	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00
	South System	0.01	0.04	0.60	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00
	PODs	0.01	0.04	0.60	0.00	0.01	0.00	0.00	0.00	0.08	0.00	0.00	0.00
	ASR Wells	0.01	0.03	0.52	0.00	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00
	Recharge Basins	0.01	0.03	0.52	0.00	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Roadway Dust	North System	-	-	-	-	0.38	0.00	-	-	-	-	0.05	0.00
	South System	-	-	-	-	0.40	0.00	-	-	-	-	0.05	0.00
	PODs	-	-	-	-	0.33	0.00	-	-	-	-	0.04	0.00
	ASR Wells	-	-	-	-	0.29	0.00	-	-	-	-	0.04	0.00
Arch. Coatings	All	23.18	-	-	-	-		0.12	-	-	-	-	
Project Totals	**North System**	**25.09**	**14.43**	**17.82**	**0.06**	**1.40**	**0.56**	**0.18**	**0.53**	**0.58**	**0.00**	**0.11**	**0.02**
	South System	**25.09**	**14.56**	**17.82**	**0.06**	**1.43**	**0.57**	**0.17**	**0.53**	**0.58**	**0.00**	**0.11**	**0.02**
	PODs	**25.09**	**14.19**	**17.81**	**0.06**	**1.34**	**0.55**	**0.16**	**0.39**	**0.43**	**0.00**	**0.10**	**0.02**
	ASR Wells	**25.81**	**20.46**	**24.34**	**0.10**	**1.50**	**0.75**	**0.16**	**0.41**	**0.48**	**0.00**	**0.10**	**0.02**
	Recharge Basins	**25.35**	**16.20**	**29.70**	**0.07**	**3.93**	**2.05**	**0.27**	**1.03**	**3.13**	**0.01**	**0.24**	**0.11**
Max Emissions:		**25.81**	**20.46**	**29.70**	**0.10**	**3.93**	**2.05**	**0.27**	**1.03**	**3.13**	**0.01**	**0.24**	**0.11**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

MICUP Construction
Air Quality Emissions
Mitigated Scraper Emissions

	SEWD	ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
		lbs per day						Tons/year					
Offroad Equipment	West Linden	2.97	22.27	27.58	0.10	0.84	0.77	0.19	1.40	1.69	0.01	0.05	0.05
	Mosher Creek	2.15	15.64	29.17	0.07	0.70	0.64	0.11	0.69	2.21	0.01	0.03	0.03
	East Mosher Creek	2.15	15.64	29.17	0.07	0.70	0.64	0.08	0.53	1.70	0.00	0.02	0.02
Material Movement	West Linden	-	-	-	-	0.41	0.04	-	-	-	-	0.09	0.01
	Mosher Creek	-	-	-	-	3.18	1.38	-	-	-	-	0.14	0.05
	East Mosher Creek	-	-	-	-	3.18	1.38	-	-	-	-	0.11	0.04
Hauling Emissions	All	0.01	0.79	0.03	0.01	0.07	0.03	0.00	0.10	0.00	0.00	0.01	0.00
Vendor Emissions	All	0.01	0.70	0.03	0.01	0.06	0.03	0.00	0.09	0.00	0.00	0.01	0.00
Worker Emissions	All	0.01	0.04	0.69	0.00	0.02	0.01	0.00	0.01	0.09	0.00	0.00	0.00
Roadway Dust	All	-	-	-	-	0.52	0.00	-	-	-	-	0.07	0.00
Arch. Coatings	All	23.18	-	-	-	-	-	0.12	-	-	-	-	-
Project Totals	**West Linden Project**	**26.18**	**23.79**	**28.33**	**0.12**	**1.92**	**0.87**	**0.31**	**1.59**	**1.78**	**0.01**	**0.22**	**0.07**
	Mosher Creek	**25.36**	**17.17**	**29.92**	**0.08**	**4.54**	**2.09**	**0.23**	**0.88**	**2.30**	**0.01**	**0.25**	**0.09**
	East Mosher Creek	**25.36**	**17.17**	**29.92**	**0.08**	**4.54**	**2.09**	**0.20**	**0.72**	**1.79**	**0.01**	**0.21**	**0.07**
Max Emissions:		**26.18**	**23.79**	**29.92**	**0.12**	**4.54**	**2.09**	**0.31**	**1.59**	**2.30**	**0.01**	**0.25**	**0.09**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

	WID	ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
		lbs per day						Tons/year					
Offroad Equipment	Stormwater Basins	2.15	15.64	29.17	0.07	0.70	0.64	0.04	0.24	0.77	0.00	0.01	0.01
	Recharge Basins	2.15	15.64	29.17	0.07	0.70	0.64	0.04	0.24	0.77	0.00	0.01	0.01
Material Movement	Stormwater Basins	-	-	-	-	3.18	1.38	-	-	-	-	0.12	0.05
	Recharge Basins	-	-	-	-	3.18	1.38	-	-	-	-	0.12	0.05
Hauling Emissions	All	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor Emissions	All	0.00	0.52	0.02	0.00	0.04	0.02	0.00	0.07	0.00	0.00	0.01	0.00
Worker Emissions	All	0.01	0.03	0.52	0.00	0.00	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Roadway Dust	All	-	-	-	-	0.29	0.00	-	-	-	-	0.04	0.00
Arch. Coatings	All	23.18	-	-	-	-	-	0.12	-	-	-	-	-
Project Totals	**Storm Drain Basins**	**25.35**	**16.22**	**29.70**	**0.07**	**4.21**	**2.05**	**0.15**	**0.31**	**0.83**	**0.00**	**0.18**	**0.06**
	Recharge Basins	**25.35**	**16.22**	**29.70**	**0.07**	**4.21**	**2.05**	**0.15**	**0.31**	**0.83**	**0.00**	**0.18**	**0.06**
Max Emissions:		**25.35**	**16.22**	**29.70**	**0.07**	**4.21**	**2.05**	**0.15**	**0.31**	**0.83**	**0.00**	**0.18**	**0.06**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

MICUP Construction
Air Quality Emissions
Mitigated Scraper Emissions

City of Stockton		ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
		lbs per day						Tons/year					
Offroad Equipment	Dry Wells	2.89	21.56	26.24	0.10	0.80	0.73	0.02	0.14	0.17	0.00	0.01	0.00
	Recharge Basins	2.15	15.64	29.17	0.07	0.70	0.64	0.14	0.93	2.98	0.01	0.04	0.04
Material Movement	Dry Wells	-	-	-	-	0.41	0.04	-	-	-	-	0.00	0.00
	Recharge Basins	-	-	-	-	3.18	1.38	-	-	-	-	0.47	0.18
Hauling Emissions	All	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vendor Emissions	All	0.00	0.52	0.02	0.00	0.04	0.02	0.00	0.07	0.00	0.00	0.01	0.00
Worker Emissions	All	0.01	0.03	0.52	0.00	0.01	0.00	0.00	0.00	0.06	0.00	0.00	0.00
Roadway Dust	All	-	-	-	-	0.29	0.00	-	-	-	-	0.04	0.00
Arch. Coatings	All	23.18	-	-	-	-		0.12	-	-	-	-	
Project Totals	**Dry Wells**	**26.08**	**22.12**	**26.78**	**0.11**	**1.56**	**0.80**	**0.14**	**0.21**	**0.24**	**0.00**	**0.05**	**0.01**
	Recharge Basins	**25.35**	**16.20**	**29.70**	**0.07**	**4.21**	**2.05**	**0.26**	**1.00**	**3.04**	**0.01**	**0.56**	**0.22**
Max Emissions:		**26.08**	**22.12**	**29.70**	**0.11**	**4.21**	**2.05**	**0.26**	**1.00**	**3.04**	**0.01**	**0.56**	**0.22**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

Overlapping Project Summaries:		ROG	NOx	CO	SO2	PM10	PM2.5	ROG	NOx	CO	SO2	PM10	PM2.5
MITIGATED - SCRAPERS = Tier 4 Final		lbs per day						Tons/year					
NSJWCD		126.43	79.83	107.49	0.35	9.60	4.48	0.94	2.89	5.20	0.02	0.67	0.20
SEWD		76.89	58.14	88.16	0.29	10.99	5.05	0.74	3.20	5.88	0.02	0.69	0.22
WID		50.69	32.44	59.41	0.15	8.42	4.10	0.31	0.63	1.67	0.01	0.35	0.12
City of Stockton		51.42	38.32	56.48	0.18	5.77	2.85	0.40	1.21	3.28	0.01	0.61	0.23
All Project Components		**305.43**	**208.73**	**311.55**	**0.97**	**34.80**	**16.48**	**2.38**	**7.93**	**16.03**	**0.05**	**2.32**	**0.77**
SJVAPCD	**Significance Thresholds**	**100**	**100**	**100**	**100**	**100**	**100**	**10**	**10**	**100**	**27**	**15**	**15**
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	**10**	**10**	**100**	**70**	**70**	**70**
	Exceed SJVAPCD Threshold?	***YES***	***YES***	***YES***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***	***No***
	Exceed Federal De Minimis Threshold?	***NA***	***NA***	***NA***	***NA***	***NA***	***NA***	***No***	***No***	***No***	***No***	***No***	***No***

Notes:
Although the region is in attainment for SO2, because SO2 is a precursor for PM2.5, the PM2.5 General Conformity de minimis thresholds are used. For PM2.5 and SO2, the de minimis threshold for projects located
Offroad emissions are based on the # of equipment days. The total lifetime project emissions for offroad equipment and material movement was calculated then divided by the project schedule for each component
These calculations assumed Tier 4 mitigation applied to the scrapers for each project component.

Appendix C5

Offroad and Material Movement Emissions Calculations

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)									
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04	[Same emission factors apply]	276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05		514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

OFFROAD

NSJWCD North System	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	175	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.04	0.04	0.00	0.00	0.00	0.02	0.12	0.13	0.00	0.00	0.00	56.30	0.00	0.00	56.30	0.00	0.00
Excavator (L)	125	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.01	0.03	0.05	0.00	0.00	0.00	0.02	0.10	0.15	0.00	0.00	0.00	70.24	0.00	0.00	70.24	0.00	0.00
Compactor	254	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.03	0.20	0.17	0.00	0.01	0.01	0.08	0.60	0.50	0.00	0.02	0.02	73.43	0.00	0.00	74.60	0.00	0.00
Loader (S)	150	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.05	0.00	0.00	0.00	0.01	0.08	0.14	0.00	0.00	0.00	18.87	0.00	0.00	18.87	0.00	0.00
Loader (L)	209	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.01	0.04	0.11	0.00	0.00	0.00	0.02	0.12	0.32	0.00	0.01	0.01	48.91	0.00	0.00	48.91	0.00	0.00
Telehandler	41	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	4.16	0.00	0.00	4.16	0.00	0.00
Water Truck	150	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.07	0.08	0.00	0.00	0.00	0.04	0.22	0.24	0.00	0.01	0.01	96.69	0.00	0.00	96.69	0.00	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**1.89**	**13.54**	**17.18**	**0.05**	**0.52**	**0.48**	**5022.87**	**0.20**	**0.04**	**0.06**	**0.42**	**0.50**	**0.00**	**0.02**	**0.01**	**0.17**	**1.25**	**1.50**	**0.00**	**0.05**	**0.04**	**368.59**	**0.01**	**0.00**	**369.76**	**0.01**	**0.00**

NSJWCD South System	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	148	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.04	0.05	0.00	0.00	0.00	0.01	0.10	0.11	0.00	0.00	0.00	47.61	0.00	0.00	47.61	0.00	0.00
Excavator (L)	83	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.00	0.03	0.04	0.00	0.00	0.00	0.01	0.07	0.10	0.00	0.00	0.00	46.64	0.00	0.00	46.64	0.00	0.00
Compactor	186	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.02	0.19	0.16	0.00	0.01	0.01	0.06	0.44	0.37	0.00	0.02	0.02	54.63	0.00	0.00	54.63	0.00	0.00
Loader (S)	115	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.01	0.06	0.10	0.00	0.00	0.00	14.46	0.00	0.00	14.46	0.00	0.00
Loader (L)	186	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.01	0.05	0.12	0.00	0.00	0.00	0.01	0.11	0.28	0.00	0.01	0.00	43.53	0.00	0.00	43.53	0.00	0.00
Telehandler	93	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.00	9.43	0.00	0.00	9.43	0.00	0.00
Water Truck	93	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.06	0.06	0.00	0.00	0.00	0.02	0.14	0.15	0.00	0.00	0.00	59.95	0.00	0.00	59.95	0.00	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**1.89**	**13.54**	**17.18**	**0.05**	**0.52**	**0.48**	**5022.87**	**0.20**	**0.04**	**0.06**	**0.40**	**0.50**	**0.00**	**0.02**	**0.01**	**0.13**	**0.94**	**1.17**	**0.00**	**0.04**	**0.03**	**276.25**	**0.01**	**0.00**	**276.25**	**0.01**	**0.00**

NSJWCD PODS	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	106	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.07	0.08	0.00	0.00	0.00	34.10	0.00	0.00	34.10	0.00	0.00
Excavator (L)	180	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.01	0.03	0.05	0.00	0.00	0.00	0.02	0.15	0.22	0.00	0.01	0.00	101.14	0.00	0.00	101.14	0.00	0.00
Compactor	286	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.02	0.14	0.12	0.00	0.01	0.01	0.09	0.67	0.56	0.00	0.03	0.02	73.43	0.00	0.00	84.00	0.00	0.00
Loader (S)	233	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.01	0.12	0.21	0.00	0.00	0.00	29.30	0.00	0.00	29.30	0.00	0.00
Loader (L)	106	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.06	0.16	0.00	0.00	0.00	24.81	0.00	0.00	24.81	0.00	0.00
Telehandler	180	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.06	0.12	0.00	0.00	0.00	18.25	0.00	0.00	18.25	0.00	0.00
Water Truck	233	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.07	0.08	0.00	0.00	0.00	0.06	0.34	0.37	0.00	0.01	0.01	150.20	0.01	0.00	150.20	0.01	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**1.89**	**13.54**	**17.18**	**0.05**	**0.52**	**0.48**	**5022.87**	**0.20**	**0.04**	**0.04**	**0.31**	**0.36**	**0.00**	**0.01**	**0.01**	**0.21**	**1.48**	**1.72**	**0.01**	**0.06**	**0.05**	**431.23**	**0.02**	**0.00**	**441.80**	**0.02**	**0.00**

NSJWCD ASR Wells	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	150	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.10	0.11	0.00	0.00	0.00	48.25	0.00	0.00	48.25	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	150	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.05	0.04	0.00	0.00	0.00	0.05	0.35	0.30	0.00	0.01	0.01	44.06	0.00	0.00	44.06	0.00	0.00
Loader (S)	325	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.02	0.17	0.30	0.00	0.01	0.01	31.44	0.00	0.00	40.87	0.00	0.00
Loader (L)	150	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.09	0.23	0.00	0.00	0.00	35.11	0.00	0.00	35.11	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	325	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.07	0.08	0.00	0.00	0.00	0.08	0.47	0.51	0.00	0.02	0.02	161.15	0.01	0.00	209.50	0.01	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	250	1.08	8.73	10.40	0.05	0.32	0.29	5513.31	0.22	0.04	0.02	0.16	0.20	0.00	0.01	0.01	0.13	1.09	1.30	0.01	0.04	0.04	689.16	0.03	0.01	689.16	0.03	0.00
Total Equipment:	6	**2.62**	**19.89**	**23.80**	**0.09**	**0.75**	**0.68**	**9076.91**	**0.36**	**0.07**	**0.05**	**0.34**	**0.41**	**0.00**	**0.01**	**0.01**	**0.30**	**2.28**	**2.74**	**0.01**	**0.08**	**0.08**	**1009.18**	**0.04**	**0.01**	**1066.95**	**0.04**	**0.01**

NSJWCD Recharge Basins	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	840	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.02	0.21	0.17	0.00	0.01	0.01	0.20	1.72	1.42	0.00	0.11	0.10	55.03	0.00	0.00	184.89	0.01	0.00
Excavator (M)	1035	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.08	0.09	0.00	0.00	0.00	0.09	0.68	0.76	0.00	0.02	0.02	80.42	0.00	0.00	332.96	0.01	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	195	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.06	0.05	0.00	0.00	0.00	0.06	0.46	0.38	0.00	0.02	0.02	57.27	0.00	0.00	57.27	0.00	0.00
Loader (S)	315	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.02	0.17	0.29	0.00	0.01	0.01	31.44	0.00	0.00	39.62	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	2070	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.06	0.36	0.39	0.00	0.01	0.01	0.49	3.02	3.25	0.01	0.11	0.10	161.15	0.01	0.00	1334.35	0.05	0.01
Scraper	2520	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.25	3.11	2.68	0.00	0.13	0.12	2.07	25.91	22.33	0.04	1.07	0.98	355.56	0.01	0.00	3584.06	0.14	0.03
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.35**	**3.84**	**3.41**	**0.01**	**0.16**	**0.15**	**2.93**	**31.97**	**28.43**	**0.06**	**1.33**	**1.22**	**740.88**	**0.03**	**0.01**	**5533.15**	**0.22**	**0.04**

Notes:
ASR projects will use 24 hour per day drill rigs "for a limited period of time". The maximum daily emissions have been updated for those to reflect this construction schedule.
Tons per year are based on total tons calculated for each component and then divided by the respective component schedule.

MATERIAL MOVEMENT / GRADING

NSJWCD North System	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Dozer	Rubber Tired Dozers	0	0	0	0	0	0	0	0
Excavator (M)			0	0	0	0	0	0	0
Excavator (L)			0	0	0	0	0	0	0
Compactor			0	0	0	0	0	0	0
Loader (S)	Crawler Tractors		0.5	0.206798	0.022329	0.01551	0.001675	0.01551	0.001675
Loader (L)	Crawler Tractors		0.5	0.206798	0.022329	0.02161	0.002333	0.02161	0.002333
Telehandler			0	0	0	0	0	0	0
Water Truck			0	0	0	0	0	0	0
Scraper	Scrapers		0	0	0	0	0	0	0
Drill Rig			0	0	0	0	0	0	0
				0.41	**0.04**	**0.04**	**0.00**	**0.04**	**0.00**

NSJWCD South System	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Dozer	Rubber Tired Dozers	0	0	0	0	0	0	0	0
Excavator (M)			0	0	0	0	0	0	0
Excavator (L)			0	0	0	0	0	0	0
Compactor			0	0	0	0	0	0	0
Loader (S)	Crawler Tractors		0.5	0.206798	0.022329	0.011891	0.001284	0.011891	0.001284
Loader (L)	Crawler Tractors		0.5	0.206798	0.022329	0.019232	0.002077	0.019232	0.002077
Telehandler			0	0	0	0	0	0	0
Water Truck			0	0	0	0	0	0	0
Scraper	Scrapers		0	0	0	0	0	0	0
Drill Rig			0	0	0	0	0	0	0
				0.41	**0.04**	**0.03**	**0.00**	**0.03**	**0.00**

NSJWCD PODS	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Dozer	Rubber Tired Dozers	0	0	0	0	0	0	0	0
Excavator (M)			0	0	0	0	0	0	0
Excavator (L)			0	0	0	0	0	0	0
Compactor			0	0	0	0	0	0	0
Loader (S)	Crawler Tractors		0.5	0.206798	0.022329	0.024092	0.002601	0.024092	0.002601
Loader (L)	Crawler Tractors		0.5	0.206798	0.022329	0.01096	0.001183	0.01096	0.001183
Telehandler			0	0	0	0	0	0	0
Water Truck			0	0	0	0	0	0	0
Scraper	Scrapers		0	0	0	0	0	0	0
Drill Rig			0	0	0	0	0	0	0
				0.41	**0.04**	**0.04**	**0.00**	**0.04**	**0.00**

NSJWCD ASR Wells	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Dozer	Rubber Tired Dozers	0	0	0	0	0	0	0	0
Excavator (M)			0	0	0	0	0	0	0
Excavator (L)			0	0	0	0	0	0	0
Compactor			0	0	0	0	0	0	0
Loader (S)	Crawler Tractors		0.5	0.206798	0.022329	0.02585	0.002791	0.033605	0.003629
Loader (L)	Crawler Tractors		0.5	0.206798	0.022329	0.01551	0.001675	0.01551	0.001675
Telehandler			0	0	0	0	0	0	0
Water Truck			0	0	0	0	0	0	0
Scraper	Scrapers		0	0	0	0	0	0	0
Drill Rig			0	0	0	0	0	0	0
				0.41	**0.04**	**0.04**	**0.00**	**0.05**	**0.01**

NSJWCD Recharge Basins	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
Dozer	Rubber Tired Dozers	8	0.5	2.555411	1.313318	0.319426	0.164165	1.073273	0.551594
Excavator (M)			0	0	0	0	0	0	0
Excavator (L)			0	0	0	0	0	0	0
Compactor			0	0	0	0	0	0	0
Loader (S)	Crawler Tractors		0.5	0.206798	0.022329	0.02585	0.002791	0.032571	0.003517
Loader (L)	Crawler Tractors		0	0	0	0	0	0	0
Telehandler			0	0	0	0	0	0	0
Water Truck			0	0	0	0	0	0	0
Scraper	Scrapers		1	0.413595	0.044659	0.051699	0.005582	0.52113	0.05627
Drill Rig			0	0	0	0	0	0	0
				3.18	**1.38**	**0.40**	**0.17**	**1.63**	**0.61**

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)								
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04		276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05	[Same emission factors apply]	514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

SEWD	Number of	lbs per day									Tons/year						Total Tons						MT/Year			Total MT		
West Linden	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	361	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.02	0.12	0.13	0.00	0.00	0.00	0.03	0.24	0.27	0.00	0.01	0.01	80.42	0.00	0.00	116.13	0.00	0.00
Excavator (L)	154	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.01	0.06	0.09	0.00	0.00	0.00	0.02	0.13	0.19	0.00	0.00	0.00	86.53	0.00	0.00	86.53	0.00	0.00
Compactor	469	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.07	0.55	0.46	0.00	0.02	0.02	0.15	1.10	0.93	0.00	0.04	0.04	73.43	0.00	0.00	137.75	0.01	0.00
Loader (S)	469	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.01	0.12	0.21	0.00	0.00	0.00	0.02	0.25	0.43	0.00	0.01	0.01	31.44	0.00	0.00	58.98	0.00	0.00
Loader (L)	364	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.01	0.11	0.28	0.00	0.01	0.00	0.03	0.21	0.55	0.00	0.01	0.01	58.51	0.00	0.00	85.19	0.00	0.00
Telehandler	128	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.01	0.04	0.09	0.00	0.00	0.00	12.98	0.00	0.00	12.98	0.00	0.00
Water Truck	359	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.04	0.26	0.28	0.00	0.01	0.01	0.09	0.52	0.56	0.00	0.02	0.02	161.15	0.01	0.00	231.42	0.01	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	213	1.08	8.73	10.40	0.05	0.32	0.29	0.00	0.00	0.00	0.02	0.15	0.18	0.00	0.01	0.01	0.04	0.31	0.37	0.00	0.01	0.01	177.93	0.01	0.00	0.00	0.00	0.00
Total Equipment:	8	**2.97**	**22.27**	**27.58**	**0.10**	**0.84**	**0.77**	**5022.87**	**0.20**	**0.04**	**0.19**	**1.40**	**1.69**	**0.01**	**0.05**	**0.05**	**0.38**	**2.81**	**3.37**	**0.01**	**0.11**	**0.10**	**682.40**	**0.03**	**0.01**	**728.98**	**0.03**	**0.01**

SEWD	Number of	lbs per day									Tons/year						Total Tons						MT/Year			Total MT		
Mosher Creek	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	73	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.02	0.15	0.12	0.00	0.01	0.01	0.02	0.15	0.12	0.00	0.01	0.01	16.07	0.00	0.00	16.07	0.00	0.00
Excavator (M)	90	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.06	0.07	0.00	0.00	0.00	0.01	0.06	0.07	0.00	0.00	0.00	28.95	0.00	0.00	28.95	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	17	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.04	0.03	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	4.99	0.00	0.00	4.99	0.00	0.00
Loader (S)	27	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.40	0.00	0.00	3.40	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	179	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.04	0.26	0.28	0.00	0.01	0.01	0.04	0.26	0.28	0.00	0.01	0.01	115.39	0.00	0.00	115.39	0.00	0.00
Scraper	218	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.18	2.24	1.93	0.00	0.09	0.08	0.18	2.24	1.93	0.00	0.09	0.08	310.05	0.01	0.00	310.05	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.25**	**2.77**	**2.46**	**0.01**	**0.12**	**0.11**	**0.25**	**2.77**	**2.46**	**0.01**	**0.12**	**0.11**	**478.84**	**0.02**	**0.00**	**478.84**	**0.02**	**0.00**

SEWD	Number of	lbs per day									Tons/year						Total Tons						MT/Year			Total MT		
East Mosher Creek	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	56	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.01	0.11	0.09	0.00	0.01	0.01	0.01	0.11	0.09	0.00	0.01	0.01	12.33	0.00	0.00	12.33	0.00	0.00
Excavator (M)	69	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.05	0.05	0.00	0.00	0.00	0.01	0.05	0.05	0.00	0.00	0.00	22.20	0.00	0.00	22.20	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	13	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	3.82	0.00	0.00	3.82	0.00	0.00
Loader (S)	21	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	2.64	0.00	0.00	2.64	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	138	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.03	0.20	0.22	0.00	0.01	0.01	0.03	0.20	0.22	0.00	0.01	0.01	88.96	0.00	0.00	88.96	0.00	0.00
Scraper	168	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.14	1.73	1.49	0.00	0.07	0.07	0.14	1.73	1.49	0.00	0.07	0.07	238.94	0.01	0.00	238.94	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.20**	**2.13**	**1.90**	**0.00**	**0.09**	**0.08**	**0.20**	**2.13**	**1.90**	**0.00**	**0.09**	**0.08**	**368.88**	**0.01**	**0.00**	**368.88**	**0.01**	**0.00**

SEWD West Linden Project	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
	Rubber Tired								
Dozer	Dozers	0	0	0	0	0.000	0.000	0	0
Excavator (M)			0	0	0	0.000	0.000	0	0
Excavator (L)			0	0	0	0.000	0.000	0	0
Compactor			0	0	0	0.000	0.000	0	0
	Crawler								
Loader (S)	Tractors		0.5	0.206797573	0.022329	0.026	0.003	0.048494	0.005236
	Crawler								
Loader (L)	Tractors		0.5	0.206797573	0.022329	0.026	0.003	0.037637	0.004064
Telehandler			0	0	0	0.000	0.000	0	0
Water Truck			0	0	0	0.000	0.000	0	0
Scraper	Scrapers		0	0	0	0.000	0.000	0	0
Drill Rig			0	0	0	0.000	0.000	0	0
				0.41	**0.04**	**0.05**	**0.01**	**0.09**	**0.01**

SEWD Mosher Creek	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
	Rubber Tired								
Dozer	Dozers	8	0.5	2.555411142	1.313318	0.093	0.048	0.093273	0.047936
Excavator (M)			0	0	0	0.000	0.000	0	0
Excavator (L)			0	0	0	0.000	0.000	0	0
Compactor			0	0	0	0.000	0.000	0	0
	Crawler								
Loader (S)	Tractors		0.5	0.206797573	0.022329	0.003	0.000	0.002792	0.000301
	Crawler								
Loader (L)	Tractors		0	0	0	0.000	0.000	0	0
Telehandler			0	0	0	0.000	0.000	0	0
Water Truck			0	0	0	0.000	0.000	0	0
Scraper	Scrapers		1	0.413595146	0.044659	0.045	0.005	0.045082	0.004868
Drill Rig			0	0	0	0.000	0.000	0	0
				3.18	**1.38**	**0.14**	**0.05**	**0.14**	**0.05**

SEWD East Mosher Creek	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
	Rubber Tired								
Dozer	Dozers	8	0.5	2.555411142	1.313318	0.072	0.037	0.071552	0.036773
Excavator (M)			0	0	0	0.000	0.000	0	0
Excavator (L)			0	0	0	0.000	0.000	0	0
Compactor			0	0	0	0.000	0.000	0	0
	Crawler								
Loader (S)	Tractors		0.5	0.206797573	0.022329	0.002	0.000	0.002171	0.000234
	Crawler								
Loader (L)	Tractors		0	0	0	0.000	0.000	0	0
Telehandler			0	0	0	0.000	0.000	0	0
Water Truck			0	0	0	0.000	0.000	0	0
Scraper	Scrapers		1	0.413595146	0.044659	0.035	0.004	0.034742	0.003751
Drill Rig			0	0	0	0.000	0.000	0	0
				3.18	**1.38**	**0.11**	**0.04**	**0.11**	**0.04**

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)								
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04		276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05	[Same emission factors apply]	514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

WID	Number of	lbs per day									Tons/year						Tons/year						MT/Year			Total MT		
Stormwater Basins	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	63	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.01	0.05	0.04	0.00	0.00	0.00	0.02	0.13	0.11	0.00	0.01	0.01	13.87	0.00	0.00	13.87	0.00	0.00
Excavator (M)	78	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.02	0.02	0.00	0.00	0.00	0.01	0.05	0.06	0.00	0.00	0.00	25.09	0.00	0.00	25.09	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	15	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00	4.41	0.00	0.00	4.41	0.00	0.00
Loader (S)	24	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.02	0.00	0.00	3.02	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	156	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.09	0.10	0.00	0.00	0.00	0.04	0.23	0.24	0.00	0.01	0.01	100.56	0.00	0.00	100.56	0.00	0.00
Scraper	189	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.06	0.78	0.67	0.00	0.03	0.03	0.16	1.94	1.67	0.00	0.08	0.07	268.80	0.01	0.00	268.80	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.09**	**0.96**	**0.85**	**0.00**	**0.04**	**0.04**	**0.22**	**2.40**	**2.13**	**0.00**	**0.10**	**0.09**	**415.75**	**0.02**	**0.00**	**415.75**	**0.02**	**0.00**

WID	Number of	lbs per day									Tons/year						Tons/year						MT/Year			Total MT		
Recharge Basins	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	63	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.01	0.05	0.04	0.00	0.00	0.00	0.02	0.13	0.11	0.00	0.01	0.01	13.87	0.00	0.00	13.87	0.00	0.00
Excavator (M)	78	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.02	0.02	0.00	0.00	0.00	0.01	0.05	0.06	0.00	0.00	0.00	25.09	0.00	0.00	25.09	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	15	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00	4.41	0.00	0.00	4.41	0.00	0.00
Loader (S)	24	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.02	0.00	0.00	3.02	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	156	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.09	0.10	0.00	0.00	0.00	0.04	0.23	0.24	0.00	0.01	0.01	100.56	0.00	0.00	100.56	0.00	0.00
Scraper	189	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.06	0.78	0.67	0.00	0.03	0.03	0.16	1.94	1.67	0.00	0.08	0.07	268.80	0.01	0.00	268.80	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.09**	**0.96**	**0.85**	**0.00**	**0.04**	**0.04**	**0.22**	**2.40**	**2.13**	**0.00**	**0.10**	**0.09**	**415.75**	**0.02**	**0.00**	**415.75**	**0.02**	**0.00**

WID Storm Drain Basins	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
	Rubber Tired								
Dozer	Dozers	8	0.5	2.555411	1.313318	0.080	0.041	0.080495	0.04137
Excavator (M)			0	0	0	0.000	0.000	0	0
Excavator (L)			0	0	0	0.000	0.000	0	0
Compactor			0	0	0	0.000	0.000	0	0
	Crawler								
Loader (S)	Tractors		0.5	0.206798	0.022329	0.002	0.000	0.002482	0.000268
	Crawler								
Loader (L)	Tractors		0	0	0	0.000	0.000	0	0
Telehandler			0	0	0	0.000	0.000	0	0
Water Truck			0	0	0	0.000	0.000	0	0
Scraper	Scrapers		1	0.413595	0.044659	0.039	0.004	0.039085	0.00422
Drill Rig			0	0	0	0.000	0.000	0	0
				3.18	**1.38**	**0.12**	**0.05**	**0.12**	**0.05**

WID Recharge Basins	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
	Rubber Tired								
Dozer	Dozers	8	0.5	2.555411	1.313318	0.080	0.041	0.080495	0.04137
Excavator (M)			0	0	0	0.000	0.000	0	0
Excavator (L)			0	0	0	0.000	0.000	0	0
Compactor			0	0	0	0.000	0.000	0	0
	Crawler								
Loader (S)	Tractors		0.5	0.206798	0.022329	0.002	0.000	0.002482	0.000268
	Crawler								
Loader (L)	Tractors		0	0	0	0.000	0.000	0	0
Telehandler			0	0	0	0.000	0.000	0	0
Water Truck			0	0	0	0.000	0.000	0	0
Scraper	Scrapers		1	0.413595	0.044659	0.039	0.004	0.039085	0.00422
Drill Rig			0	0	0	0.000	0.000	0	0
				3.18	**1.38**	**0.12**	**0.05**	**0.12**	**0.05**

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)									
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04	[Same emission factors apply]	276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05		514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

City of Stockton	Number of	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
Dry Wells	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	18	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	5.79	0.00	0.00	5.79	0.00	0.00
Excavator (L)	8	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	4.50	0.00	0.00	4.50	0.00	0.00
Compactor	24	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.06	0.05	0.00	0.00	0.00	0.01	0.06	0.05	0.00	0.00	0.00	7.05	0.00	0.00	7.05	0.00	0.00
Loader (S)	24	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.02	0.00	0.00	3.02	0.00	0.00
Loader (L)	18	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	4.21	0.00	0.00	4.21	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	18	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	11.60	0.00	0.00	11.60	0.00	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	12	1.08	8.73	10.40	0.05	0.32	0.29	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	10.02	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**2.89**	**21.56**	**26.24**	**0.10**	**0.80**	**0.73**	**4799.79**	**0.19**	**0.04**	**0.02**	**0.14**	**0.17**	**0.00**	**0.01**	**0.00**	**0.02**	**0.14**	**0.17**	**0.00**	**0.01**	**0.00**	**46.19**	**0.00**	**0.00**	**36.17**	**0.00**	**0.00**

City of Stockton	Number of	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
Recharge Basins	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	245	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.02	0.20	0.17	0.00	0.01	0.01	0.06	0.50	0.41	0.00	0.03	0.03	53.93	0.00	0.00	53.93	0.00	0.00
Excavator (M)	302	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.08	0.09	0.00	0.00	0.00	0.03	0.20	0.22	0.00	0.01	0.01	80.42	0.00	0.00	97.15	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	57	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.05	0.05	0.00	0.00	0.00	0.02	0.13	0.11	0.00	0.01	0.00	16.74	0.00	0.00	16.74	0.00	0.00
Loader (S)	92	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.05	0.08	0.00	0.00	0.00	11.57	0.00	0.00	11.57	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	604	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.06	0.35	0.38	0.00	0.01	0.01	0.14	0.88	0.95	0.00	0.03	0.03	161.15	0.01	0.00	389.35	0.02	0.00
Scraper	735	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.24	3.02	2.60	0.00	0.12	0.11	0.60	7.56	6.51	0.01	0.31	0.29	355.56	0.01	0.00	1045.35	0.04	0.01
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.34**	**3.73**	**3.32**	**0.01**	**0.16**	**0.14**	**0.85**	**9.32**	**8.29**	**0.02**	**0.39**	**0.36**	**679.38**	**0.03**	**0.01**	**1614.09**	**0.06**	**0.01**

City of Stockton Dry Wells	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
	Rubber Tired								
Dozer	Dozers	0	0	0	0	0.000	0.000	0	0
Excavator (M)			0	0	0	0.000	0.000	0	0
Excavator (L)			0	0	0	0.000	0.000	0	0
Compactor			0	0	0	0.000	0.000	0	0
	Crawler								
Loader (S)	Tractors		0.5	0.206798	0.022329	0.002	0.000	0.002482	0.000268
	Crawler								
Loader (L)	Tractors		0.5	0.206798	0.022329	0.002	0.000	0.001861	0.000201
Telehandler			0	0	0	0.000	0.000	0	0
Water Truck			0	0	0	0.000	0.000	0	0
Scraper	Scrapers		0	0	0	0.000	0.000	0	0
Drill Rig			0	0	0	0.000	0.000	0	0
				0.41	**0.04**	**0.00**	**0.00**	**0.00**	**0.00**

City of Stockton Recharge Basins	Lookup	Hours Per Day	Acres Graded	lb per day		TPY		Total Tons	
				PM10	PM2.5	PM10	PM2.5	PM10	PM2.5
	Rubber Tired								
Dozer	Dozers	8	0.5	2.555411	1.313318	0.313	0.161	0.313038	0.160881
Excavator (M)			0	0	0	0.000	0.000	0	0
Excavator (L)			0	0	0	0.000	0.000	0	0
Compactor			0	0	0	0.000	0.000	0	0
	Crawler								
Loader (S)	Tractors		0.5	0.206798	0.022329	0.010	0.001	0.009513	0.001027
	Crawler								
Loader (L)	Tractors		0	0	0	0.000	0.000	0	0
Telehandler			0	0	0	0.000	0.000	0	0
Water Truck			0	0	0	0.000	0.000	0	0
Scraper	Scrapers		1	0.413595	0.044659	0.052	0.006	0.151996	0.016412
Drill Rig			0	0	0	0.000	0.000	0	0
				3.18	**1.38**	**0.37**	**0.17**	**0.47**	**0.18**

Daily Acres Graded by Equipment Type

Equipment	Acres Graded per 8 hours
Crawler Tractors	0.5
Graders	0.5
Rubber Tired Dozers	0.5
Scrapers	1

Source: CalEEMod Appendix G, Table G-14

Grading Emission Factor (lbs/acre/day)

Pollutant	PM10	PM2.5
S	7.1	7.1
F	0.6	0.031
Wb	12	12
SF per acre	43560	43560
Ft per mile	5280	5280
Uncontrolled EF	1.060500375	0.114509
Controlled EF	**0.413595146**	**0.044659**

Source: CalEEMod Appendix C, Section 4.4.1 (pg C-11)

Controlled EF assumes 61% reduction in PM from 2x per day watering

Bulldozing Emission Factor (lbs/hr)

Pollutant	PM10	PM2.5
C	1	5.7
s	6.9	6.9
M	7.9	7.9
F	0.75	0.105
Uncontrolled EF	0.752760759	0.413778
Controlled EF	**0.293576696**	**0.161374**

Source: CalEEMod Appendix C, Section 4.4.2 (pg C-12)

Controlled EF assumes 61% reduction in PM from 2x per day watering

Appendix C6

Mobile Source Emissions Calculations

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Hauling Emissions

							g/mile							
		ROG	NOx	CO	SO2		PM10 F	PM10 F	PM2.5E	PM2.5 F	PM2.5 F	CO2	CH4	N2O
Trip Length (mi)	Year	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBV	CO2_RUNEX	H4_RUNEN	N2O_RUNEX
20	2025	0.014	1.65	0.0674	0.0148	0.0281	0.0354	0.0764	0.0269	0.0089	0.0267	1559.5203	0.0007	0.2457
20	2026	0.01	1.60	0.0639	0.0145	0.0280	0.0354	0.0768	0.0268	0.0089	0.0269	1534.2146	0.0006	0.2417
20	2027	0.01	1.56	0.0609	0.0143	0.0279	0.0354	0.0775	0.0267	0.0089	0.0271	1507.0742	0.0006	0.2374

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
NSJWCD	North System	19,297	16	2,412	3	720	20	67	16,751
NSJWCD	South System	22,907	16	2,863	5	560	20	102	25,566
NSJWCD	PODs	1,000	16	125	0	1160	20	2	539
NSJWCD	ASR Wells	2,007	16	251	0	1600	20	3	784
			Total:	**5,651**	**9**	**Total**			

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
SEWD	All Project Components	58,832	16	7,354	11	680	20	216	54,074
			Total:	**7,354**	**11**	680	20	216	54,074

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
WID	All Project Components	1,440	16	180	0.3	600	20	6	1,500
			Total:	**180**	**0.3**	600	20	6	1,500

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
City of Stockton	All Project Components	-	16	-	-	680	20	-	-
			Total:	**-**		680	20	-	-

Max Daily Emissions

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
NSJWCD	North System	0.00	0.24	0.01	0.00	0.00	0.02	0.00	0.01	230.37	0.00	0.04
NSJWCD	South System	0.00	0.37	0.02	0.00	0.01	0.03	0.01	0.01	351.61	0.00	0.06
NSJWCD	PODs	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	7.41	0.00	0.00
NSJWCD	ASR Wells	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	10.78	0.00	0.00
		0.0032	**0.3723**	**0.0152**	**0.0033**	**0.0063**	**0.0252**	**0.0061**	**0.0080**	**351.6060**	**0.0002**	**0.0554**

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
SEWD	All Project Components	0.01	0.79	0.03	0.01	0.01	0.05	0.01	0.02	743.66	0.00	0.12
	Total:											

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
WID	All Project Components	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	20.63	0.00	0.00
	Total:											

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
City of Stockton	All Project Components	-	-	-	-	-	-	-	-	-	-	-

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Hauling Emissions

Max Annual Emissions

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
NSJWCD	North System	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	28.80	0.00	0.00	75.39	0.00	0.01
NSJWCD	South System	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	43.95	0.00	0.01	89.50	0.00	0.01
NSJWCD	PODs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.00	0.00	3.91	0.00	0.00
NSJWCD	ASR Wells	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	0.00	0.00	7.84	0.00	0.00
		0.0004	**0.0465**	**0.0019**	**0.0004**	**0.0008**	**0.0032**	**0.0008**	**0.0010**	**43.9507**	**0.0000**	**0.0069**	**89.4997**	**0.0000**	**0.0141**

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
SEWD	All Project Components	0.00	0.10	0.00	0.00	0.00	0.01	0.00	0.00	92.96	0.00	0.01	229.86	0.00	0.04
	Total:														

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
WID	All Project Components	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58	0.00	0.00	5.63	0.00	0.00
	Total:														

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
City of Stockton	All Project Components	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:
250 is # of work days CalEEmod assumes in a year
Haul trip length based on CalEEMod defaults.
EMFAC2021 HHDT emission factors from 2025 were used in this assessment.

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Worker Trip Emissions

	g/mile												
Year	ROG ROG_RUNEX	NOx NOx_RUNEX	CO CO_RUNEX	SO2 SOx_RUNEX	PM10_RUNEX	PM10 F PM10_PMTW	PM10 F PM10_PMBW	PM2.5E PM2.5_RUNEX	PM2.5 F PM2.5_PMTW	PM2.5 F PM2.5_PMBW	CO2 CO2_RUNEX	CH4 CH4_RUNEX	N2O N2O_RUNEX
2025	0.0100	0.0482	0.8119	0.0028	0.0014	0.0080	0.0090	0.0013	0.0020	0.0031	285.5337	0.0026	0.0050
2026	0.0089	0.0431	0.7612	0.0027	0.0013	0.0080	0.0090	0.0012	0.0020	0.0031	278.0093	0.0024	0.0046
2027	0.0081	0.0391	0.7245	0.0027	0.0013	0.0080	0.0091	0.0012	0.0020	0.0032	272.3481	0.0022	0.0044

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
NSJWCD	North System	28	720	12	336	84,000
NSJWCD	South System	28	560	12	336	84,000
NSJWCD	PODs	28	1160	12	336	84,000
NSJWCD	ASR Wells	24	1600	12	288	72,000
NSJWCD	Recharge Basins	24	2000	12	288	72,000
	Total:	**132**				

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
SEWD	All Project Compon	32	680	12	384	96,000
	Total:	**32**	680	12	1	141

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
WID	All Project Compon	24	600	12	288	72,000
	Total:	**24**	600	12	0	120

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
City of Stockton	All Project Compon	24	680	12	288	72,000
	Total:	**24**	680	12	0	106

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Worker Trip Emissions

Max Daily Emissions

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
NSJWCD	North System	0.01	0.04	0.60	0.00	0.00	0.01	0.00	0.00	211.51	0.00	0.00
NSJWCD	South System	0.01	0.04	0.60	0.00	0.00	0.01	0.00	0.00	211.51	0.00	0.00
NSJWCD	PODs	0.01	0.04	0.60	0.00	0.00	0.01	0.00	0.00	211.51	0.00	0.00
NSJWCD	ASR Wells	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00
NSJWCD	Recharge Basins	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00
		0.0074	**0.0357**	**0.6014**	**0.0021**	**0.0010**	**0.0126**	**0.0009**	**0.0038**	**211.5111**	**0.0019**	**0.0037**

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
SEWD	All Project Compon	0.01	0.04	0.69	0.00	0.00	0.01	0.00	0.00	241.73	0.00	0.00
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
WID	All Project Compon	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
City of Stockton	All Project Compon	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00

Max Annual Emissions

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
NSJWCD	North System	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	26.44	0.00	0.00	69.22	0.00	0.00
NSJWCD	South System	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	26.44	0.00	0.00	53.84	0.00	0.00
NSJWCD	PODs	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	26.44	0.00	0.00	111.52	0.00	0.00
NSJWCD	ASR Wells	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	131.85	0.00	0.00
NSJWCD	Recharge Basins	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	164.81	0.00	0.00
		0.0009	**0.0045**	**0.0752**	**0.0003**	**0.0001**	**0.0016**	**0.0001**	**0.0005**	**26.4389**	**0.0002**	**0.0005**	**164.8138**	**0.0015**	**0.0029**

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
SEWD	All Project Compon	0.00	0.01	0.09	0.00	0.00	0.00	0.00	0.00	30.22	0.00	0.00	74.72	0.00	0.00

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
WID	All Project Compon	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	49.44	0.00	0.00

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
City of Stockton	All Project Compon	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	56.04	0.00	0.00

# of 1-way worker trips based on assumption of 2 workers per piece of construction equipment

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Vendor Trip Emissions

						g/mile							
Year	ROG ROG_RUNEX	NOx NOx_RUNEX	CO CO_RUNEX	SO2 SOx_RUNEX	PM10_RUNEX	PM10 F PM10_PMTW	PM10 F PM10_PMBW	PM2.5E PM2.5_RUNEX	PM2.5 F PM2.5_PMTW	PM2.5 F PM2.5_PMBW	CO2 CO2_RUNE	CH4 CH4_RUNEX	N2O N2O_RUNEX
2025	0.0144	1.6514	0.0674	0.0148	0.0281	0.0354	0.0764	0.0269	0.0089	0.0267	#######	0.0007	0.2457
2026	0.0140	1.6036	0.0639	0.0145	0.0280	0.0354	0.0768	0.0268	0.0089	0.0269	#######	0.0006	0.2417
2027	0.0136	1.5601	0.0609	0.0143	0.0279	0.0354	0.0775	0.0267	0.0089	0.0271	#######	0.0006	0.2374

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
NSJWCD	North System	14	720	12	168	42,000
NSJWCD	South System	14	560	12	168	42,000
NSJWCD	PODs	14	1160	12	168	42,000
NSJWCD	ASR Wells	12	1600	12	144	36,000
NSJWCD	Recharge Basins	12	2000	12	144	36,000
	Total:	**66**				

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
SEWD	All Project Components	16	680	12	192	48,000
	Total:	**-**	680	12	-	-

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
WID	All Project Components	12	600	12	144	36,000
	Total:	**12**	600	12	0	60

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
City of Stockton	All Project Components	12	680	12	144	36,000
	Total:	**12**	680	12	0	53

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Vendor Trip Emissions

Max Daily Emissions

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
NSJWCD	North System	0.01	0.61	0.02	0.01	0.01	0.04	0.01	0.01	577.61	0.00	0.09
NSJWCD	South System	0.01	0.61	0.02	0.01	0.01	0.04	0.01	0.01	577.61	0.00	0.09
NSJWCD	PODs	0.01	0.61	0.02	0.01	0.01	0.04	0.01	0.01	577.61	0.00	0.09
NSJWCD	ASR Wells	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
NSJWCD	Recharge Basins	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
	Total:	**0.0053**	**0.6116**	**0.0250**	**0.0055**	**0.0104**	**0.0414**	**0.0100**	**0.0132**	**577.6129**	**0.0002**	**0.0910**

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
SEWD	All Project Components	0.01	0.70	0.03	0.01	0.01	0.05	0.01	0.02	660.13	0.00	0.10
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
WID	All Project Components	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
City of Stockton	All Project Components	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
	Total:											

Max Annual Emissions

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
NSJWCD	North System	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	72.20	0.00	0.01	189.04	0.00	0.03
NSJWCD	South System	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	72.20	0.00	0.01	147.03	0.00	0.02
NSJWCD	PODs	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	72.20	0.00	0.01	304.56	0.00	0.05
NSJWCD	ASR Wells	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	360.07	0.00	0.06
NSJWCD	Recharge Basins	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	450.09	0.00	0.07
	Total:	**0.0007**	**0.0765**	**0.0031**	**0.0007**	**0.0013**	**0.0052**	**0.0012**	**0.0016**	**72.2016**	**0.0000**	**0.0114**	**450.0879**	**0.0002**	**0.0709**

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
SEWD	All Project Components	0.00	0.09	0.00	0.00	0.00	0.01	0.00	0.00	82.52	0.00	0.01	204.04	0.00	0.03

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
WID	All Project Components	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	135.03	0.00	0.02

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
City of Stockton	All Project Components	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	153.03	0.00	0.02

Notes:
250 is # of work days CalEEmod assumes in a year
EMFAC2021 HHDT emission factors from 2025 were used in this assessment.
Trip length based on CalEEMod default for worker trips, rounded up. Conservatively applied to vendor trip lengths, which tend to be smaller.
# of 1-way vendor trips based on assumption of 1 vendor per piece of construction equipment

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Roadway Dust Emissions

Paved	PM10 (lb/mile)	PM2.5 (lb/mile)
k	1	0.25
sL	0.1	0.1
W	2.4	2.4
p	2	2
N	365	365
Emission Factor	**0.000661541**	**0.000165385**

Source: CalEEMod Appendix C, Section 5.14 (page C-45)

		Haul VMT		Vendor VMT		Worker VMT		Total VMT		PM10 (lbs)		PM2.5 (lbs)	
	Phase	per year	per day	per year	per day	per year	per day	per year	per day	TPY	lb/day	TPY	lb/day
NSJWCD	North System	16750.97201	67.00388803	42000	168	84000	336	142751	571.0039	0.047218	0.377742	3.9E-09	6.25E-05
NSJWCD	South System	25566.34646	102.2653859	42000	168	84000	336	151566.3	606.2654	0.050134	0.401069	4.15E-09	6.63E-05
NSJWCD	PODs	538.7544274	2.15501771	42000	168	84000	336	126538.8	506.155	0.041855	0.334842	3.46E-09	5.54E-05
NSJWCD	ASR Wells	784.0346249	3.1361385	36000	144	72000	288	108784	435.1361	0.035983	0.28786	2.98E-09	4.76E-05

		Haul VMT		Vendor VMT		Worker VMT		Total VMT		PM10 (lbs)		PM2.5 (lbs)	
	Phase	per year	per day	per year	per day	per year	per day	per year	per day	TPY	lb/day	TPY	lb/day
SEWD	All Project Compo	54073.65827	216.2946331	48000	192	96000	384	198073.7	792.2946	0.065517	0.524135	5.42E-09	8.67E-05

		Haul VMT		Vendor VMT		Worker VMT		Total VMT		PM10 (lbs)		PM2.5 (lbs)	
	Phase	per year	per day	per year	per day	per year	per day	per year	per day	TPY	lb/day	TPY	lb/day
WID	All Project Compo	1499.892326	5.999569304	36000	144	72000	288	109499.9	437.9996	0.036219	0.289755	3E-09	4.79E-05

		Haul VMT		Vendor VMT		Worker VMT		Total VMT		PM10 (lbs)		PM2.5 (lbs)	
	Phase	per year	per day	per year	per day	per year	per day	per year	per day	TPY	lb/day	TPY	lb/day
City of Stockton	All Project Compo	0	0	36000	144	72000	288	108000	432	0.035723	0.285786	2.95E-09	4.73E-05

Appendix C7

Architectural Coatings Emissions Calculations

Architectrual Coatings

Emission Factor Calcs

Nonresidential Exterior

Cvoc =	50	g/L	source: Table G-17, SJVAPCD start date 12/31/2021
UC1 =	0.002205	lb/g	
UC2 =	3.78541	L/gal	
S =	180	sqft/gal	
EF =	0.002318	lb VOC/sqft	

Nonresidential Interior

Cvoc =	50	g/L	source: Table G-17, SJVAPCD start date 12/31/2021
UC1 =	0.002205	lb/g	
UC2 =	3.78541	L/gal	
S =	180	sqft/gal	
EF =	0.002318	lb VOC/sqft	

Emission Calculations

	Exterior	Interior	
EF =	0.002318	0.002318	lb VOC/sqft
F =	0.25	0.75	Per CalEEMod Guidance, Appendix C, Section 4.8
A =	10000	10000	bldg sq ft
E =	5.795417	17.38625	lb VOC/day
Days	10	10	Max days per arch. Coating project
E =	0.028977	0.086931	ton VOC/year

Notes:

Conservatively assumed arch coatings would be limited to 10,000 sq ft of building space for each project component

Appendix D

Agricultural Land Evaluation and Site Assessment (LESA) Model Outputs

CALIFORNIA AGRICULTURAL

LAND EVALUATION AND SITE ASSESSMENT MODEL

Instruction Manual



For further information, please contact:

California Department of Conservation
Office of Land Conservation
801 K Street, MS 13-71
Sacramento, CA 95814-3528
(916) 324-0850
FAX (916) 327-3430

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CALIFORNIA AGRICULTURAL

LAND EVALUATION AND SITE ASSESSMENT MODEL

Instruction Manual
1997

Department of Conservation
Office of Land Conservation

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EXECUTIVE SUMMARY

Land Evaluation and Site Assessment (LESA) is a term used to define an approach for rating the relative quality of land resources based upon specific measurable features. The formulation of a California Agricultural LESA Model is the result of Senate Bill 850 (Chapter 812 /1993), which charges the Resources Agency, in consultation with the Governor's Office of Planning and Research, with developing an amendment to Appendix G of the California Environmental Quality Act (CEQA) Guidelines concerning agricultural lands. Such an amendment is intended "to provide lead agencies with an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process" (Public Resources Code Section 21095).

The California Agricultural LESA Model is composed of six different factors. Two Land Evaluation factors are based upon measures of soil resource quality. Four Site Assessment factors provide measures of a given project's size, water resource availability, surrounding agricultural lands, and surrounding protected resource lands. For a given project, each of these factors is separately rated on a 100 point scale. The factors are then weighted relative to one another and combined, resulting in a single numeric score for a given project, with a maximum attainable score of 100 points. It is this project score that becomes the basis for making a determination of a project's potential significance, based upon a range of established scoring thresholds. This Manual provides detailed instructions on how to utilize the California LESA Model, and includes worksheets for applying the Model to specific projects.

INTRODUCTION

Defining the LESA System

The Land Evaluation and Site Assessment (LESA) system is a point-based approach that is generally used for rating the relative value of agricultural land resources. In basic terms, a given LESA model is created by defining and measuring two separate sets of factors. The first set, Land Evaluation, includes factors that measure the inherent soil-based qualities of land as they relate to agricultural suitability. The second set, Site Assessment, includes factors that are intended to measure social, economic, and geographic attributes that also contribute to the overall value of agricultural land. While this dual rating approach is common to all LESA models, the individual land evaluation and site assessment factors that are ultimately utilized and measured can vary considerably, and can be selected to meet the local or regional needs and conditions for which a LESA model is being designed to address. In short, the LESA methodology lends itself well to adaptation and customization in individual states and localities. Considerable additional information on LESA may be found in *A Decade with LESA - the Evolution of Land Evaluation and Site Assessment* (8).

Background on LESA Nationwide

In 1981, the federal Natural Resources Conservation Service (NRCS), known then as the Soil Conservation Service, released a new system that was designed to provide objective ratings of the agricultural suitability of land compared to demands for nonagricultural uses of lands. The system became known as Land Evaluation and Site Assessment, or LESA. Soon after it was designed, LESA was adopted as a procedural tool at the federal level for identifying and addressing the potential adverse effects of federal programs (e.g., funding of highway construction) on farmland protection. The Farmland Protection Policy Act of 1981 (5) spells out requirements to ensure that federal programs, to the extent practical, are compatible with state, local, and private programs and policies to protect farmland, and calls for the use of LESA to aid in this analysis. Typically, staff of the NRCS is involved in performing LESA scoring analyses of individual projects that involve other agencies of the federal government.

Since its inception, the LESA approach has received substantial attention from state and local governments as well. Nationwide, over two hundred jurisdictions have developed local LESA methodologies (7). One of the attractive features of the LESA approach is that it is well suited to being modified to reflect regional and local conditions. Typical local applications of LESA include assisting in decision making concerning the sitting of projects, changes in zoning, and spheres of influence determinations. LESA is

also increasingly being utilized for farmland protection programs, such as the identification of priority areas to concentrate conservation easement acquisition efforts.

Because of the inherent flexibility in LESA model design, there is a broad array of factors that a given LESA model can utilize. Some LESA models require the measurement of as many as twenty different factors. Over the past 15 years, the body of knowledge concerning LESA model development and application has begun to indicate that LESA models utilizing only several basic factors can capture much of the variability associated with the determination of the relative value of agricultural lands. In fact, LESA models with many factors are increasingly viewed as having redundancies, with different factors essentially measuring the same features, or being highly correlated with one another. Additional information on the evolution and development of the LESA approach is provided in, A *Decade with LESA -The Evolution of Land Evaluation and Site Assessment* (8).

Development of the California Agricultural LESA Model

In 1990 the Department of Conservation commissioned a study to investigate land use decisions that affect the conversion of agricultural lands in California. The study, conducted by Jones and Stokes Associates, Inc., was prepared in response to concerns about agricultural land conversion identified in the *California Soil Conservation Plan* (1) (developed by the ad hoc Soil Conservation Advisory Committee serving the Department of Conservation in 1987). Among these concerns was the belief that there was inadequate information available concerning the socioeconomic and environmental implications of farmland conversions, and that the adequacy of current farmland conversion impact analysis under the California Environmental Quality Act (CEQA) was not fully known. The findings of this study are included in the publication, *The Impacts of Farmland Conversion in California* (2).

Currently, neither CEQA nor the State CEQA Guidelines contains procedures or specific guidance concerning how agencies should address farmland conversion impacts of projects. The only specific mention of agricultural issues is contained in Appendix G of the State CEQA Guidelines, which states that a project will normally have a significant effect on the environment if it will “convert prime agricultural land to non-agricultural use or impair the agricultural productivity of prime agricultural land”.

Among the conclusions contained in *The Impacts of Farmland Conversion in California* study was that the lack of guidance in how lead agencies should address the significance of farmland conversion impacts resulted in many instances of no impact analysis at all. A survey of environmental documents sent to the Governor's Office of Planning and Research (OPR) between 1986 and 1988 was performed. The survey

showed that among projects that affected at least 100 acres of land and for which agriculture was a project issue, nearly 30 percent received Negative Declarations, and therefore did not did not receive the environmental impact analysis that would be provided by an Environmental Impact Report (EIR).

Of those projects involving the conversion of agricultural lands and being the subject of an EIR, the study found a broad range of approaches and levels of detail in describing the environmental setting, performing an impact analysis, and providing alternative mitigation measures. The only agricultural impacts found to be significant in the EIRs were those involving the direct removal of prime agricultural lands from production by the project itself. The focus on prime farmland conversion in the projects surveyed was deemed to be related to the narrow direction provided in Appendix G of the State CEQA Guidelines.

The formulation of a California LESA Model is the result of Senate Bill 850 (Chapter 812 /1993), which charges the Resources Agency, in consultation with the Governor's Office of Planning and Research, to develop an amendment to Appendix G of the California Environmental Quality Act (CEQA) Guidelines. Such an amendment is intended "to provide lead agencies with an optional methodology to ensure that significant effects on the environment of agricultural land conversions are quantitatively and consistently considered in the environmental review process" (Public Resources Code Section 21095). This legislation authorizes the Department of Conservation to develop a California LESA Model, which can in turn be adopted as the required amendment to Appendix G of the CEQA Guidelines.

Presentation of the California LESA Model

The California LESA Model is presented in this Manual in the following sections:

Section I. provides a listing of the information and tools that will typically be needed to develop LESA scores for individual projects.

Section II. provides step-by-step instructions for scoring each of the six Land Evaluation and Site Assessment factors that are utilized in the Model, with an explanation of the rationale for the use of each factor.

Section III. defines the assignment of weights to each of the factors relative to one another, and the creation of a final LESA score for a given project.

Section IV. assigns scoring thresholds to final LESA scores for the purpose of determining the significance of a given project under CEQA where the conversion of agricultural lands is a project issue.

Additionally:

Appendix A. provides an abridged set of step-by-step LESA scoring instructions that can be used and reproduced for scoring individual projects.

Appendix B. demonstrates the application of the California LESA Model to the scoring of a hypothetical project.

The California Agricultural LESA Model

Section I. Required Resources and Information

The California Land Evaluation and Site Assessment (LESA) Model requires the use and interpretation of basic land resource information concerning a given project. A series of measurements and calculations is also necessary to obtain a LESA score. Listed below are the materials and tools that will generally be needed to make these determinations.

Land Evaluation and Site Assessment calculations will require:

1. A calculator or other means of tabulating numbers

2. An accurately scaled map of the project area, such as a parcel map

3. A means for making acreage determinations of irregularly shaped map units. Options include, from least to most technical:

    - A transparent grid-square or dot-planimeter method of aerial measurement

    - A hand operated electronic planimeter

    - The automatic planimetry capabilities of a Geographic Information System (GIS)

4. A modern soil survey, generally produced by the USDA Natural Resources Conservation Service, which delineates the soil-mapping units for a given project. [Note: If modern soil survey information is not available for a given area of study, it may be necessary to draw upon the services of a professional soil scientist to perform a specific project survey].

5. Maps that depict land uses for parcels including and surrounding the project site, such as the Department of Conservation's Important Farmland Map series, the Department of Water Resources Land Use map series, or other appropriate information.

6. Maps or information that indicate the location of parcels including and surrounding the project site that are within agricultural preserves, are under public ownership, have conservation easements, or have other forms of long term commitments that are considered compatible with the agricultural use of a given project site.

Section II. Defining and Scoring the California Land Evaluation and Site Assessment Model Factors

This section provides detailed step-by-step instructions for the measurement and scoring of each of the Land Evaluation and Site Assessment factors that are utilized in the California Agricultural LESA Model, and is intended to serve as an introduction to the process of utilizing the Model. Once users are familiar with the Model, a more streamlined set of instructions and scoring sheets is available in Appendix A. In addition, the scoring of a hypothetical project is presented using these scoring sheets in Appendix B.

Scoring of Land Evaluation Factors

The California LESA Model includes two Land Evaluation factors that are separately rated:

1. The Land Capability Classification Rating
2. The Storie Index Rating

The information needed to make these ratings is typically available from soil surveys that have been conducted by the federal Natural Resources Conservation Service (formerly known as the Soil Conservation Service). Consultation should be made with NRCS staff (field offices exist in most counties) to assure that valid and current soil resource information is available for the project site. Copies of soil surveys are available at local field offices of the NRCS, and may also be available through libraries, city and county planning departments, the Cooperative Extension, and other sources. In addition, a Certified Professional Soil Scientist (CPSS) may also be consulted to obtain appropriate soil resource information for the project site. A directory of CPSS registered soil consultants is available through the Professional Soil Scientists Association of California, P.O. Box 3213, Yuba City, CA 95992-3213; phone: (916) 671-4276.

1) The USDA Land Capability Classification (LCC) - The LCC indicates the suitability of soils for most kinds of crops. Groupings are made according to the limitations of the soils when used to grow crops, and the risk of damage to soils when they are used in agriculture. Soils are rated from Class I to Class VIII, with soils having the fewest limitations receive the highest rating (Class I). Specific subclasses are also utilized to further characterize soils. An expanded explanation of the LCC is included in most soil surveys.

2) The Storie Index - The Storie Index provides a numeric rating (based upon a 100 point scale) of the relative degree of suitability or value of a given soil for intensive agriculture. The rating is based upon soil characteristics only. Four factors that represent the inherent characteristics and qualities of the soil are

considered in the index rating. The factors are: profile characteristics, texture of the surface layer, slope, and other factors (e.g., drainage, salinity).

In some situations, only the USDA Land Capability Classification information may be currently available from a given published soil survey. However, Storie Index ratings can readily be calculated from information contained in soil surveys by qualified soil scientists. Users are encouraged to seek assistance from NRCS staff or Certified Professional Soil Scientists to derive Storie Index information for the soils as well. If, however, limitations of time or resources restrict the derivation of Storie Index ratings for the soils within a region, it may be possible to adapt the Land Evaluation by relying solely upon the LCC rating. Under this scenario the LCC rating would account for 50 percent of the overall LESA factor weighting.

Identifying a Project's Soils

In order to rate the Land Capability Classification and Storie Index factors, the evaluator must identify the soils that exist on a given project site and determine their relative proportions. A **Land Evaluation Worksheet** (Table 1A.) is used to tabulate these figures, based upon the following:

Step 1.
Locate the project on the appropriate map sheet in the Soil Survey.

Step 2.
Photocopy the map sheet and clearly delineate the project boundaries on the map, paying close attention to the map scale.

Step 3.
Identify all of the soil mapping units existing in the project site (each mapping unit will have a different map unit symbol) and enter the each mapping unit symbol in **Column A** of the **Land Evaluation Worksheet** (Table 1A).

Step 4.
Calculate the acreage of each soil mapping unit present within the project site using any of the means identified in **Section 1**, **Required Resources and Information**, and enter this information in **Column B**.

Step 5.

Divide the acres of each soil mapping unit by the total project acreage to determine the proportion of each unit that comprises the project, and enter this information in Column C.

1. Land Evaluation - The Land Capability Classification Rating

Step 1.
In the Guide to Mapping Units typically found within soil surveys, identify the Land Capability Classification (LCC) designation (e.g., IV-e) for each mapping unit that has been identified in the project and enter these designations in **Column D** of the **Land Evaluation Worksheet** (Table 1A.).

Step 2.
From Table 2., **The Numeric Conversion of Land Capability Classification Units**, obtain a numeric score for each mapping unit, and enter these scores in **Column E**.

Step 3.
Multiply the proportion of each soil mapping unit (**Column C**) by the LCC points for each mapping unit (**Column E**) and enter the resulting scores in **Column F**.

Step 4.
Sum the LCC scores in **Column F** to obtain a single LCC Score for the project. Enter this LCC Score in **Line 1** of the **Final LESA Worksheet** (Table 8)

Table 2. Numeric Conversion of Land Capability Classification Units

Land Capability Classification	LCC Point Rating
I	100
IIe	90
IIs,w	80
IIIe	70
IIIs,w	60
IVe	50
IVs,w	40
V	30
VI	20
VII	10
VIII	0

Table 1A.
Land Evaluation Worksheet

Land Capability Classification (LCC) and Storie Index Scores

A	B	C	D	E	F	G	H
Soil Map Unit	Project Acres	Proportion of Project Area	LCC	LCC Rating	LCC Score	Storie Index	Storie Index Score
Totals		(Must Sum to 1.0)		***LCC Total***		***Storie Index Total***	

Table 1B.
Site Assessment Worksheet 1.

Project Size Score

	I	J	K
	LCC Class I - II	LCC Class III	LCC Class IV - VIII
Total Acres			
Project Size Scores			

Highest Project Size Score |

2. Land Evaluation - The Storie Index Rating Score

Step 1.
From the appropriate soil survey or other sources of information identified in Appendix C, determine the Storie Index Rating (the Storie Index Rating is already based upon a 100 point scale) for each mapping unit and enter these values in **Column G** of the **Land Evaluation Worksheet** (Table 1A.).

Step 2.
Multiply the proportion of each soil mapping unit found within the project (**Column C**) by the Storie Index Rating (**Column G**), and enter these scores in **Column H**.

Step 3.
Sum the Storie Index Rating scores in **Column H** to obtain a single Storie Index Rating score for the project. Enter this Storie Index Rating Score in **Line 2** of the **Final LESA Worksheet** (Table 8)

Scoring of Site Assessment Factors

The California LESA Model includes four Site Assessment factors that are separately rated:

1. **The Project Size Rating**
2. **The Water Resources Availability Rating**
3. **The Surrounding Agricultural Land Rating**
4. **The Surrounding Protected Resource Land Rating**

1. Site Assessment - The Project Size Rating

The Project Size Rating relies upon acreage figures that were tabulated under the Land Capability Classification Rating in Table 1A. The Project Size rating is based upon identifying acreage figures for three separate groupings of soil classes within the project site, and then determining which grouping generates the highest Project Size Score.

Step 1.
Using information tabulated in **Columns B** and **D** of the **Land Evaluation Worksheet** (Table 1A), enter acreage figures in **Site Assessment Worksheet 1. - Project Size** (Table 1B) using either **Column I, J,** or **K** for each of the soil mapping units in a given project.

Step 2.
Sum the entries in **Column I** to determine the total acreage of Class I and II soils on the project site.

Sum the entries in **Column J** to determine the total acreage of Class III soils on the project site.

Sum the entries in **Column K** to determine the total acreage of Class IV and lower rated soils on the project site.

Step 3.
For each of the three columns, apply the appropriate scoring plan provided in Table 3, **Project Size Scoring**, and enter the **Project Size Score** for each grouping in the **Site Assessment Worksheet 1. - Project Size** (Table 1B). Determine which column generates the highest score. The highest score becomes the overall **Project Size Score**. Enter this number in **Line 3** of the **Final LESA Scoresheet** (Table 8).

Table 3. Project Size Scoring

LCC Class I or II soils		LCC Class III soils		LCC Class IV or lower	
Acres	***Score***	***Acres***	***Score***	***Acres***	***Score***
80 or above	100	160 or above	100	320 or above	100
60-79	90	120-159	90	240-319	80
40-59	80	80-119	80	160-239	60
20-39	50	60-79	70	100-159	40
10-19	30	40-59	60	40-99	20
fewer than 10	0	20-39	30	fewer than 40	0
		10-19	10		
		fewer than 10	0		

Explanation of the Project Size Factor

The Project Size factor in the California Agricultural LESA Model was developed in cooperation with Nichols-Berman, a consulting firm under contract with the Department of Conservation. A thorough discussion of the development of this rating is presented by Nichols-Berman in a report to the Department entitled, *Statewide LESA Methodologies Report - Project Size and Water Resource Availability Factors* (3).

The inclusion of the measure of a project's size in the California Agricultural LESA Models is a recognition of the role that farm size plays in the viability of commercial agricultural operations. In general, larger farming operations can provide greater flexibility in farm management and marketing decisions. Certain economies of scale for equipment and infrastructure can also be more favorable for larger operations. In addition, larger operations tend to have greater impacts upon the local economy through direct employment, as well as impacts upon support industries (e.g., fertilizers, farm equipment, and shipping) and food processing industries.

While the size of a given farming operation may in many cases serve as a direct indicator of the overall economic viability of the operation, The California Agricultural LESA Model does not specifically consider the issue of economic viability. The variables of economic viability for a specific farm include such factors as the financial management and farming skills of the operator, as well as the debt load and interest rates being paid by an individual operator, which are issues that cannot readily be included in a statewide LESA model.

In terms of agricultural productivity, the size of a farming operation can be considered not just from its total acreage, but the acreage of different quality lands that comprise the operation. Lands with higher quality soils lend themselves to greater management and cropping flexibility and have the potential to provide a greater economic return per unit acre. For a given project, instead of relying upon a single acreage figure in the Project Size rating, the project is divided into three acreage groupings based upon the Land Capability Classification ratings that were previously determined in the Land Evaluation analysis. Under the Project Size rating, relatively fewer acres of high quality soils are required to achieve a maximum Project Size score. Alternatively, a maximum score on lesser quality soils could also be derived, provided there is a sufficiently large acreage present. Acreage figures utilized in scoring are the synthesis of interviews that were conducted statewide for growers of a broad range of crops. In the interviews growers were queried as to what acreage they felt would be necessary in order for a given parcel to be considered attractive for them to farm.

The USDA LCC continues to be the most widely available source of information on land quality. Project Size under this definition is readily measurable, and utilizes much of the same information needed to score a given project under the Land Evaluation component of the methodology. This approach also complements the LE determination, which, while addressing soil quality, does not account for the total acreage of soils of given qualities within a project.

This approach allows for an accounting of the significance of high quality agricultural land as well as lesser quality agricultural lands, which by virtue of their large area can be considered significant agricultural resources. In this way, no single acreage figure for a specific class of soils (e.g., soils defined as “prime”) is necessary.

2. Site Assessment - The Water Resources Availability Rating

The Water Resources Availability Rating is based upon identifying the various water sources that may supply a given property, and then determining whether different restrictions in supply are likely to take place in years that are characterized as being periods of drought and non-drought. **Site Assessment Worksheet 2. - Water Resources Availability Worksheet** (Table 4) is used to tabulate the score.

Step 1.
Identify the different water resource types that are used to supply the proposed project site (for example, irrigation district water, ground water, and riparian water are considered to be three different types of water resources). Where there is only one water source identified for the proposed project, skip to Step 4.

Step 2.
Divide the proposed project site into portions, with the boundaries of each portion being defined by the irrigation water source(s) supplying it. A site that is fully served by a single source of water will have a single portion, encompassing the entire site. A site that is fully served by two or more sources that are consistently merged together to serve a crop's needs would also have a single portion. (e.g., a portion of the proposed project may receive both irrigation district and groundwater). If the project site includes land that has no irrigation supply, consider this acreage as a separate portion as well. Enter the water resource portions of the project in **Column B** of Table 4, **Site Assessment Worksheet 2. - Water Resources Availability**.

[As an example, a hypothetical project site is determined to have four separate water supply portions:

Portion 1 is served by irrigation district water only;
Portion 2 is served by ground water only;
Portion 3 is served by *both* irrigation district water and ground water;
Portion 4 is not irrigated at all.**]**

Step 3.
Calculate the proportion of the total project area that is represented by each water resource portion, and enter these figures in **Column C** of **Site Assessment Worksheet 2. - Water Resources Availability**, verifying that the sum of the proportions equals 1.0.

Table 4. Site Assessment Worksheet 2. - Water Resources Availability

A	B	C	D	E
Project Portion	Water Source	Proportion of Project Area	Water Availability Score	Weighted Availability Score (C x D)
1				
2				
3				
4				
5				
6				
		(Must Sum to 1.0)	***Total Water Resource Score***	

Step 4.

For each water resource supply portion of the project site, determine whether irrigated and dryland agriculture is *feasible*, and if any *physical* or *economic restrictions* exist, during both *drought* and *non-drought* years. These italicized terms are defined below:

- A *physical restriction* is an occasional or regular interruption or reduction in a water supply, or a shortened irrigation season, that forces a change in agricultural practices -- such as planting a crop that uses less water, or leaving land fallow. (This could be from cutbacks in supply by irrigation and water districts, or by ground or surface water becoming depleted or unusable. Poor water quality can also result in a physical restriction -- for example by requiring the planting of salt-tolerant plants, or by effectively reducing the amount of available water.)

- An *economic restriction* is a rise in the cost of water to a level that forces a reduction in consumption. (This could be from surcharge increases from water suppliers as they pass along the cost of finding new water supplies, the extra cost of pumping more ground water to make up for losses in surface water supplies, or the extra energy costs of pumping the same amount of ground water from deeper within an aquifer.)

- Irrigated agricultural production is *feasible* when:

  1) There is an existing irrigation system on the project site that can serve the portion of the project identified in Step 2;

  2) *Physical* and/or *economic restrictions* are not severe enough to halt production; and

  3) It is possible to achieve a viable economic return on crops though irrigated production.

(A major question that should be considered is, if there is an irrigated crop that can be grown within the region, can it actually be grown on the project site? Depending upon the jurisdiction, some typical crops that have a large water demand may not be feasible to grow on the project site, while others that require less water are feasible. Information to aid in making this determination can be obtained from county agricultural commissioners, the UC Cooperative Extension, irrigation districts, and other sources.)

- *Dryland production* is *feasible* when rainfall is adequate to allow an economically viable return on a nonirrigated crop.

- A *drought year* is a year that lies within a defined drought period, as defined by the Department of Water Resources or by a local water agency. Many regions of the state are by their arid nature dependent upon imports of water to support irrigated agriculture. These regions shall not be considered under periods of drought unless a condition of drought is declared for the regions that typically would be providing water exports.

Step 5.
Each of the project's water resource supply portions identified in **Step 2** is scored separately. Water Resources Availability scoring is performed by identifying the appropriate condition that applies to each portion of the project, as identified in Table 5., **Water Resource Availability Scoring**. Using Table 5, identify the option that best describes the water resource availability for that portion and its corresponding water resource score. Option 1 defines the condition of no restrictions on water resource availability and is followed progressively with increasing restrictions to Option 14, the most severe condition, where neither irrigated nor dryland production is considered feasible. Enter each score into **Column D** of Table 4.

Step 6.
For each portion of the project site, determine the section's weighted score by multiplying the portion's score (**Column D**), by its proportion of the project area (**Column C**), and enter these scores in **Column E**, the weighted Water Availability Score. Sum the **Column E** scores to obtain the total Water Resource Availability Score, and enter this figure in **Line 4** of the **Final LESA Score Sheet** (Table 8).

Table 5. Water Resource Availability Scoring

Option	Non-Drought Years			Drought Years			WATER RESOURCE SCORE
	RESTRICTIONS			RESTRICTIONS			
	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	Irrigated Production Feasible?	Physical Restrictions ?	Economic Restrictions ?	
1	YES	NO	NO	YES	NO	NO	100
2	YES	NO	NO	YES	NO	YES	95
3	YES	NO	YES	YES	NO	YES	90
4	YES	NO	NO	YES	YES	NO	85
5	YES	NO	NO	YES	YES	YES	80
6	YES	YES	NO	YES	YES	NO	75
7	YES	YES	YES	YES	YES	YES	65
8	YES	NO	NO	NO	-- --	-- --	50
9	YES	NO	YES	NO	-- --	-- --	45
10	YES	YES	NO	NO	-- --	-- --	35
11	YES	YES	YES	NO	-- --	-- --	30
12	Irrigated production not feasible, but rainfall adequate for dryland production in both drought and non-drought years						25
13	Irrigated production not feasible, but rainfall adequate for dryland production in non-drought years (but not in drought years)						20
14	Neither irrigated nor dryland production feasible						0

Explanation of the Water Resource Availability Rating

The Water Resource Availability factor in the California Agricultural LESA Model was developed in cooperation with Nichols-Berman, a consulting firm under contract with the Department of Conservation. A thorough discussion of the development of this rating is presented by Nichols-Berman in a report to the Department entitled, *Statewide LESA Methodologies Report - Project Size and Water Resource Availability Factors* (3). During the development of this factor it became apparent that certain conditions unique to California would need to be represented in this system.

First, it was decided to classify water reliability based upon the *effects* on agricultural production (such as being forced to change to lower-value crops, putting in groundwater pumps, or cutting back on the acreage farmed) rather than the actual *type* of limitation (such as a limitation on the quantity, frequency, or duration of water delivery). LESA systems have traditionally focused on the latter. However, it was found that the many types of limitations are too varied in California to adequately represent in the LESA system. In the Statewide LESA system, these effects are referred to as *restrictions*.

Second, the factor had to include an interrelation with cost. The historical shortages and unreliability of California water use has led to the establishment of various interconnected and dual systems. Probably more than any other state, reliability is related with cost -- a more reliable water supply can sometimes be obtained, but at a greater cost. Therefore, *restrictions* were classified into two major categories -- *physical* and *economic*. These are separated because, generally, a physical restriction is more severe than an economic restriction and this should be reflected in the LESA system.

Third, the factor had to include the effects of the drought cycle in California. During the drought of 1987 to 1992, many agricultural areas of the state experienced water shortages. The impact of these shortages resulted in a number of different actions. Some areas were able to avoid the worst effects of the drought simply by implementing water conservation measures. Other areas were able to obtain additional water supplies, such as by securing water transfers or simply pumping more groundwater, but at an increase in the overall price of water. Other options included shifting crops, replanting to higher value crops to offset the increase in water prices, or leaving land fallow. A project site that experiences restrictions during a drought year should not be scored as high as a similar project site that does not.

The easiest way to make determinations of irrigation feasibility and the potential restrictions of water sources is to investigate the cropping history of the project site. For instance, was the water supply to the project site reduced by the local irrigation district during the last drought? If the site has a ground water supply, do area ground water levels sometimes drop to levels that force markedly higher energy costs to pump the water?

If the history of the project site is unavailable (including when the site has recently installed an irrigation system), look at the history of the general area. However, remember that the project site may have different conditions than the rest of the region. For instance, the project site could have an older water right than others in the region. Although certain areas of the state had severe restrictions on water deliveries during the last drought, some parcels within these areas had very secure deliveries due to more senior water rights. If this was the case in the region of the project site, check the date of water right and compare it with parcels that received their total allotment during the last drought. The local irrigation district should have information on water deliveries.

The scoring of water resource availability for a project site should not just reflect the adequacies of water supply in the past -- it should be a *prediction* of how the water system will perform in the future. For instance, a local jurisdiction might find that the allocation of flows to stream and river systems has been recently increased for environmental reasons, which will decrease the future available surface water supply. In this case, the past history of the site is not an adequate representation of future water supply and water system performance.

3. Site Assessment - The Surrounding Agricultural Land Rating

Determination of the surrounding agricultural land use rating is based upon the identification of a project's "Zone of Influence" (ZOI), which is defined as that land near a given project, both directly adjoining and within a defined distance away, that is likely to influence, and be influenced by, the agricultural land use of the subject project site. The determination of the ZOI is described below, and is illustrated with an example in Figure 1.

Defining a Project's "Zone of Influence"

Step 1.
Locate the proposed project on an appropriate map and outline the area and dimensions of the proposed project site.

Step 2.
Determine the smallest rectangle that will completely contain the project site (Rectangle A).

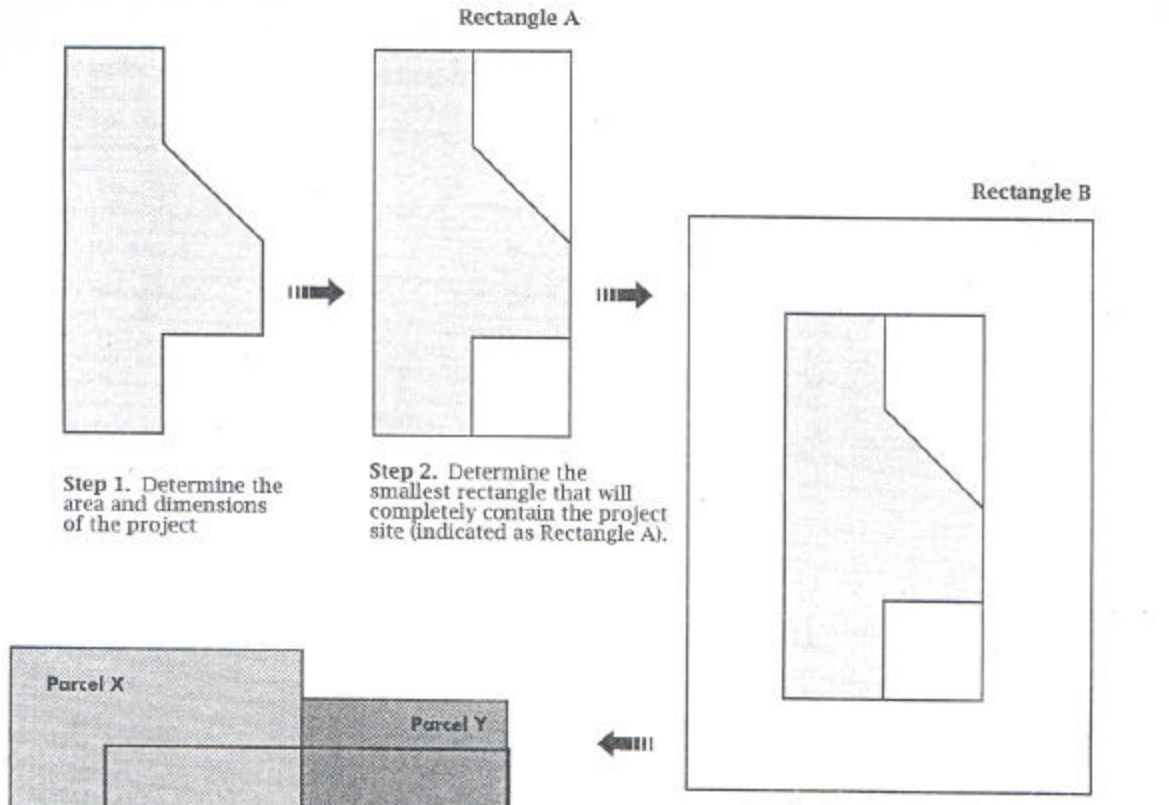
Step 3.
Create a second rectangle (Rectangle B) that extends 0.25 mile (1320 feet) beyond Rectangle A on all sides.

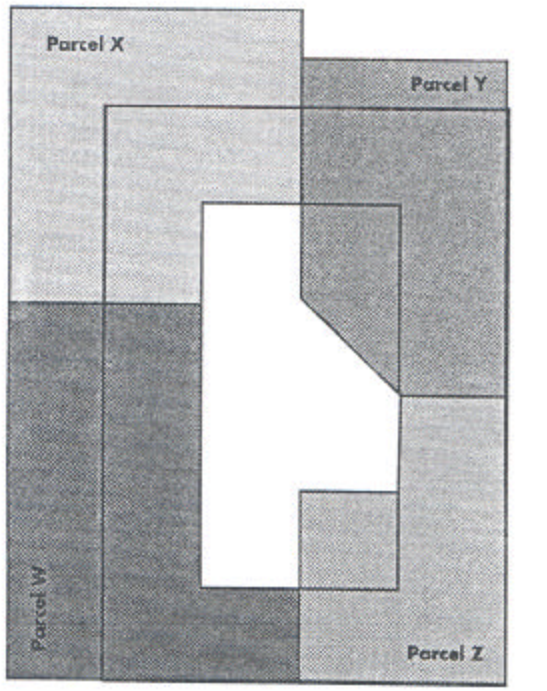
Step 4.
Identify all parcels that are within or are intersected by Rectangle B.

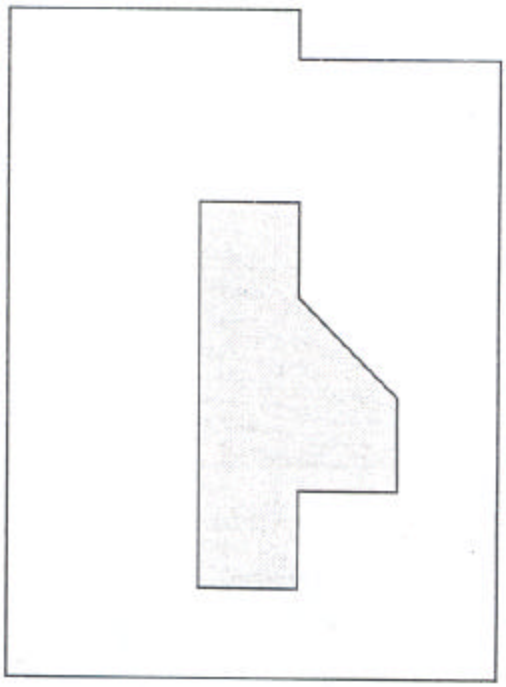
Step 5.
Define the project site's "zone of influence" as the entire area of all parcels identified in Step 4, less the area of the proposed project from Step 1.

[In the illustration provided in Figure 1, Parcels W, X, and Y extend beyond Rectangle B and are therefore included in their entirety in defining the project site's Zone of Influence.**]**

Figure 1: Defining a Project's Zone of Influence







Measuring Surrounding Agricultural Land

Step 1.
Calculate the percentage of the project's Zone of Influence that is currently producing agricultural crops. **[**This figure can be determined using information from the Department of Conservation's Important Farmland Map Series, the Department of Water Resources' Land Use Map Series, locally derived maps, or direct site inspection. For agricultural land that is currently fallowed, a determination must be made concerning whether the land has been fallowed as part of a rotational sequence during normal agricultural operations, or because the land has become formally "committed" to a nonagricultural use. Land that has become formally committed, whether fallow or not, should not generally be included in determining the proportion of the Zone of Influence that is agricultural land. For further information on the definition of Committed Land, refer to the following Explanation of the Surrounding Agricultural Land Rating.**]**

Step 2.
Based on the percentage of agricultural land in the ZOI determined in Step 1, assign a Surrounding Agricultural Land score to the project according to Table 6, and enter this score in **Line 5** of the **Final LESA Scoresheet** (Table 8) .

Table 6. Surrounding Agricultural Land Rating

Percent of Project's Zone of Influence in Agricultural Use	Surrounding Agricultural Land Score
90 - 100%	100 Points
80 - 89	90
75 - 79	80
70 - 74	70
65 - 69	60
60 - 64	50
55 - 59	40
50 - 54	30
45 - 49	20
40 - 44	10
40 <	0

Explanation of the Surrounding Agricultural Land Rating

The Surrounding Agricultural Land Rating is designed to provide a measurement of the level of agricultural land use for lands in close proximity to a subject project. The California Agricultural LESA Model rates the potential significance of the conversion of an agricultural parcel that has a large proportion of surrounding land in agricultural production more highly than one that has a relatively small percentage of surrounding land in agricultural production. The definition of a "Zone of Influence" that accounts for surrounding lands up to a minimum of one quarter mile from the project boundary is the result of several iterations during model development for assessing an area that will generally be a representative sample of surrounding land use. In a simple example, a single one quarter mile square project (160 acres) would have a Zone of Influence that is a minimum of eight times greater (1280 acres) that the parcel itself.

Land within a Zone of Influence that is observed to be fallow will require a case by case determination of whether this land should be considered agricultural land. The Department of Conservation's Important Farmland Maps may be of assistance in making this determination. In addition, land currently in agricultural production may be designated as being "committed" to future nonagricultural development. The Department of Conservation's Farmland Mapping and Monitoring Program has a land use designation of Land Committed to Nonagricultural Use, and is defined as "land that is permanently committed by local elected officials to nonagricultural development by virtue of decisions which cannot be reversed simply by a majority vote of a city council or county board of supervisors. The "committed" land must be so designated in an adopted local general plan, and must also meet the requirements of either (a) or (b) below:

(a). It must have received one of the following final discretionary approvals:

1. Tentative subdivision map (approved per the Subdivision Map Act);
2. Tentative or final parcel map (approved per the Subdivision Map Act);
3. Recorded development agreement (per Government Code §65864);
4. Other decisions by a local government which are analogous to items #1-3 above and which exhibit an element of permanence. Zoning by itself does <u>not</u> qualify as a permanent commitment.

<u>Or</u>

(b) It must be the subject of one of the final fiscal commitments to finance the capital improvements specifically required for future development of the land in question as shown below:

1. Recorded Resolution of Intent to form a district and levy an assessment;
2. Payment of assessment;
3. Sale of bonds;
4. Binding contract, secured by bonds, guaranteeing installation of infrastructure;
5. Other fiscal commitments which are analogous to items #1-4 above and exhibit an element of permanence."

Lead agencies are encouraged to identify Land Committed to Nonagricultural Use within a project's ZOI and make the determination whether this land, while still in agricultural production, be considered nonagricultural land for the purposes of the calculation performed here.

4. Site Assessment - The Surrounding Protected Resource Land Rating

The Surrounding Protected Resource Land Rating is essentially an extension of the Surrounding Agricultural Land Rating, and is scored in a similar manner. Protected resource lands are those lands with long term use restrictions that are compatible with or supportive of agricultural uses of land. Included among them are the following:

- Williamson Act contracted lands
- Publicly owned lands maintained as park, forest, or watershed resources
- Lands with agricultural, wildlife habitat, open space, or other natural resource easements that restrict the conversion of such land to urban or industrial uses.

Instructions for the Surrounding Protected Resource Land Rating

Step 1.
Utilizing the same "Zone of Influence" (ZOI) area calculated for a project under the Surrounding Agricultural Land Rating, calculate the percentage of the ZOI that is Protected Resource Land, as defined above.

Step 2.
Assign a Surrounding Protected Resource Land score to the project according to Table 7, and enter this score on **Line 6** of the **Final LESA Scoresheet** (Table 8).

Table 7. Surrounding Protected Resource Land Rating

Percent of Project's Zone of Influence Defined as Protected	Surrounding Protected Resource Land Score
90 - 100%	100 Points
80 - 89	90
75 - 79	80
70 - 74	70
65 - 69	60
60 - 64	50
55 - 59	40
50 - 54	30
45 - 49	20
40 - 44	10
40 <	0

Section III. Weighting of Factors and Final LESA Scoring

The California LESA Model is weighted so that 50 percent of the total LESA score of a given project is derived from the Land Evaluation factors, and 50 percent from the Site Assessment factors. Individual factor weights are listed below, with the sum of the factor weights required to equal 100 percent.

Land Evaluation Factors

Land Capability Classification	25%
Storie Index Rating	25%
Land Evaluation Subtotal	**50%**

Site Assessment Factors

Project Size	15%
Water Resource Availability	15%
Surrounding Agricultural Lands	15%
Surrounding Protected Resource Lands	5%
Site Assessment Subtotal	**50%**
Total LESA Factor Weighting	**100%**

Each factor is measured separately (each on 100 point scale) and entered in the appropriate line in **Column B** of the **Final LESA Scoresheet** (Table 8). Each factor's score is then multiplied by its respective factor weight, resulting in a weighted factor score in **Column D** as indicated in Table 8. The weighted factor scores are summed, yielding a Total LESA Score (100 points maximum) for a given project, which is entered in **Line 7** of **Column D**.

Table 8. Final LESA Scoresheet

A	B		C		D
Factor Name	Factor Rating (0-100 points)	X	Factor Weighting (Total = 1.00)	=	Weighted Factor Rating
<u>Land Evaluation</u>					
1. Land Capability Classification	<Line 1>_____	X	0.25	=	_____
2. Storie Index Rating	<Line 2>_____	X	0.25	=	_____
<u>Site Assessment</u>					
1. Project Size	<Line 3>_____	X	0.15	=	_____
2. Water Resource Availability	<Line 4>_____	X	0.15	=	_____
3. Surrounding Agricultural Lands	<Line 5>_____	X	0.15	=	_____
4. Protected Resource Lands	<Line 6>_____	X	0.05	=	_____
			Total LESA Score (sum of weighted factor ratings)		<Line 7>_____

Section IV. California Agricultural LESA Scoring Thresholds - Making Determinations of Significance Under CEQA

A single LESA score is generated for a given project after all of the individual Land Evaluation and Site Assessment factors have been scored and weighted as detailed in Sections 2 and 3. Just as with the scoring of individual factors that comprise the California Agricultural LESA Model, final project scoring is based on a scale of 100 points, with a given project being capable of deriving a maximum of 50 points from the Land Evaluation factors and 50 points from the Site Assessment factors.

The California Agricultural LESA Model is designed to make determinations of the potential significance of a project's conversion of agricultural lands during the Initial Study phase of the CEQA review process. Scoring thresholds are based upon both the total LESA score as well as the component LE and SA subscores. In this manner the scoring thresholds are dependent upon the attainment of a minimum score for the LE and SA subscores so that a single threshold is not the result of heavily skewed subscores (i.e., a site with a very high LE score, but a very low SA score, or vice versa). Table 9 presents the California Agricultural LESA scoring thresholds.

Table 9. California LESA Model Scoring Thresholds

Total LESA Score	Scoring Decision
0 to 39 Points	Not Considered Significant
40 to 59 Points	Considered Significant only if LE and SA subscores are each greater than or equal to 20 points
60 to 79 Points	Considered Significant unless either LE or SA subscore is less than 20 points
80 to 100 Points	Considered Significant

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LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table A. SEWD LCC and Storie Index

A	B		C	D	E	F	G	H
Soil Map Unit	Soil Area (total SEWD acres)	Soil Area (estimated soil area in project areas)	Proportion of Project Area	LCC	LCC Rating	LCC Score (C x E)	Storie Index	Storie Index Score (C x G)
Archerdale clay loam, 0 to 2 percent slopes	3,305.8	50.5	27%	III	80	22	80	22
Boggiano clay loam, 0 to 2 percent slopes	19.2	0.3	0%	III	80	0	60	0
Cogna loam, 0 to 2 percent slopes	3,322.8	50.8	28%	III	80	22	80	22
Cogna loam, 0 to 2 percent slopes, overwash	14.2	0.2	0%	III	80	0	80	0
Columbia fine sandy loam, drained, 0 to 2 percent slopes, MLRA 17	160.8	2.5	1%	II	90	1	80	1
Finrod clay loam, 0 to 2 percent slopes	1,126.8	17.2	9%	III	80	7	55	5
Galt clay, 0 to 1 percent slopes, MLRA 17	40.0	0.6	0%	III	80	0	60	0
Hollenbeck silty clay, 0 to 2 percent slopes	1,026.8	15.7	9%	III	80	7	60	5
Honcut sandy loam, 0 to 2 percent slopes	102.2	1.6	1%	II	90	1	90	1
Jacktone clay, 0 to 2 percent slopes	191.1	2.9	2%	IIIs,w	60	1	60	1
Rocklin sandy loam, 2 to 5 percent slopes	49.6	0.8	0%	IV	60	0	70	0
San Joaquin complex, 0 to 1 percent slopes	92.5	1.4	1%	II	90	1	80	1
San Joaquin sandy loam, 0 to 2 percent slopes	77.0	1.2	1%	III	80	1	80	1
San Joaquin sandy loam, 2 to 5 percent slopes	391.6	6.0	3%	IIIs,w	60	2	60	2
Stockton clay, 0 to 2 percent slopes	1,851.0	28.3	15%	III	80	12	80	12
Stockton fine sandy loam, 0 to 2 percent slopes, overwashed	26.3	0.4	0%	III	80	0	60	0
Vignolo silt loam, 0 to 2 percent slopes	50.6	0.8	0%	III	80	0	80	0
Vignolo silty clay loam, 0 to 2 percent slopes	153.0	2.3	1%	III	80	1	80	1
Water	63.6	1.0	1%	VIII	-	-	-	-
Totals	**12,065**	**184**				**79**		**74**

LCC-to-LCC Rating Conversion Table	
LCC Class	LESA Score
I	100
IIe	90
IIs	90
IIw	90
II	90
III	80
IIIs	80
IIIw	80
IIIe	70
IIIs,w	60
IV	60
IVw	50
IVe	50
IVs	50
IVs,w	40
V	30
VI	20
VIe	20
VII	10
VIIe	10
VIIw	10
VIII	0

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table B. SEWD Project Size Score

	I	J	K
Soil Map Unit	**LCC Class I-II (acres)**	**LCC Class III (acres)**	**LCC Class IV-VIII (acres)**
Archerdale clay loam, 0 to 2 percent slopes	-	3,305.83	-
Boggiano clay loam, 0 to 2 percent slopes	-	19.24	-
Cogna loam, 0 to 2 percent slopes	-	3,322.85	-
Cogna loam, 0 to 2 percent slopes, overwash	-	14.25	-
Columbia fine sandy loam, drained, 0 to 2 percent slopes, MLRA 17	160.78	-	-
Finrod clay loam, 0 to 2 percent slopes	-	1,126.82	-
Galt clay, 0 to 1 percent slopes, MLRA 17	-	39.98	-
Hollenbeck silty clay, 0 to 2 percent slopes	-	1,026.79	-
Honcut sandy loam, 0 to 2 percent slopes	102.19	-	-
Jacktone clay, 0 to 2 percent slopes	-	191.09	-
Rocklin sandy loam, 2 to 5 percent slopes	-	-	49.58
San Joaquin complex, 0 to 1 percent slopes	92.54	-	-
San Joaquin sandy loam, 0 to 2 percent slopes	-	77.00	-
San Joaquin sandy loam, 2 to 5 percent slopes	-	391.62	-
Stockton clay, 0 to 2 percent slopes	-	1,851.03	-
Stockton fine sandy loam, 0 to 2 percent slopes, overwashed	-	26.26	-
Vignolo silt loam, 0 to 2 percent slopes	-	50.62	-
Vignolo silty clay loam, 0 to 2 percent slopes	-	152.99	-
Water	-	-	63.63
SEWD Area by LCC Class (acres)	355.50	11,596.36	113.21
Percentage of Total SEWD Area	2.9%	96.1%	0.9%
Total Permanent Disturbance Footprint of SEWD Project Components (acres)	184.34		
LCC Class Disturbance Area (acres)[1]	5.43	177.18	1.73
LESA Project Size Scoring	-	100	-
Highest of 3 Categories (for use on Final LESA Score Sheet)	**100**		

1 Note: Because specific project locations are unknown at this time, this model exercise evaluates soil types across the SEWD project components area in the EIR. The model then accounts for LCC Class types as a percentage of SEWD project components area, applied to the estimated total disturbance footprint.

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table C. SEWD Water Resources

A	B	C	D	E
Project Proportion	Water Source	Proportion of Project Area	Water Availability Score[1]	Weighted Availability Score (C x D)
1	Irrigation	1	100	100

[1] *Note: Because some specific project component locations are unknown at this time, and because of the general agricultural nature of the project area, this model conservatively assumes project components may be sited on lands with water irrigation resources available in both drought and non-drought years with no physical or economic restrictions. As such, a Water Resource Score of 100 is applied.*

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table D. SEWD Surrounding Ag

A	B	C	D	E	F	G
Total Acres	Acres in Agriculture	Acres of Protected Resource Lands	Percent in Agriculture[1]	Percent Protected Resource Land[1]	Surrounding Agricultural Land Score	Surrounding Protected Resource Land Score
184.34	--	--	80.8%	79.3%	90	80

[1] *Source: California Department of Conservation. 2025. "California Important Farmland Finder." https://maps.conservation.ca.gov/DLRP/CIFF/ (accessed January 2025)*

LESA Model - Mokelumne River Integrated Conjunctive Use Program

Table E. SEWD LESA Scoring

	Factor Scores	Factor Weight	Weighted Factor Scores
Land Evaluation Factors			
Land Capability Classification	79	0.25	20
Storie Index	74	0.25	19
Land Evaluation Subtotal		**0.5**	38
Site Assessment Factors			
Project Size	100	0.15	15
Water Resource Availability	100	0.15	15
Surrounding Agricultural Land	90	0.15	14
Protected Resource Land	80	0.05	4
Site Assessment Subtotal		**0.5**	48
		Final LESA Score	86

LESA Model - Mokelumne River Integrated Conjunctive Use Program

Table A. NSJWCD LCC and Storie Index

A	B		C	D	E	F	G	H
Soil Map Unit	Soil Area (total NSJWCD acres)	Soil Area (estimated soil area in project areas)	Proportion of Project Area	LCC	LCC Rating	LCC Score (C x E)	Storie Index	Storie Index Score (C x G)
Acampo sandy loam, 0 to 2 percent slopes	980.4658	31.8	3%	IIIe	70	2	60	2
Archerdale clay loam, 0 to 2 percent slopes	48.797891	1.6	0%	III	80	0	80	0
Bruella sandy loam, 0 to 2 percent slopes	300.95755	9.7	1%	IIe	90	1	80	1
Bruella sandy loam, hard substratum, 0 to 2 percent slopes	567.25724	18.4	2%	IIe	90	2	80	1
Cogna loam, 0 to 2 percent slopes	0.0358142	0.0	0%	III	80	0	80	0
Columbia fine sandy loam, channeled, partially drained, 0 to 2 percent slopes, frequently flo	122.45968	4.0	0%	VIIw	10	0	20	0
Columbia fine sandy loam, drained, 0 to 2 percent slopes, MLRA 17	1360.3606	44.1	4%	IIw	90	4	80	4
Columbia fine sandy loam, partially drained, 0 to 2 percent slopes, occasionally flooded	702.09118	22.7	2%	IIIw	80	2	60	1
Cometa sandy loam, 2 to 5 percent slopes	528.65774	17.1	2%	IIIe	70	1	60	1
Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16	80.807684	2.6	0%	IIw	90	0	70	0
Dumps	111.12601	3.6	0%	VIII	-	-	-	-
Egbert silty clay loam, partially drained, 0 to 2 percent slopes, MLRA 16	347.87183	11.3	1%	IIIw	80	1	60	1
Exeter sandy loam, 0 to 2 percent slopes	367.29695	11.9	1%	IIe	90	1	55	1
Finrod clay loam, 0 to 2 percent slopes	624.19254	20.2	2%	III	80	2	60	1
Galt clay, 0 to 1 percent slopes, MLRA 17	189.6553	6.1	1%	IIIw	80	0	60	0
Galt clay, 0 to 4 percent slopes, MLRA 17	41.504588	1.3	0%	IIIw	80	0	60	0
Hicksville loam, 0 to 2 percent slopes, occasionally flooded	13.531294	0.4	0%	IIIw	80	0	40	0
Hicksville loam, bedrock substratum, 2 to 5 percent slopes, occasionally flooded	61.905289	2.0	0%	IVs,w	40	0	60	0
Hollenbeck silty clay, 0 to 2 percent slopes	551.87244	17.9	2%	III	80	1	60	1
Jacktone clay, 0 to 2 percent slopes	154.09369	5.0	0%	IIIs,w	60	0	60	0
Kaseberg fine sandy loam, 2 to 15 percent slopes	4.7432067	0.2	0%	VIe	20	0	40	0
Kingdon fine sandy loam, 0 to 2 percent slopes	2829.8985	91.6	9%	IIe	90	8	80	7
Montpellier-Cometa complex, 5 to 8 percent slopes	715.19511	23.2	2%	IVe	50	1	40	1
Pits, gravel	264.59802	8.6	1%	VIII	-	-	-	-
Ramoth sandy loam, 15 to 30 percent slopes	71.109648	2.3	0%	VIIe	10	0	20	0
Ramoth sandy loam, 5 to 8 percent slopes	283.45901	9.2	1%	VIe	20	0	40	0
Ramoth sandy loam, 8 to 15 percent slopes	13.298342	0.4	0%	VIe	20	0	30	0
Redding gravelly loam, 0 to 8 percent slopes, dry	38.050337	1.2	0%	IVe	50	0	40	0
Redding gravelly loam, 1 to 30 percent slopes, dry, MLRA 17	81.352508	2.6	0%	VIe	20	0	30	0
Rocklin fine sandy loam, 0 to 2 percent slopes	393.29073	12.7	1%	IVe	50	1	60	1
Rocklin sandy loam, 2 to 5 percent slopes	1603.7723	51.9	5%	IVe	50	3	70	4
San Joaquin complex, 0 to 1 percent slopes	2.3853529	0.1	0%	IIe	90	0	80	0
San Joaquin loam, 0 to 2 percent slopes	301.88058	9.8	1%	IIIe	70	1	70	1
San Joaquin loam, thick surface, 0 to 2 percent slopes	1916.7357	62.1	6%	IIIe	70	4	75	5
San Joaquin sandy loam, 0 to 2 percent slopes	137.1563	4.4	0%	IIIe	70	0	80	0
San Joaquin sandy loam, 2 to 5 percent slopes	1517.3264	49.1	5%	IIIs,w	60	3	60	3
San Joaquin-Urban land complex, 0 to 2 percent slopes	10.649429	0.3	0%	IIIe	70	0	60	0
Stockton clay, 0 to 2 percent slopes	847.86022	27.5	3%	III	80	2	80	2
Tokay fine sandy loam, 0 to 2 percent slopes	10873.902	352.1	35%	IIe	90	32	80	28
Tokay-Urban land complex, 0 to 2 percent slopes	5.8370889	0.2	0%	IIe	90	0	70	0
Tujunga loamy sand, 0 to 2 percent slopes	447.03421	14.5	1%	IIIe	70	1	60	1
Vina fine sandy loam, 0 to 2 percent slopes, MLRA 17	1285.3909	41.6	4%	IIe	90	4	80	3
Water	81.43803	2.6	0%	VIII	-	-	-	-
Totals	**30,881**	**1,000**				**78**		**71**

LCC-to-LCC Rating Conversion Table	
LCC Class	LESA Score
I	100
IIe	90
IIs	90
IIw	90
II	90
III	80
IIIs	80
IIIw	80
IIIe	70
IIIs,w	60
IV	60
IVw	50
IVe	50
IVs	50
IVs,w	40
V	30
VI	20
VIe	20
VII	10
VIIe	10
VIIw	10
VIII	0

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table B. NSJWCD Project Size Score

	I	J	K
Soil Map Unit	LCC Class I-II (acres)	LCC Class III (acres)	LCC Class IV-VIII (acres)
Acampo sandy loam, 0 to 2 percent slopes	-	980.47	-
Archerdale clay loam, 0 to 2 percent slopes	-	48.80	-
Bruella sandy loam, 0 to 2 percent slopes	300.96	-	-
Bruella sandy loam, hard substratum, 0 to 2 percent slopes	567.26	-	-
Cogna loam, 0 to 2 percent slopes	-	0.04	-
Columbia fine sandy loam, channeled, partially drained, 0 to 2 percent slopes, frequently flo	-	-	122.46
Columbia fine sandy loam, drained, 0 to 2 percent slopes, MLRA 17	1,360.36	-	-
Columbia fine sandy loam, partially drained, 0 to 2 percent slopes, occasionally flooded	-	702.09	-
Cometa sandy loam, 2 to 5 percent slopes	-	528.66	-
Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16	80.81	-	-
Dumps	-	-	111.13
Egbert silty clay loam, partially drained, 0 to 2 percent slopes, MLRA 16	-	347.87	-
Exeter sandy loam, 0 to 2 percent slopes	367.30	-	-
Finrod clay loam, 0 to 2 percent slopes	-	624.19	-
Galt clay, 0 to 1 percent slopes, MLRA 17	-	189.66	-
Galt clay, 0 to 4 percent slopes, MLRA 17	-	41.50	-
Hicksville loam, 0 to 2 percent slopes, occasionally flooded	-	13.53	-
Hicksville loam, bedrock substratum, 2 to 5 percent slopes, occasionally flooded	-	-	61.91
Hollenbeck silty clay, 0 to 2 percent slopes	-	551.87	-
Jacktone clay, 0 to 2 percent slopes	-	154.09	-
Kaseberg fine sandy loam, 2 to 15 percent slopes	-	-	4.74
Kingdon fine sandy loam, 0 to 2 percent slopes	2,829.90	-	-
Montpellier-Cometa complex, 5 to 8 percent slopes	-	-	715.20
Pits, gravel	-	-	264.60
Ramoth sandy loam, 15 to 30 percent slopes	-	-	71.11
Ramoth sandy loam, 5 to 8 percent slopes	-	-	283.46
Ramoth sandy loam, 8 to 15 percent slopes	-	-	13.30
Redding gravelly loam, 0 to 8 percent slopes, dry	-	-	38.05
Redding gravelly loam, 1 to 30 percent slopes, dry, MLRA 17	-	-	81.35
Rocklin fine sandy loam, 0 to 2 percent slopes	-	-	393.29
Rocklin sandy loam, 2 to 5 percent slopes	-	-	1,603.77
San Joaquin complex, 0 to 1 percent slopes	2.39	-	-
San Joaquin loam, 0 to 2 percent slopes	-	301.88	-
San Joaquin loam, thick surface, 0 to 2 percent slopes	-	1,916.74	-
San Joaquin sandy loam, 0 to 2 percent slopes	-	137.16	-
San Joaquin sandy loam, 2 to 5 percent slopes	-	1,517.33	-
San Joaquin-Urban land complex, 0 to 2 percent slopes	-	10.65	-
Stockton clay, 0 to 2 percent slopes	-	847.86	-
Tokay fine sandy loam, 0 to 2 percent slopes	10,873.90	-	-
Tokay-Urban land complex, 0 to 2 percent slopes	5.84	-	-
Tujunga loamy sand, 0 to 2 percent slopes	-	447.03	-
Vina fine sandy loam, 0 to 2 percent slopes, MLRA 17	1,285.39	-	-
Water	-	-	81.44
NSJWCD Area by LCC Class (acres)	17,674.09	9,361.41	3,845.80
Percentage of Total NSJWCD Area	57.2%	30.3%	12.5%
Total Permanent Disturbance Footprint of NSJWCD Project Components (acres)	1,000.05		
LCC Class Disturbance Area (acres)[1]	572.35	303.16	124.54
LESA Project Size Scoring	100	100	20
Highest of 3 Categories (for use on Final LESA Score Sheet)	**100**		

[1] *Note: Because specific project locations are unknown at this time, this model exercise evaluates soil types across the NSJWCD* project component areas mapped in EIR. *The model then accounts for LCC Class types as a percentage of total project component areas, applied to the estimated total disturbance footprint.*

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table C. NSJWCD Water Resources

A	B	C	D	E
Project Proportion	Water Source	Proportion of Project Area	Water Availability Score[1]	Weighted Availability Score (C x D)
1	Irrigation	1	100	100

[1] *Note: Because some specific project component locations are unknown at this time, and because of the general agricultural nature of the project area, this model conservatively assumes project components may be sited on lands with water irrigation resources available in both drought and non-drought years with no physical or economic restrictions. As such, a Water Resource Score of 100 is applied.*

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table D. NSJWCD Surrounding Ag

A	B	C	D	E	F	G
Total Acres	Acres in Agriculture	Acres of Protected Resource Lands	Percent in Agriculture[1]	Percent Protected Resource Land[1]	Surrounding Agricultural Land Score	Surrounding Protected Resource Land Score
1,000.05	--	--	80.8%	79.3%	90	80

[1] *Source: California Department of Conservation. 2025. "California Important Farmland Finder." https://maps.conservation.ca.gov/DLRP/CIFF/ (accessed January 2025)*

LESA Model - Mokelumne River Integrated Conjunctive Use Program

Table E. NSJWCD LESA Scoring

	Factor Scores	Factor Weight	Weighted Factor Scores
Land Evaluation Factors			
Land Capability Classification	78	0.25	20
Storie Index	71	0.25	18
Land Evaluation Subtotal		**0.5**	37
Site Assessment Factors			
Project Size	100	0.15	15
Water Resource Availability	100	0.15	15
Surrounding Agricultural Land	90	0.15	14
Protected Resource Land	80	0.05	4
Site Assessment Subtotal		**0.5**	48
		Final LESA Score	85

LESA Model - Mokelumne River Integrated Conjunctive Use Program

Table A. City of Stockton LCC and Storie Index

A	B		C	D	E	F	G	H
Soil Map Unit	Soil Area (total City of Stockton acres)	Soil Area (estimated soil area in project areas)	Proportion of Project Area	LCC	LCC Rating	LCC Score (C x E)	Storie Index	Storie Index Score (C x G)
Acampo sandy loam, 0 to 2 percent slopes	1,224.1	7.9	11%	IIIe	70	8	60	7
Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16	385.5	2.5	4%	III	80	3	70	2
Finrod clay loam, 0 to 2 percent slopes	12.0	0.1	0%	IIe	90	0	55	0
Galt clay, 0 to 1 percent slopes, MLRA 17	84.1	0.5	1%	IIe	90	1	60	0
Hollenbeck silty clay, 0 to 2 percent slopes	343.4	2.2	3%	III	80	3	60	2
Jacktone clay, 0 to 2 percent slopes	3,029.8	19.5	28%	VIIw	10	3	60	17
Jacktone-Urban land complex, 0 to 2 percent slopes	109.2	0.7	1%	IIw	90	1	60	1
Rioblancho clay loam, drained, 0 to 2 percent slopes	1,717.3	11.0	16%	IIIw	80	13	60	9
Stockton clay, 0 to 2 percent slopes	2,531.5	16.3	23%	IIIe	70	16	80	19
Stockton fine sandy loam, 0 to 2 percent slopes, overwashed	4.2	0.0	0%	IIw	90	0	60	0
Stockton silty clay loam, 0 to 2 percent slopes, overwashed	263.9	1.7	2%	VIII	-	-	60	1
Stockton-Urban land complex, 0 to 2 percent slopes	868.1	5.6	8%	IIIw	80	6	70	6
Tokay fine sandy loam, 0 to 2 percent slopes	154.0	1.0	1%	IIe	90	1	80	1
Urban land	4.8	0.0	0%	III	80	0	-	-
Vignolo silty clay loam, 0 to 2 percent slopes	38.3	0.2	0%	IIIw	80	0	80	0
Water	124.4	0.8	1%	IIIw	80	1	-	-
Totals	**10,894**	**70**				**55**		**65**

LCC-to-LCC Rating Conversion Table	
LCC Class	LESA Score
I	100
IIe	90
IIs	90
IIw	90
II	90
III	80
IIIs	80
IIIw	80
IIIe	70
IIIs,w	60
IV	60
IVw	50
IVe	50
IVs	50
IVs,w	40
V	30
VI	20
VIe	20
VII	10
VIIe	10
VIIw	10
VIII	0

LESA Model - Mokelumne River Integrated Conjunctive Use Program

Table B. City of Stockton Project Size Score

Soil Map Unit	I LCC Class I-II (acres)	J LCC Class III (acres)	K LCC Class IV-VIII (acres)
Acampo sandy loam, 0 to 2 percent slopes	-	1,224.05	-
Devries sandy loam, drained, 0 to 2 percent slopes, MLRA 16	-	385.47	-
Finrod clay loam, 0 to 2 percent slopes	11.97	-	-
Galt clay, 0 to 1 percent slopes, MLRA 17	84.10	-	-
Hollenbeck silty clay, 0 to 2 percent slopes	-	343.41	-
Jacktone clay, 0 to 2 percent slopes	-	-	3,029.79
Jacktone-Urban land complex, 0 to 2 percent slopes	109.23	-	-
Rioblancho clay loam, drained, 0 to 2 percent slopes	-	1,717.26	-
Stockton clay, 0 to 2 percent slopes	-	2,531.53	-
Stockton fine sandy loam, 0 to 2 percent slopes, overwashed	4.18	-	-
Stockton silty clay loam, 0 to 2 percent slopes, overwashed	-	-	263.90
Stockton-Urban land complex, 0 to 2 percent slopes	-	868.12	-
Tokay fine sandy loam, 0 to 2 percent slopes	154.00	-	-
Urban land	-	4.78	-
Vignolo silty clay loam, 0 to 2 percent slopes	-	38.26	-
Water	-	124.38	-
City of Stockton Area by LCC Class (acres)	363.47	7,237.26	3,293.69
Percentage of Total City of Stockton Area	3.3%	66.4%	30.2%
Total Permanent Disturbance Footprint of City of Stockton Project Components (acres)	70.00		
LCC Class Disturbance Area (acres)[1]	2.34	46.50	21.16
LESA Project Size Scoring	100	100	20
Highest of 3 Categories (for use on Final LESA Score Sheet)	**100**		

1 Note: Because specific project locations are unknown at this time, this model exercise evaluates soil types across the City of Stockton project component areas mapped in EIR. The model then accounts for LCC Class types as a percentage of total project component areas, applied to the estimated total disturbance footprint.

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table C. City of Stockton Water Resources

A	B	C	D	E
Project Proportion	Water Source	Proportion of Project Area	Water Availability Score[1]	Weighted Availability Score (C x D)
1	Irrigation	1	100	100

[1] *Note: Because some specific project component locations are unknown at this time, and because of the general agricultural nature of the project area, this model conservatively assumes project components may be sited on lands with water irrigation resources available in both drought and non-drought years with no physical or economic restrictions. As such, a Water Resource Score of 100 is applied.*

LESA Model - Mokelumne River Integrated Conjunctive Use Program
Table D. City of Stockton Surrounding Ag

A	B	C	D	E	F	G
Total Acres	Acres in Agriculture	Acres of Protected Resource Lands	Percent in Agriculture[1]	Percent Protected Resource Land[1]	Surrounding Agricultural Land Score	Surrounding Protected Resource Land Score
70.00	--	--	80.8%	79.3%	90	80

[1] *Source: California Department of Conservation. 2025. "California Important Farmland Finder." https://maps.conservation.ca.gov/DLRP/CIFF/ (accessed January 2025)*

LESA Model - Mokelumne River Integrated Conjunctive Use Program

Table E. City of Stockton LESA Scoring

	Factor Scores	Factor Weight	Weighted Factor Scores
Land Evaluation Factors			
Land Capability Classification	55	0.25	14
Storie Index	65	0.25	16
Land Evaluation Subtotal		**0.5**	30
Site Assessment Factors			
Project Size	100	0.15	15
Water Resource Availability	100	0.15	15
Surrounding Agricultural Land	90	0.15	14
Protected Resource Land	80	0.05	4
Site Assessment Subtotal		**0.5**	48
		Final LESA Score	78

Appendix E

Biological Resources Database Search Results

Appendix E1A

CDFW Plant CNDDB Results

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Taxonomic Group IS (Ferns OR Gymnosperms OR Monocots OR Dicots OR Lichens OR Bryophytes)
 AND CNPS List IS (1A OR 1B OR 1B.1 OR 1B.2 OR 1B.3 OR 2A OR 2B OR 2B.1 OR 2B.2 OR 2B.3 OR 3 OR 3.1 OR 3.2 OR 3.3)
 AND County IS (San Joaquin)

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
alkali milk-vetch	PDFAB0F8R1	None	None	G2T1	S1	1B.2
Astragalus tener var. tener						
big tarplant	PDAST1C011	None	None	G1G2	S1S2	1B.1
Blepharizonia plumosa						
Boggs Lake hedge-hyssop	PDSCR0R060	None	Endangered	G2	S2	1B.2
Gratiola heterosepala						
bristly sedge	PMCYP032Y0	None	None	G5	S2	2B.1
Carex comosa						
caper-fruited tropidocarpum	PDBRA2R010	None	None	G1	S1	1B.1
Tropidocarpum capparideum						
Delta button-celery	PDAPI0Z0S0	None	Endangered	G1	S1	1B.1
Eryngium racemosum						
Delta mudwort	PDSCR10030	None	None	G5	S2	2B.1
Limosella australis						
Delta tule pea	PDFAB250D2	None	None	G5T2	S2	1B.2
Lathyrus jepsonii var. jepsonii						
diamond-petaled California poppy	PDPAP0A0D0	None	None	G1	S1	1B.1
Eschscholzia rhombipetala						
dwarf downingia	PDCAM060C0	None	None	GU	S2	2B.2
Downingia pusilla						
Greene's tuctoria	PMPOA6N010	Endangered	Rare	G1	S1	1B.1
Tuctoria greenei						
heartscale	PDCHE040B0	None	None	G3T2	S2	1B.2
Atriplex cordulata var. cordulata						
Hoover's calycadenia	PDAST1P040	None	None	G2	S2	1B.3
Calycadenia hooveri						
Hospital Canyon larkspur	PDRAN0B0A2	None	None	G3T3	S3	1B.2
Delphinium californicum ssp. interius						
large-flowered fiddleneck	PDBOR01050	Endangered	Endangered	G1	S1	1B.1
Amsinckia grandiflora						
legenere	PDCAM0C010	None	None	G2	S2	1B.1
Legenere limosa						
Lemmon's jewelflower	PDBRA0M0E0	None	None	G3	S3	1B.2
Caulanthus lemmonii						

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
marsh skullcap *Scutellaria galericulata*	PDLAM1U0J0	None	None	G5	S2	2B.2
Mason's lilaeopsis *Lilaeopsis masonii*	PDAPI19030	None	Rare	G2	S2	1B.1
palmate-bracted bird's-beak *Chloropyron palmatum*	PDSCR0J0J0	Endangered	Endangered	G1	S1	1B.1
recurved larkspur *Delphinium recurvatum*	PDRAN0B1J0	None	None	G2?	S2	1B.2
saline clover *Trifolium hydrophilum*	PDFAB400R5	None	None	G2	S2	1B.2
San Joaquin spearscale *Extriplex joaquinana*	PDCHE041F3	None	None	G2	S2	1B.2
Sanford's arrowhead *Sagittaria sanfordii*	PMALI040Q0	None	None	G3	S3	1B.2
shining navarretia *Navarretia nigelliformis ssp. radians*	PDPLM0C0J2	None	None	G4T2T3	S2S3	1B.2
showy golden madia *Madia radiata*	PDAST650E0	None	None	G3	S3	1B.1
side-flowering skullcap *Scutellaria lateriflora*	PDLAM1U0Q0	None	None	G5	S1S2	2B.2
slough thistle *Cirsium crassicaule*	PDAST2E0U0	None	None	G1	S1	1B.1
spicate calycadenia *Calycadenia spicata*	PDAST1P090	None	None	G3?	S3	1B.3
succulent owl's-clover *Castilleja campestris var. succulenta*	PDSCR0D3Z1	Threatened	Endangered	G4?T2T3	S2S3	1B.2
Suisun Marsh aster *Symphyotrichum lentum*	PDASTE8470	None	None	G2	S2	1B.2
Tuolumne button-celery *Eryngium pinnatisectum*	PDAPI0Z0P0	None	None	G2	S2	1B.2
watershield *Brasenia schreberi*	PDCAB01010	None	None	G5	S3	2B.3
woolly rose-mallow *Hibiscus lasiocarpos var. occidentalis*	PDMAL0H0R3	None	None	G5T3	S3	1B.2
Wright's trichocoronis *Trichocoronis wrightii var. wrightii*	PDAST9F031	None	None	G4T3	S1	2B.1

Record Count: 35

Appendix E1B

CDFW Wildlife CNDDB Results

Selected Elements by Common Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Taxonomic Group IS (Fish OR Amphibians OR Reptiles OR Birds OR Mammals OR Mollusks OR Arachnids OR Crustaceans OR Insects)
 AND County IS (San Joaquin)

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Alameda whipsnake *Masticophis lateralis euryxanthus*	ARADB21031	Threatened	Threatened	G4T2	S2	
American badger *Taxidea taxus*	AMAJF04010	None	None	G5	S3	SSC
American bumble bee *Bombus pensylvanicus*	IIHYM24260	None	None	G3G4	S2	
An andrenid bee *Andrena subapasta*	IIHYM35210	None	None	G1G2	S1S2	
bank swallow *Riparia riparia*	ABPAU08010	None	Threatened	G5	S3	
Blennosperma vernal pool andrenid bee *Andrena blennospermatis*	IIHYM35030	None	None	G2	S1	
burrowing owl *Athene cunicularia*	ABNSB10010	None	Candidate Endangered	G4	S2	SSC
California black rail *Laterallus jamaicensis coturniculus*	ABNME03041	None	Threatened	G3T1	S2	FP
California glossy snake *Arizona elegans occidentalis*	ARADB01017	None	None	G5T2	S2	SSC
California horned lark *Eremophila alpestris actia*	ABPAT02011	None	None	G5T4Q	S4	WL
California linderiella *Linderiella occidentalis*	ICBRA06010	None	None	G2G3	S2S3	
California red-legged frog *Rana draytonii*	AAABH01022	Threatened	None	G2G3	S2S3	SSC
California tiger salamander - central California DPS *Ambystoma californiense pop. 1*	AAAAA01181	Threatened	Threatened	G2G3T3	S3	WL
coast horned lizard *Phrynosoma blainvillii*	ARACF12100	None	None	G4	S4	SSC
Crotch's bumble bee *Bombus crotchii*	IIHYM24480	None	Candidate Endangered	G2	S2	
Delta smelt *Hypomesus transpacificus*	AFCHB01040	Threatened	Endangered	G1	S1	
ferruginous hawk *Buteo regalis*	ABNKC19120	None	None	G4	S3S4	WL
foothill yellow-legged frog - central coast DPS *Rana boylii pop. 4*	AAABH01054	Threatened	Endangered	G3T2	S2	
foothill yellow-legged frog - south Sierra DPS *Rana boylii pop. 5*	AAABH01055	Endangered	Endangered	G3T2	S2	

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
giant gartersnake *Thamnophis gigas*	ARADB36150	Threatened	Threatened	G2	S2	
golden eagle *Aquila chrysaetos*	ABNKC22010	None	None	G5	S3	FP
great blue heron *Ardea herodias*	ABNGA04010	None	None	G5	S4	
green sturgeon - southern DPS *Acipenser medirostris pop. 1*	AFCAA01031	Threatened	None	G2T1	S1	SSC
hardhead *Mylopharodon conocephalus*	AFCJB25010	None	None	G3	S3	SSC
least Bell's vireo *Vireo bellii pusillus*	ABPBW01114	Endangered	Endangered	G5T2	S3	
loggerhead shrike *Lanius ludovicianus*	ABPBR01030	None	None	G4	S4	SSC
longfin smelt - San Francisco Bay-Delta DPS *Spirinchus thaleichthys pop. 2*	AFCHB03040	Endangered	Threatened	G5TNRQ	S1	
merlin *Falco columbarius*	ABNKD06030	None	None	G5	S3S4	WL
midvalley fairy shrimp *Branchinecta mesovallensis*	ICBRA03150	None	None	G2	S2S3	
moestan blister beetle *Lytta moesta*	IICOL4C020	None	None	G2	S2	
Northern California legless lizard *Anniella pulchra*	ARACC01020	None	None	G3	S2S3	SSC
northern harrier *Circus hudsonius*	ABNKC11011	None	None	G5	S3	SSC
northwestern pond turtle *Actinemys marmorata*	ARAAD02031	Proposed Threatened	None	G2	SNR	SSC
osprey *Pandion haliaetus*	ABNKC01010	None	None	G5	S4	WL
pallid bat *Antrozous pallidus*	AMACC10010	None	None	G4	S3	SSC
Ricksecker's water scavenger beetle *Hydrochara rickseckeri*	IICOL5V010	None	None	G2?	S2?	
riparian (=San Joaquin Valley) woodrat *Neotoma fuscipes riparia*	AMAFF08081	Endangered	None	G5T1	S1	SSC
riparian brush rabbit *Sylvilagus bachmani riparius*	AMAEB01021	Endangered	Endangered	G5T1	S2	
Sacramento anthicid beetle *Anthicus sacramento*	IICOL49010	None	None	G4	S4	
Sacramento splittail *Pogonichthys macrolepidotus*	AFCJB34020	None	None	G3	S3	SSC

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
San Joaquin coachwhip *Masticophis flagellum ruddocki*	ARADB21021	None	None	G5T2T3	S3	SSC
San Joaquin kit fox *Vulpes macrotis mutica*	AMAJA03041	Endangered	Threatened	G4T2	S3	
San Joaquin pocket mouse *Perognathus inornatus*	AMAFD01060	None	None	G2G3	S2S3	
San Joaquin Valley giant flower-loving fly *Rhaphiomidas trochilus*	IIDIP05010	None	None	G1	S1	
song sparrow ("Modesto" population) *Melospiza melodia pop. 1*	ABPBXA3013	None	None	G5T3?Q	S3?	SSC
steelhead - Central Valley DPS *Oncorhynchus mykiss irideus pop. 11*	AFCHA0209K	Threatened	None	G5T2Q	S2	SSC
Swainson's hawk *Buteo swainsoni*	ABNKC19070	None	Threatened	G5	S4	
Townsend's big-eared bat *Corynorhinus townsendii*	AMACC08010	None	None	G4	S2	SSC
tricolored blackbird *Agelaius tricolor*	ABPBXB0020	None	Threatened	G1G2	S2	SSC
valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	IICOL48011	Threatened	None	G3T3	S3	
vernal pool fairy shrimp *Branchinecta lynchi*	ICBRA03030	Threatened	None	G3	S3	
vernal pool tadpole shrimp *Lepidurus packardi*	ICBRA10010	Endangered	None	G3	S3	
western bumble bee *Bombus occidentalis*	IIHYM24252	None	Candidate Endangered	G3	S1	
western mastiff bat *Eumops perotis californicus*	AMACD02011	None	None	G4G5T4	S3S4	SSC
western ridged mussel *Gonidea angulata*	IMBIV19010	None	None	G3	S2	
western spadefoot *Spea hammondii*	AAABF02020	Proposed Threatened	None	G2G3	S3S4	SSC
western yellow-billed cuckoo *Coccyzus americanus occidentalis*	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
white-tailed kite *Elanus leucurus*	ABNKC06010	None	None	G5	S3S4	FP
yellow warbler *Setophaga petechia*	ABPBX03010	None	None	G5	S3	SSC
yellow-breasted chat *Icteria virens*	ABPBX24010	None	None	G5	S4	SSC
yellow-headed blackbird *Xanthocephalus xanthocephalus*	ABPBXB3010	None	None	G5	S3	SSC

Record Count: 61

Appendix E1C

CNPS Rare Plant Inventory

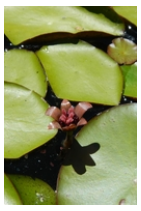
CALIFORNIA NATIVE PLANT SOCIETY

CNPS Rare Plant Inventory

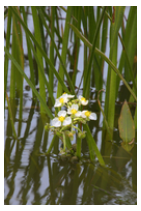
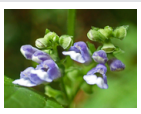
Search Results

36 matches found. Click on scientific name for details

Search Criteria: CRPR is one of [**1A:1B:2A:2B:3**] , County or Island is one of [**SJQ**]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	CA ENDEMIC	DATE ADDED	PHOTO
Amsinckia grandiflora	large-flowered fiddleneck	Boraginaceae	annual herb	(Mar)Apr-May	FE	CE	G1	S1	1B.1	Yes	1974-01-01	 © 2015 Zoya Akulova
Astragalus tener var. *tener*	alkali milk-vetch	Fabaceae	annual herb	Mar-Jun	None	None	G2T1	S1	1B.2	Yes	1994-01-01	No Photo Available
Atriplex cordulata var. *cordulata*	heartscale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G3T2	S2	1B.2	Yes	1988-01-01	 © 1994 Robert E. Preston, Ph.D.
Blepharizonia plumosa	big tarplant	Asteraceae	annual herb	Jul-Oct	None	None	G1G2	S1S2	1B.1	Yes	1994-01-01	No Photo Available
Brasenia schreberi	watershield	Cabombaceae	perennial rhizomatous herb (aquatic)	Jun-Sep	None	None	G5	S3	2B.3		2010-10-27	 ©2014 Kirsten Bovee
Calycadenia hooveri	Hoover's calycadenia	Asteraceae	annual herb	Jul-Sep	None	None	G2	S2	1B.3	Yes	1980-01-01	No Photo Available
Calycadenia spicata	spicate calycadenia	Asteraceae	annual herb	May-Sep	None	None	G3?	S3	1B.3		2023-04-05	 © 2023 Christopher Bronny

Carex comosa	bristly sedge	Cyperaceae	perennial rhizomatous herb	May-Sep	None	None	G5	S2	2B.1		1994-01-01	 Dean Wm. Taylor 1997
Castilleja campestris var. *succulenta*	succulent owl's-clover	Orobanchaceae	annual herb (hemiparasitic)	(Mar)Apr-May	FT	CE	G4? T2T3	S2S3	1B.2	Yes	1984-01-01	No Photo Available
Caulanthus lemmonii	Lemmon's jewelflower	Brassicaceae	annual herb	Feb-May	None	None	G3	S3	1B.2	Yes	2001-01-01	No Photo Available
Chloropyron palmatum	palmate-bracted bird's-beak	Orobanchaceae	annual herb (hemiparasitic)	May-Oct	FE	CE	G1	S1	1B.1	Yes	1974-01-01	No Photo Available
Cirsium crassicaule	slough thistle	Asteraceae	annual/perennial herb	May-Aug	None	None	G1	S1	1B.1	Yes	1974-01-01	No Photo Available
Delphinium californicum ssp. *interius*	Hospital Canyon larkspur	Ranunculaceae	perennial herb	Apr-Jun	None	None	G3T3	S3	1B.2	Yes	1984-01-01	No Photo Available
Delphinium recurvatum	recurved larkspur	Ranunculaceae	perennial herb	Mar-Jun	None	None	G2?	S2	1B.2	Yes	1988-01-01	No Photo Available
Downingia pusilla	dwarf downingia	Campanulaceae	annual herb	Mar-May	None	None	GU	S2	2B.2		1980-01-01	 © 2013 Aaron Arthur
Eryngium pinnatisectum	Tuolumne button-celery	Apiaceae	annual/perennial herb	May-Aug	None	None	G2	S2	1B.2	Yes	1974-01-01	 © 2007 Robert E. Preston, Ph.D.
Eryngium racemosum	Delta button-celery	Apiaceae	annual/perennial herb	(May)Jun-Oct	None	CE	G1	S1	1B.1	Yes	1974-01-01	No Photo Available
Eschscholzia rhombipetala	diamond-petaled California poppy	Papaveraceae	annual herb	Mar-Apr	None	None	G1	S1	1B.1	Yes	1980-01-01	No Photo Available
Extriplex joaquinana	San Joaquin spearscale	Chenopodiaceae	annual herb	Apr-Oct	None	None	G2	S2	1B.2	Yes	1988-01-01	No Photo Available
Gratiola heterosepala	Boggs Lake hedge-hyssop	Plantaginaceae	annual herb	Apr-Aug	None	CE	G2	S2	1B.2		1974-01-01	 ©2004 Carol W. Witham

Hibiscus lasiocarpos var. *occidentalis*	woolly rose-mallow	Malvaceae	perennial rhizomatous herb (emergent)	Jun-Sep	None	None	G5T3	S3	1B.2	Yes	1974-01-01	 © 2020 Steven Perry
Lathyrus jepsonii var. *jepsonii*	Delta tule pea	Fabaceae	perennial herb	May-Jul(Aug-Sep)	None	None	G5T2	S2	1B.2	Yes	1974-01-01	 © 2003 Mark Fogiel
Legenere limosa	legenere	Campanulaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.1	Yes	1974-01-01	 ©2000 John Game
Lilaeopsis masonii	Mason's lilaeopsis	Apiaceae	perennial rhizomatous herb	Apr-Nov	None	CR	G2	S2	1B.1	Yes	1974-01-01	No Photo Available
Limosella australis	Delta mudwort	Scrophulariaceae	perennial stoloniferous herb	May-Aug	None	None	G5	S2	2B.1		1994-01-01	 © 2020 Richard Sage
Madia radiata	showy golden madia	Asteraceae	annual herb	Mar-May	None	None	G3	S3	1B.1	Yes	1988-01-01	No Photo Available
Micropus amphibolus	Mt. Diablo cottonweed	Asteraceae	annual herb	Mar-May	None	None	G3G4	S3S4	3.2	Yes	1974-01-01	 © 2008 Aaron Arthur
Navarretia nigelliformis ssp. *radians*	shining navarretia	Polemoniaceae	annual herb	(Mar)Apr-Jul	None	None	G4T2T3	S2S3	1B.2	Yes	1994-01-01	No Photo Available
Sagittaria sanfordii	Sanford's arrowhead	Alismataceae	perennial rhizomatous herb (emergent)	May-Oct(Nov)	None	None	G3	S3	1B.2	Yes	1984-01-01	 ©2013 Debra L. Cook
Scutellaria galericulata	marsh skullcap	Lamiaceae	perennial rhizomatous herb	Jun-Sep	None	None	G5	S2	2B.2		1994-01-01	 © 2021 Scot Loring
Scutellaria lateriflora	side-flowering skullcap	Lamiaceae	perennial rhizomatous herb	Jul-Sep	None	None	G5	S1S2	2B.2		1994-01-01	No Photo Available
Symphyotrichum lentum	Suisun Marsh aster	Asteraceae	perennial rhizomatous herb	(Apr)May-Nov	None	None	G2	S2	1B.2	Yes	1974-01-01	No Photo Available

Trichocoronis wrightii var. *wrightii*	Wright's trichocoronis	Asteraceae	annual herb	May-Sep	None	None	G4T3	S1	2B.1		1988-01-01	No Photo Available
Trifolium hydrophilum	saline clover	Fabaceae	annual herb	Apr-Jun	None	None	G2	S2	1B.2	Yes	2001-01-01	 © 2005 Dean Wm Taylor
Tropidocarpum capparideum	caper-fruited tropidocarpum	Brassicaceae	annual herb	Mar-Apr	None	None	G1	S1	1B.1	Yes	1974-01-01	No Photo Available
Tuctoria greenei	Greene's tuctoria	Poaceae	annual herb	May-Jul(Sep)	FE	CR	G1	S1	1B.1	Yes	1974-01-01	 ©2008 F. Gauna

Showing 1 to 36 of 36 entries

Suggested Citation:

California Native Plant Society, Rare Plant Program. 2024. Rare Plant Inventory (online edition, v9.5). Website https://www.rareplants.cnps.org [accessed 19 December 2024].

Appendix E1D

USFWS IPaC Results

IPaC **U.S. Fish & Wildlife Service**

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Calaveras , Contra Costa , and San Joaquin counties, California



Local offices

San Francisco Bay-Delta Fish And Wildlife

(916) 930-5603
(916) 930-5654

650 Capitol Mall
Suite 8-300
Sacramento, CA 95814

Sacramento Fish And Wildlife Office

(916) 414-6600
(916) 414-6713

Federal Building
2800 Cottage Way, Room W-2605
Sacramento, CA 95825-1846

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

NOT FOR CONSULTATION

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Riparian Brush Rabbit Sylvilagus bachmani riparius Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/6189	Endangered
Salt Marsh Harvest Mouse Reithrodontomys raviventris Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/613	Endangered
San Joaquin Kit Fox Vulpes macrotis mutica Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/2873	Endangered

Birds

NAME	STATUS
California Condor Gymnogyps californianus There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/8193	Endangered
California Least Tern Sternula antillarum browni Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/8104	Endangered
California Ridgway''s Rail Rallus obsoletus obsoletus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4240	Endangered

NOT FOR CONSULTATION

Yellow-billed Cuckoo Coccyzus americanus — Threatened

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/3911

Reptiles

NAME	STATUS

Alameda Whipsnake (=striped Racer) Masticophis lateralis euryxanthus — Threatened

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/5524

Giant Garter Snake Thamnophis gigas — Threatened

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/4482

Northwestern Pond Turtle Actinemys marmorata — Proposed Threatened

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1111

Amphibians

NAME	STATUS

California Red-legged Frog Rana draytonii — Threatened

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/2891

California Tiger Salamander Ambystoma californiense — Threatened

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/2076

Foothill Yellow-legged Frog Rana boylii — Threatened

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5133

NOT FOR CONSULTATION

Foothill Yellow-legged Frog Rana boylii — Endangered

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5133

Western Spadefoot Spea hammondii — Proposed Threatened

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/5425

Fishes

NAME	STATUS

Delta Smelt Hypomesus transpacificus — Threatened

Wherever found

There is **final** critical habitat for this species. Your location overlaps the critical habitat.
https://ecos.fws.gov/ecp/species/321

Longfin Smelt Spirinchus thaleichthys — Endangered

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9011

Longfin Smelt Spirinchus thaleichthys — Proposed Endangered

No critical habitat has been designated for this species.

Insects

NAME	STATUS

Lange's Metalmark Butterfly Apodemia mormo langei — Endangered

Wherever found

There is **proposed** critical habitat for this species.
https://ecos.fws.gov/ecp/species/4382

Monarch Butterfly Danaus plexippus — Candidate

Wherever found

No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/9743

NOT FOR CONSULTATION

Valley Elderberry Longhorn Beetle Desmocerus californicus dimorphus — Threatened

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/7850

Crustaceans

NAME	STATUS

Conservancy Fairy Shrimp Branchinecta conservatio — Endangered

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/8246

Longhorn Fairy Shrimp Branchinecta longiantenna — Endangered

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/4294

Vernal Pool Fairy Shrimp Branchinecta lynchi — Threatened

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/498

Vernal Pool Tadpole Shrimp Lepidurus packardi — Endangered

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/2246

Flowering Plants

NAME	STATUS

Antioch Dunes Evening-primrose Oenothera deltoides ssp. howellii — Endangered

Wherever found

There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/5970

NOT FOR CONSULTATION

Colusa Grass Neostapfia colusana — Threatened
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/5690

Contra Costa Goldfields Lasthenia conjugens — Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/7058

Contra Costa Wallflower Erysimum capitatum var. angustatum — Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/7601

Fleshy Owl's-clover Castilleja campestris ssp. succulenta — Threatened
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/8095

Ione Manzanita Arctostaphylos myrtifolia — Threatened
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1806

Keck's Checker-mallow Sidalcea keckii — Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/5704

Large-flowered Fiddleneck Amsinckia grandiflora — Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/5558

NOT FOR CONSULTATION

Pallid Manzanita Arctostaphylos pallida — Threatened
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/8292

Palmate-bracted Bird's Beak Cordylanthus palmatus — Endangered
Wherever found
No critical habitat has been designated for this species.
https://ecos.fws.gov/ecp/species/1616

Santa Cruz Tarplant Holocarpha macradenia — Threatened
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/6832

Soft Bird's-beak Cordylanthus mollis ssp. mollis — Endangered
Wherever found
There is **final** critical habitat for this species. Your location does not overlap the critical habitat.
https://ecos.fws.gov/ecp/species/8541

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Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Delta Smelt Hypomesus transpacificus https://ecos.fws.gov/ecp/species/321#crithab	Final

Bald & Golden Eagles

There are no documented cases of eagles being present at this location. However, if you believe eagles may be using your site, please reach out to the local Fish and Wildlife Service office.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

Bald and Golden Eagle information is not available at this time

NOT FOR CONSULTATION

What does IPaC use to generate the potential presence of bald and golden eagles in my specified location?

The potential for eagle presence is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply). To see a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs of bald and golden eagles in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur. Please contact your local Fish and Wildlife Service Field Office if you have questions.

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Eagle Management https://www.fws.gov/program/eagle-management
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf
- Supplemental Information for Migratory Birds and Eagles in IPaC https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action

NOT FOR CONSULTATION

Migratory bird information is not available at this time

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

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For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

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Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Wetland information is not available at this time

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

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Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also

been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

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Appendix E2A

Potential to Occur – Plants

TABLE OF PLANT SPECIES

Scientific Name **Common Name**	**Federal & State & CRPR Listing Status (F|S|CRPR)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Recharge of Areas[2]**	**Rationale & HCP Coverage**
Amsinckia grandiflora **large-flowered fiddleneck**	FE|SE|1B.1	Cismontane woodland, valley and foothill grassland Elevation: 885-1805 feet Blooming period: (March) April-May	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Project area is located outside the known elevation range of this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Astragalus tener var. tener **alkali milk-vetch**	None|None|1B.2	Playas, valley and foothill grassland (adobe clay), vernal pools Elevation: 5-195 feet Blooming period: March-June	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Species has been extirpated from the project area. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Atriplex cordulata var. cordulata **heartscale**	None|None|1B.2	Chenopod scrub, meadows and seeps, valley and foothill grassland (sandy) Elevation: 0-1835 feet Blooming period: April-October	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Species has been extirpated from the project area. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Blepharizonia plumosa **big tarplant**	None|None|1B.1	Valley and foothill grassland Elevation: 100-1655 feet Blooming period: July-October	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Recent and historical occurrence records are clustered along the eastern side of the Coast Mountain Range. While it is presumed extant, it is unlikely that this species still exists in the metropolitan center of Stockton. **Not Covered by any existing HCPs.**
Brasenia schreberi **watershield**	None|None|2B.3	Marshes and swamps (freshwater) Elevation: 0-7220 feet Blooming period: June-September	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** The project area is likely to have fresh emergent wetlands and aquatic habitat present that may provide suitable habitat for this species. However, all recent California Natural Diversity Database (CNBDD) occurrences of this species are isolated at higher elevations in the Sierra Nevada Mountains or north of Santa Rosa in the Coast Mountain Range. The species is unlikely to occur in the project area. **Not Covered by any existing HCPs.**
Calycadenia hooveri **Hoover's calycadenia**	None|None|1B.3	Cismontane woodland, valley and foothill grassland Elevation: 215-985 feet Blooming period: July-September	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Project area is located outside the known elevation range of this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Calycadenia spicata **spicate calycadenia**	None|None|1B.3	Cismontane woodland, valley and foothill grassland Elevation: 130-4595 feet Blooming period: May-September	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Project area is located outside the known elevation range of this species. **Not Covered by any existing HCPs.**
Carex comosa **bristly sedge**	None|None|2B.1	Coastal prairie, marshes and swamps (lake margins), valley and foothill grassland Elevation: 0-2050 feet Blooming period: May-September	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project components have suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

Scientific Name **Common Name**	**Federal & State & CRPR Listing Status (F|S|CRPR)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Recharge of Areas[2]**	**Rationale & HCP Coverage**
Castilleja campestris var. succulenta **succulent owl's-clover**	FT|SE|1B.2	Vernal pools (often acidic) Elevation: 165-2460 feet Blooming period: (March) April-May	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWCD, SEWD:** Vernal pool habitats were identified in NSJWCD and SEWD project components. The closest CNDDB occurrence record is at a lower elevation than is typical, extending the known elevation range for this species. **CS:** This project components does not have suitable habitat present to support this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Caulanthus lemmonii **Lemmon's jewelflower**	None|None|1B.2	Pinyon and juniper woodland, valley and foothill grassland Elevation: 260-5185 feet Blooming period: February-May	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** The project area is located at a lower elevation than this species is known to occur at. **Not Covered by any existing HCPs.**
Chloropyron palmatum **palmate-bracted bird's-beak**	FE|SE|1B.1	Chenopod scrub, valley and foothill grassland Elevation: 15-510 feet Blooming period: May-October	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project components are located within a valley where this species has possibly been extirpated from, however, project components with suitable grasslands could support this species. **Not Covered by any existing HCPs.**
Cirsium crassicaule **slough thistle**	None|None|1B.1	Chenopod scrub, marshes and swamps (sloughs), riparian scrub Elevation: 10-330 feet Blooming period: May-August	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** Riparian and margins along aquatic habitat are likely suitable to support this species, and the project components are within the known elevation range. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Delphinium californicum ssp. interius **Hospital Canyon larkspur**	None|None|1B.2	Chaparral (openings), cismontane woodland (mesic), coastal scrub Elevation: 640-3595 feet Blooming period: April-June	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** The project area is located at a lower elevation than this species is known to occur at. The project area does not support suitable habitat for this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Delphinium recurvatum **recurved larkspur**	None|None|1B.2	Chenopod scrub, cismontane woodland, valley and foothill grassland Elevation: 10-2590 feet Blooming period: March-June	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** Project components with suitable grasslands or woodlands land covers could support this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Downingia pusilla **dwarf downingia**	None|None|2B.2	Valley and foothill grassland (mesic), vernal pools Elevation: 5-1460 feet Blooming period: March-May	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** Vernal pool habitats were identified in NSJWCD and SEWD project components, additionally suitable grasslands land cover occurring in CS could support this species. **Not Covered by any existing HCPs.**

Scientific Name **Common Name**	**Federal & State & CRPR Listing Status (F|S|CRPR)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Recharge of Areas[2]**	**Rationale & HCP Coverage**
Eryngium pinnatisectum **Tuolumne button-celery**	None|None|1B.2	Cismontane woodland, lower montane coniferous forest, vernal pools Elevation: 230-3000 feet Blooming period: May-August	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** The project area is located at a lower elevation than this species is known to occur at. Vernal pools located within NSJWCD and SEWD project components are much lower in elevation, and unlikely to support this species. **Not Covered by any existing HCPs.**
Eryngium racemosum **Delta button-celery**	None|SE|1B.1	Riparian scrub (vernally mesic clay depressions) Elevation: 10-100 feet Blooming period: (May) June-October	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** Riparian habitats are likely suitable to support this species, and the project components are within the known elevation range. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Eschscholzia rhombipetala **diamond-petaled California poppy**	None|None|1B.1	Valley and foothill grassland (alkaline, clay) Elevation: 0-3200 feet Blooming period: March-April	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** It is unlikely that the grasslands within the San Joaquin Valley and project area support habitat for this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Extriplex joaquinana **San Joaquin spearscale**	None|None|1B.2	Chenopod scrub, meadows and seeps, playas, valley and foothill grassland Elevation: 5-2740 feet Blooming period: April-October	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Project area is located within a valley where this species has been extirpated from. **Not Covered by any existing HCPs.**
Gratiola heterosepala **Boggs Lake hedge-hyssop**	None|SE|1B.2	Marshes and swamps (lake margins), vernal pools Elevation: 35-7790 feet Blooming period: April-August	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** Vernal pool habitats were identified in NSJWCD and SEWD project components. Fresh emergent wetlands may provide suitable habitat for this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Hibiscus lasiocarpos var. occidentalis **woolly rose-mallow**	None|None|1B.2	Marshes and swamps (freshwater) Elevation: 0-395 feet Blooming period: June-September	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project components have suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. **Not Covered by any existing HCPs.**
Lathyrus jepsonii var. jepsonii **Delta tule pea**	None|None|1B.2	Marshes and swamps (brackish, freshwater) Elevation: 0-15 feet Blooming period: May-July (August-September)	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project components have suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. . **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Legenere limosa **legenere**	None|None|1B.1	Vernal pools Elevation: 5-2885 feet Blooming period: April-June	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWCD, SEWD:** Vernal pool habitats were identified in NSJWCD and SEWD project components and provide suitable habitat for this species.

Scientific Name **Common Name**	**Federal & State & CRPR Listing Status (F|S|CRPR)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Recharge of Areas[2]**	**Rationale & HCP Coverage**
				CS: This project component does not have suitable habitat present to support this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Lilaeopsis masonii **Mason's lilaeopsis**	None|CR|1B.1	Marshes and swamps (brackish, freshwater), riparian scrub Elevation: 0-35 feet Blooming period: April-November	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project components provide suitable habitat types that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Limosella australis **Delta mudwort**	None|None|2B.1	Marshes and swamps (brackish, freshwater), riparian scrub Elevation: 0-10 feet Blooming period: May-August	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project components provide suitable habitat types that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Madia radiata **showy golden madia**	None|None|1B.1	Cismontane woodland, valley and foothill grassland Elevation: 80-3985 feet Blooming period: March-May	**NSJWCD: No** **SEWD: No** **CS: No**	C **NSJWCD, SEWD, CS:** It is unlikely that the grasslands or woodlands within the San Joaquin Valley or project area support habitat for this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Navarretia nigelliformis ssp. radians **shining navarretia**	None|None|1B.2	Cismontane woodland, valley and foothill grassland, vernal pools Elevation: 215-3280 feet Blooming period: (March) April-July	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** The project area is located at a lower elevation than this species is known to occur at. Vernal pools located within NSJWCD and SEWD project components are much lower in elevation, and unlikely to support this species. **Not Covered by any existing HCPs.**
Sagittaria sanfordii **Sanford's arrowhead**	None|None|1B.2	Marshes and swamps (shallow freshwater). Known to occur in ditches as well in known association with water plantain (*Alisma plantago-aquatica),* water primrose *(Ludwigia peploides),* and various species of cattails (*Typha spp.*)[1]. Elevation: 0-2135 feet Blooming period: May-October (November)	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project area has suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, agricultural ditches, and valley foothill riparian. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Scutellaria galericulata **marsh skullcap**	None|None|2B.2	Lower montane coniferous forest, marshes and swamps, meadows and seeps (mesic) Elevation: 0-6890 feet Blooming period: June-September	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project area has suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. **Not Covered by any existing HCPs.**

[1] The Natomas Basin Conservancy. 2024. Valley Arrowhead (formerly Sanford's Arrowhead). Accessed on February 11, 2025 via: https://natomasbasin.org/education/the-nbhcp-species/sanfords-arrowhead/

Scientific Name **Common Name**	**Federal & State & CRPR Listing Status (F|S|CRPR)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Recharge of Areas[2]**	**Rationale & HCP Coverage**
Scutellaria lateriflora **side-flowering skullcap**	None|None|2B.2	Marshes and swamps, meadows and seeps (mesic) Elevation: 0-1640 feet Blooming period: July-September	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project area has suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. **Not Covered by any existing HCPs.**
Trichocoronis wrightii var. wrightii **Wright's trichocoronis**	None|None|2B.1	Marshes and swamps, meadows and seeps, riparian forest, vernal pools Elevation: 15-1425 feet Blooming period: May-September	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** The project components have suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. Vernal pool habitats were identified in NSWCD and SEWD project components. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Trifolium hydrophilum **saline clover**	None|None|1B.2	Marshes and swamps, valley and foothill grassland (mesic, alkaline), vernal pools Elevation: 0-985 feet Blooming period: April-June	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes** **CS: No**	**NSJWCD, SEWD, CS:** The project components have suitable habitat types present that could support this species, such as aquatic features, fresh emergent wetlands, and valley foothill riparian. Vernal pool habitats were identified in NSWCD and SEWD project components. **Not Covered by any existing HCPs.**
Tropidocarpum capparideum **caper-fruited tropidocarpum**	None|None|1B.1	Valley and foothill grassland (alkaline hills) Elevation: 5-1495 feet Blooming period: March-April	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** It is unlikely that the grasslands in the project area provide suitable habitat for this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Tuctoria greenei **Greene's tuctoria**	FE|CR|1B.1	Vernal pools Elevation: 100-3510 feet Blooming period: May-July (September)	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWCD, SEWD:** Vernal pool habitats were identified in NSWCD and SEWD project components. **CS:** This project component is outside the known elevation range for this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

Notes: CNDDB = California Natural Diversity Database; CR = California Rare Plant; CRPR = California Rare Plant Rank; CS = City of Stockton; NSJWCD = North San Joaquin Water Conservation District; SEWD = Stockton Each Water District;

1 - Status Definitions

E = Listed as Endangered under the Federal (FE) or State (SE) Endangered Species Acts
T = Listed as Threatened under the Federal (FT) or State (SE) Endangered Species Acts
CR = Listed as a California Rare Plant
None = No status

2 - Potential for Occurrence within the Project components

Yes = proposed project component is located within the extant range of the species and suitable habitat is available in the proposed project component; known occurrences may be present in the project component and vicinity.
No = The project component is located outside of the species' extant range and/or potential habitat to support the species is not present.

Species Names, Statuses, and Habitat Types Follows; CNPS Rare Plant Inventory Database. Available on-line: https://www.cnps.org/rare-plants/cnps-inventory-of-rare-plants

Appendix E2B

Potential to Occur – Wildlife

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
Invertebrates				
Apodemia mormo langei **Lange's Metalmark Butterfly**	FE | None	Endemic to the Antioch Dunes in Contra Costa County. All life stages of Lange's metalmark are closely tied to naked buckwheat (*Eriogonum nudum var. psychicola)* (formerly *var. auriculatum).* This host plant, also endemic to the Antioch Dunes, serves as the primary nectar source for adult butterflies, as sites for oviposition, and as the larval foodplant. Currently, Lange's metalmark can only be found within the Antioch Dunes National Wildlife Refuge[1].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the limited range of this species. Currently, they are only found within the Antioch Dunes National Wildlife Refuge[2]. **Not Covered by any existing HCPs.**
Bombus crotchii **Crotch's bumble bee**	None | CE	Species requires nesting, foraging, and overwintering habitat. Inhabit open grassland and scrub habitats. They are general foragers and have been reported visiting a wide variety of flowering plants. Crotch's specifically are best suited to forage at open flowers with short corollas. Plant families most commonly associated with Crotch's bumblebee include legumes (*Fabacea*), dogbanes (*Apocynaceae*), daisy (*Asteraceae*), mint (*Lamiaceae*), and borage (*Boraginaceae*). It should be noted, that floral associations do not necessarily represent this species' preference for these plants over other flowering plants, but rather may represent the prevalence of these flowers in the landscape where this species occurs. Little is known about hibernacula or overwintering, but generally, bumblebees overwinter in soft, disturbed soils or under leaf litter or other debris and they nest underground.[3]	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project area provides primary land cover types that are suitable for nesting, foraging, and overwintering. Suitable nesting habitat and burrows may be present in the annual grasslands of the project area. Suitable nectar plants are likely to be present in the project area. **Not Covered by any existing HCPs.**
Bombus occidentalis **western bumblebee**	None | CE	Species requires nesting, foraging, and overwintering habitat. Open grassy areas, urban parks and gardens, chaparral and shrub areas, and mountain meadows. This species is now largely confined to high elevation sites and a small handful of records on the northern California	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** While the past range of this species may have included portions of the San Joaquin Valley, this species has been extirpated from this region and is only known to occur within portions of far northern California[7] **Not Covered by any existing HCPs.**

[1] United States Fish and Wildlife Service (USFWS). 2020. Lange's metalmark butterfly (Apodemia.mormo.langei)?5-Year Review. USFWS; Sacramento, CA.

[2] Ibid

[3] Xerces. 2018. A Petition to the State of California Fish and Game Commission to List The Crotch bumblebee . Franklin's bumble bee, Suckley bumblebee, and western bumble bee as Endangered under the California Endangered Species Act.

[7] California Department of Fish and Wildlife (CDFW). 2023. Survey Considerations for California Endangered Species Act Candidate Bumble Bee Species.

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		Coast[4]. Typically nests underground in abandoned rodent burrows, such as old squirrel or other animal nests, and in open west-southwest slopes bordered by trees, although a few nests have been reported from above-ground locations such as in logs among railroad ties. Availability of nest sites may depend on rodent abundance.[5] They are general foragers and have been reported visiting a wide variety of flowering plants. Western bumblebee specifically are best suited to forage at open flowers with short corollas. Species most commonly associated with western bumblebee include thistles (*Cirsium*), wild buckwheat (*Erigonum*), goldenrods (*Solidago*), daisy, buckthorn (*Ceanothus*), knapweeds (*Centaurea*), and beardtongues (*Penstemon*)[6]. It should be noted, that floral associations do not necessarily represent this species' preference for these plants over other flowering plants, but rather may represent the prevalence of these flowers in the landscape where this species occurs.		
Branchinecta conservatio **conservancy fairy shrimp**	FE | None	Found only in ephemeral freshwater habitats, such as vernal pools and similar features, and have life histories highly adapted to the environmental conditions of these ephemeral habitats[8]. Mostly inhabit relatively large and turbid vernal pools, called playa pools, which typically remain inundated much longer than most vernal pools. Endemic mainly to the Central Valley, with nine disjunct populations distributed very patchily throughout the Central Valley and one population in southern California located on the Los Padres National Forest in Ventura County[9].	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWD, SEWD:** Project components may provide suitable vernal pool habitat. Located outside of the critical habitat for vernal pools where species are highly likely to occur[10]. **CS:** No suitable vernal pool habitat mapped. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Branchinecta longiantenna **longhorn fairy shrimp**	FE | None	Endemic to California and dependent on soil-bottom vernal pools and rock pools in seasonally inundated wetlands. However, based on known occurrences, the species does not seem to	**NSJWCD: No** **SEWD: No**	**NSJWD, SEWD, CS:** While the past range of this species may have included the San Joaquin Valley, this species has been extirpated from this region and is only known to

[4] Xerces. 2018. A Petition to the State of California Fish and Game Commission to List The Crotch bumblebee . Franklin's bumble bee, Suckley bumblebee, and western bumble bee as Endangered under the California Endangered Species Act.

[5] Xerces. 2014. Jepsen, S. & Foltz Jordan, S. Species Fact Sheet. Bombus.occidentalis. Xerces Society for Invertebrate Conservation.

[6] Ibid

[8] USFWS. 2024. Vernal Pool Fairy Shrimp (Branchinecta.lynchi) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.

[9] Ibid.

[10] USFWS. 2005. Vernal Pools - Final Critical Habitat - USFWS [ds258]. Accessed via BIOs Online Viewer on December 24, 2024.

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		demonstrate a strong affinity for a specific vernal pool type[11]. They can be found primarily in sandstone outcrop vernal pools, grassland pools, and roadside ditches, all varying in size and water depth[12] .Today this species is known to live in just five widely separated locations stretching from Contra Costa County in the north to San Luis Obispo County in the south[13].The five locations include: Carrizo Plain National Monument, San Luis Obispo; San Luis National Wildlife Refuge Complex, Merced County; Brushy Peak Preserve, Alameda County; Casco Caves Preserve, Bryon, Contra Costa County; and Alkali Sink Conservation Easement Bank east of Mendota, Fresno County. While it is possible that their range included the San Joaquin and the Sierra Foothill Vernal Pool Regions in the past, they are no longer found there.	**CS: No**	occur within five regions, all of which are located outside of the project area[14]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Branchinecta lynchi **vernal pool fairy shrimp**	FT | None	Endemic to California and the Agate Desert of southern Oregon. Found only in ephemeral freshwater habitats, such as vernal pools and similar features, and have life histories highly adapted to the environmental conditions of these ephemeral habitats[15]. It can be found in a wide range of vernal pools, including extremely small or marginal ones that fill with water for just long enough to allow the individuals to complete their lifecycle.	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWD, SEWD:** Project components may provide suitable vernal pool habitat. Located outside of the critical habitat for vernal pools where species are highly likely to occur[16]. **CS:** No suitable vernal pool habitat mapped. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Danaus plexippus (pop. 1) **monarch (California overwintering population)**	PT | None	Overwinters along the coast from Mendocino County south into Baja California in wind-protected groves of gum (*Eucalyptus* spp.), Monterey pine (*Pinus radiata*), or Monterey cypress (*Hesperocyparis macrocarpa*) with nectar and water sources nearby[17]. Breeding habitat in California is characterized by the presence of early spring milkweeds (*Asclepias spp.*). Monarch larvae feed exclusively on milkweed species that can occur in a multitude of habitats, including	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project area provides suitable foraging habitat and potentially suitable breeding habitat where milkweed species are present. The project area is outside of the known overwintering range for this species. **Not Covered by any existing HCPs.**

[11] USFWS. 2022. Longhorn Fairy Shrimp (Branchinecta.longiantenna) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.
[12] USFWS. 2012. Longhorn Fairy Shrimp (Branchinecta.longiantenna). 5Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California.
[13] USFWS. 2024. Longhorn Fairy Shrimp. Accessed on December 24, 2024 via: https://www.fws.gov/species/longhorn-fairy-shrimp-branchinecta-longiantenna
[14] Ibid
[15] USFWS. 2024. Vernal Pool Fairy Shrimp (Branchinecta.lynchi) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.
[16] USFWS. 2005. Vernal Pools - Final Critical Habitat - USFWS [ds258]. Accessed via BIOs Online Viewer on December 24, 2024.
[17] IELP. 2012. The Legal Status of Monarch Butterflies in California. International Environmental Law Project; Portland, OR.

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
		agricultural, riparian, wetlands, meadows, roadsides, and more. Adult monarchs will forage on a wide variety of plant species for nectar[18].		
Desmocerus californicus dimorphus **valley elderberry longhorn beetle**	FT | None	Dependent on host plant, elderberry (*Sambucus* spp.), which most commonly grows in riparian woodlands, but also in some upland habitats such as oak savannas and annual grasslands. Current presumed range in Central Valley extends from Shasta County south to Fresno County, including the valley floor and lower foothills up to about 500 feet in elevation[19].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD, CS:** Elderberry shrubs have potential to occur in riparian habitats and upland habitats identified in these project components. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Lepidurus packardi **vernal pool tadpole shrimp**	FE | None	Found only in ephemeral freshwater habitats, such as vernal pools and similar features, and have life histories highly adapted to the environmental conditions of these ephemeral habitats. Limited to pools that are sufficiently large or are otherwise able to retain water for a long enough duration to complete its lifecycle. Endemic to the Central Valley, as well as a few locations in the San Francisco Bay area and South Coast Range[20].	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWD, SEWD:** Project components may provide suitable vernal pool habitat. Located outside of the critical habitat for vernal pools where species are highly likely to occur[21]. **CS:** No suitable vernal pool habitat mapped. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Fish				
Acipenser medirostris **green sturgeon (southern DPS)**	FT | SSC	Spawning occurs primarily in the Sacramento River, but those that spawn in the Feather and Yuba Rivers are also part of the southern DPS. Oceanic waters, bays, and estuaries during non-spawning season. Enters San Francisco Bay late winter through early spring, and spawn occurs from April through early July. Spawn in cool sections of river mainstems in deep pools containing small to medium-sized gravel, cobble, or boulder substrate[22].	**NSJWCD: No** **SEWD: No** **CS: Yes**	**CS:** The project is within the range for this species, however, potential for occurrence within reaches of the Mokelumne River above its confluence with the San Joaquin/Delta is low, as the deep pools adults of this species prefer are limited. Only the area furthest downstream, the tidally influenced area near the confluence, is considered critical habitat. The Calaveras River is not included as critical habitat for this species. **NSJWCD, SEWD:** No suitable habitat for this species is present in the project components. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[18] Xerces Society. 2015. Conservation Status and Ecology of Monarchs in the United States. NatureServe, Arlington, Virginia.
[19] USFWS. 2017. Framework for Assessing Impacts to the Valley Elderberry Longhorn Beetle (Desmocerus.californicus.dimorphus). USFWS; Sacramento, CA.
[20] USFWS. 2024. Vernal Pool Tadpole Shrimp (Lepidurus.packardi) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.
[21] USFWS. 2005. Vernal Pools - Final Critical Habitat - USFWS [ds258]. Accessed via BIOs Online Viewer on December 24, 2024.
[22] National Marine Fisheries Service (NMFS). 2015. Southern Distinct Population Segment of the North American Green Sturgeon (Acipenser.medirostris) 5-Year Review: Summary and Evaluation. NMFS; Long Beach, CA.

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
Acipenser transmontanus **white sturgeon**	None | SCT, SSC	Much like green sturgeon, white sturgeon primarily live in estuaries of large river systems, but are anadromous fish moving from the ocean to fresh water for spawning. This species is generally found in deep, soft-bottomed areas of estuaries, where they move about in response to changes in salinity. Found in coastal and anadromous waters in California including the Sacramento and San Joaquin river basins and tributaries. Adults migrate from the estuary into the river starting in December, spawn from February to June, and return to the Delta after spawning.	**NSJWCD: Yes** **SEWD: No** **CS: Yes**	**NSJWCD, CS:** The Mokelumne River provides suitable habitat for this species. **SEWD:** No suitable habitat for this species is present in the project components. **Not Covered by any existing HCPs.**
Archoplites interruptus **Sacramento perch**	None | SSC	Though extirpated from its historic range within the Central Valley, it has been transplanted across several western states with mixed success. Now persists only as introduced populations in reproductively isolated waterbodies (primarily lakes and reservoirs across California and sporadic locations in other western states[23].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** Species is only found in limited distribution throughout California, where it has been intentionally introduced, primarily in lakes and reservoirs[24]. It is very unlikely to occur within the project area waterways. **Not Covered by any existing HCPs.**
Cottus gulosus **riffle sculpin**	None | SSC	Inhabits sand and gravel riffles of headwaters and creeks. May also be found in sand-gravel runs and backwaters of small to large rivers. Distributed from the lower Columbia River in Washington to Morro Bay in California, including the Sacramento-San Joaquin River drainage (except Pit River)[25].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD:** The Mokelumne, Calaveras and other natural waterways within the project components provide suitable habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Not Covered by any existing HCPs.**
Entosphenus Tridentatus **Pacific lamprey**	None | SSC	Anadromous species with juvenile life stage residing in freshwater year-round. Adults typically migrate from the ocean into freshwater in winter high flows.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD:** The Mokelumne River and Calaveras River provide suitable habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Not Covered by any existing HCPs.**
Hesperoleucus symmetricus symmetricus **central California roach**	None | SSC	Roach are generally found in small streams and are adapted to persisting in intermittent streams as dense populations are frequently encountered in isolated pools (Fry 1936, Moyle et al. 1982, Leidy 2007). They are most common in the mid-elevation streams of the Sierra Nevada foothills but may also be found in the main channels of some rivers like the Stanislaus and Tuolumne.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD:** The project components provide suitable aquatic habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Not Covered by any existing HCPs.**

[23] CDFW. 2025. Sacramento Perch (Archoplites interruptus). Fact Webpage. Available at: https://wildlife.ca.gov/Conservation/Fishes/Sacramento-Perch.

[24] Ibid

[25] Page, L.M. and B.M. Burr, 1991. A field guide to freshwater fishes of North America north of Mexico. Houghton Mifflin Company, Boston. 432 p. (Ref. 5723)

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
Hypomesus transpacificus **delta smelt**	FT | SE	Endemic to open waters of San Francisco Bay and Sacramento-San Joaquin River Delta. Distribution includes San Pablo Bay up through Suisun Bay, upstream through the delta to the Sacramento River below Isleton, and the San Joaquin River below Mossdale. Spawning has not been observed in the wild, but is thought to take place in sloughs and shallow edge-water channels in the upper delta and in Montezuma Slough near Suisun Bay[26].	**NSJWCD: No** **SEWD: No** **CS: Yes**	**NSJWCD, SEWD:** The Mokelumne River and the Calaveras River likely only provide suitable habitat within the lower tidally influenced reaches for this species which do not overlap with project components. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Covered by San Joaquin County Multi-Species Habitat Conservation. Critical habitat for this species overlaps with the CS project component.**
Spirinchus thaleichthys **Longfin smelt**	CE | ST	Considered pelagic and anadromous, though anadromy in this species is poorly understood, and certain populations are not anadromous, completing their life cycle in freshwater lakes and streams. This DPS is a pelagic fish that exhibits an anadromous life history with reproduction within low-salinity to freshwater habitats beginning in late fall/early winter, extending into the spring as water temperature and low-salinity conditions allow.	**NSJWCD: NO** **SEWD: No** **CS: Yes**	**NSJWCD, SEWD:** The Mokelumne River and the Calaveras River likely only provide suitable habitat within the lower tidally influenced reaches for this species which do not overlap with project components. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Lampetra Ayresii **western river lamprey**	None | SSC	Anadromous species with juvenile life stage residing in freshwater year-round. Adults typically migrate from the ocean into freshwater in winter high flows.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD:** Therefore, this species has the potential to occur within NSJWCD and SEWD project components in the Mokelumne and Calaveras Rivers as well as other natural waterways. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Not Covered by any existing HCPs.**
Lavinia exilicauda exilicauda **Sacramento hitch**	None | SSC	Often found in slow warm water, including lakes and quiet stretches of rivers. Hitch are sometimes found in cool and clear, low-gradient streams in sandy runs or pools. Very heat tolerant fish and can withstand water temperatures greater than 30°C under some conditions. Can be found living in brackish water with salinities as high as 9 ppt.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD:** The Mokelumne and Calaveras Rivers, as well as other natural waterways provide suitable habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Not Covered by any existing HCPs.**
Mylopharodon conocephalus **hardhead**	None | SSC	Usually found in clear deep streams with a slow but present flow. Less common in brackish waters, generally prefer to stay in freshwater.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD:** The Mokelumne and Calaveras Rivers provide suitable habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur.

[26] USFWS. 2010. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to Reclassify the Delta Smelt from Threatened to Endangered throughout its Range. USFWS; Sacramento CA.

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
				Not Covered by any existing HCPs.
Oncorhynchus mykiss irideus (pop. 11) **steelhead (central valley DPS)**	FT | SSC	Includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Sacramento and San Joaquin Rivers and their tributaries; excludes such fish originating from San Francisco and San Pablo Bays and their tributaries. This DPS does include steelhead from two artificial propagation projects: Coleman National Fish Hatchery Project and Feather River Fish Hatchery Project. Spawning habitat includes gravel-bottomed, fast-flowing, well-oxygenated rivers and streams. Non-spawning habitat includes estuarine and marine waters[27].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD:** The project components provide suitable aquatic habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Covered by Calaveras River HCP. Critical habitat for this species overlaps with NSJWCD, SEWD, and CS project components.**
Oncorhynchus mykiss irideus (pop. 8) **Steelhead (central California coast DPS)**	FT | SSC	Includes naturally spawned anadromous steelhead originating below natural and manmade impassable barriers from the Russian River to and including Aptos Creek, and all drainages of San Francisco and San Pablo Bays eastward to Chipps Island at the confluence of the Sacramento and San Joaquin Rivers. Also, steelhead from two artificial propagation programs: Don Clausen Fish Hatchery Program and Kingfisher Flat Hatchery Program (Monterey Bay Salmon and Trout Project). Spawning habitat includes gravel-bottomed, fast-flowing, well-oxygenated rivers and streams. Non-spawning habitat includes estuarine and marine waters[28].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD,CS:** The project area is outside of the range for this species. **Not Covered by any existing HCPs.**
Oncorhynchus tshawytscha (pop. 11) **Central Valley spring-run chinook salmon**	FT | ST	Chinook are an anadromous species, they hatch and rear in freshwater, then migrate to the ocean to feed until adulthood before returning to spawn. Juveniles typically move down into the estuary within a few weeks of hatching, where they then can stay and feed for weeks to months before migrating out to the ocean. Some juveniles stay in freshwater for 1-2 years before migrating downstream.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD,:** The Mokelumne and Calaveras River provide suitable habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Covered by Calaveras River HCP. EFH for this species overlaps with the project area.**

[27] National Oceanic and Atmospheric Administration (NOAA). 2019. NOAA Fisheries, West Coast Region, Protected Species Accounts. Available online: https://archive.fisheries.noaa.gov/wcr/protected_species/salmon_steelhead/salmon_and_steelhead_listings/steelhead/california_central_valley/california_central_valley_steelhead.html

[28] IBIDi

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
Oncorhynchus tshawytscha (pop. 13) **Central Valley fall/late fall-run Chinook salmon**	None | SSC	Chinook are an anadromous species, they hatch and rear in freshwater, then migrate to the ocean to feed until adulthood before returning to spawn. Juveniles typically move down into the estuary within a few weeks of hatching, where they then can stay and feed for weeks to months before migrating out to the ocean. Some juveniles stay in freshwater for 1-2 years before migrating downstream.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWCD, SEWD,:** The Mokelumne and Calaveras River provide suitable habitat for this species. **CS:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. **Covered by Calaveras River HCP. EFH for this species overlaps with the project area.**
Oncorhynchus tshawytscha (pop. 7) **Sacramento River winter-run Chinook salmon**	FE | SE	Chinook are an anadromous species, they hatch and rear in freshwater, then migrate to the ocean to feed until adulthood before returning to spawn. Juveniles typically move down into the estuary within a few weeks of hatching, where they then can stay and feed for weeks to months before migrating out to the ocean.	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** The project area is outside of the range for this species. **Covered by Calaveras River HCP. EFH for this species overlaps with the project area.**
Pogonichthys Macrolepidotus **Sacramento splittail**	None | SSC	Typically found in estuarine environments all throughout the Sacramento-San Joaquin Delta. Can be found in slower moving water, channels, floodplains, sloughs, and slow-moving rivers.	**NSJWCD: No** **SEWD: Yes** **CS: Yes**	**NSJWCD:** The Mokelumne River likely only provides suitable habitat within the lower tidally influenced reaches for this species, which do not overlap with project components **CS, SEWD:** The Mokelumne River provides suitable habitat for this species where the WID diversion point will occur. The lower Calaveras River provides suitable habitat for this species. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Spirinchus thaleichthys **longfin smelt – San Francisco Bay Delta DPS**	CE | ST	Considered pelagic and anadromous, though anadromy in this species is poorly understood, and certain populations are not anadromous, completing their life cycle in freshwater lakes and streams[29]. Bay-Delta longfin smelt DPS occupies the San Francisco Bay Estuary and areas of the Pacific Ocean out to the Farallon Islands. This DPS is a pelagic fish that exhibit an anadromous life history with reproduction within low-salinity to freshwater habitats beginning in late fall/early winter and extends into the spring as water temperature and low-salinity conditions allow[30].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWCD, SEWD, CS:** No suitable habitat for this species is present in the project area. **Not Covered by any existing HCPs.**

[29] USFWS. 2012. Endangered and Threatened Wildlife and Plants; 12-month Finding on a Petition to List the San Francisco Bay-Delta Population of the Longfin Smelt as Endangered or Threatened
[30] USFWS. 2022. Endangered and Threatened Wildlife Plants; Endangered Species Status for the San Francisco Bay-Delta Distinct Population Segment of the Longfin Smelt

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
Reptiles and Amphibians				
Actinemys marmorata **northwestern pond turtle**	PT | SSC	Ranges throughout California except for Inyo and Mono Counties. Generally, occurs in various water bodies including permanent and ephemeral systems either natural or artificial. Upland habitat that is at least moderately undisturbed is required for nesting and overwintering, in soils that are loose enough for excavation[31]. Nesting occurs from late May until the middle of July. Females find a suitable site, usually with dry soil, sparse vegetation and a southern exposure. The eggs incubate naturally underground for 90-130 days, depending on summer temperatures[32].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD,CS:** The project components provide suitable aquatic and upland habitat for foraging and nesting, especially near existing bodies of water. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Anniella pulchra northern **California legless lizard**	None | SSC	Occurs from the southern edge of the San Joaquin River in northern Contra Costa County south to Ventura County, south of which there is a wide area where the species of legless lizards (*Anniella)* is or are unknown. Occurs in scattered locations in the San Joaquin Valley, along the southern Sierra Nevada Mountains, on the desert side of the Tehachapi Mountains, and part of the San Gabriel Mountains[33]. Generally found in habitats with a relatively sparse amount of vegetation including coastal sand dunes, chaparral, pine-oak woodland, desert scrub, grassland, and riparian zones. Specifically, requires sandy to loose loamy substrates suitable for burrowing, and avoids areas with gravel or larger sized substrates and those with greater than 10% clay content. Also tends to avoid non-native grasslands, iceplant fields, and other non-native dominated herbaceous communities[34]. Occurs in moist warm loose soils with plant cover, and moisture is essential.	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** Suitable habitat is present in the project components where sandy soils, grassland, and riparian habitats occur. Project area is within the northernmost extent of this species range[35]. **Not Covered by any existing HCPs.**

[31] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.

[32] USFWS. 2024. Western Pond Turtle Overview. Online Webpage. Available at: https://www.fws.gov/species/western-pond-turtle-actinemys-marmorata.

[33] Nafis, G. (2000-2020) California Herps - A Guide to the Amphibians and Reptiles of California. Available at: http://www.californiaherps.com/.

[34] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.

[35] CDFW. 2016. California Legless Lizard Range - CWHR R043 [ds1750]. Accessed on December 24, 2024 via BIOs online viewer.

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
Ambystoma californiense pop. 1 **California tiger salamander - central California DPS**	FT | ST	Breeds in fish-free ephemeral ponds which form in winter and dry in summer. Some also breed in slow streams and semi-permanent waters, including cattle ponds. Spends most of the year underground in small mammal burrows, especially those of California ground squirrel (*Otospermophilus beecheyi*). Typical habitat associations include grassland, oak savanna, edges of mixed woodland, and lower elevation coniferous forest[36]. Adult Central California tiger salamanders engage in mass migrations during a few rainy nights per year, typically from November through April, although migrating adults have been observed as early as October and as late as May. During these rain events, adults leave their underground burrows and return to breeding ponds to mate and will then return to their underground burrows[37].	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWD, SEWD:** Project components may provide suitable vernal pool habitat. Located outside of the critical habitat for vernal pools. Annual grasslands provide suitable habitat. **CS:** No suitable aquatic breeding habitat or terrestrial habitat present. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Arizona elegans occidentalis **California glossy snake**	None | SSC	Ranges in the cismontane portion of southern California, the southern portion of the Central Coast Ranges, and in isolated pockets up to the Alameda and San Joaquin County border. Generally found in open desert, grasslands, shrublands, chaparral, and woodlands. Some evidence of open and sandy habitat preference exists, but specific habitat requirements for this species aren't known[38].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range of this species. Currently, they are only found up to the very southern border of San Joaquin County, which is outside of the project area[39]. **Not Covered by any existing HCPs.**
Masticophis flagellum ruddocki **San Joaquin coachwhip**	None | SSC	Ranges in the southern half of the Central Valley and Monterey and San Benito Counties. Generally found in open dry areas with little to no tree cover. Specifically, populations in the western half of this species' distribution primarily use grassland and saltbush scrub habitats. Mammal burrows are used for overwintering and possibly for oviposition[40].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range of this species. Currently, they are only found up to the very southern border of San Joaquin County, which is outside of the project area[41]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[36] Nafis, G. (2000-2020) California Herps - A Guide to the Amphibians and Reptiles of California. Available at: http://www.californiaherps.com/.

[37] USFWS. 2017. Recovery Plan for the Central California Distinct Population Segment of the California Tiger Salamander (Ambystoma.californiense). U.S. Fish and Wildlife Service, Pacific Southwest Region, Sacramento, California.

[38] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.

[39] Ibid

[40] Ibid

[41] Ibid

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
Masticophis lateralis euryxanthus **Alameda whipsnake**	FT | ST	Endemic to California where it is only found in the East Bay area in Alameda and Contra Costa Counties. Prefers open areas in canyons, rocky hillsides, and chaparral scrublands, but will range into adjacent grasslands and woodlands [42].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the limited range of this species. Currently, they are only known to occur within Alameda and Contra Costa County[43]. **Not Covered by any existing HCPs.**
Phrynosoma blainvillii **coast horned lizard**	None | SSC	Ranges in the southern half of California outside of the desert, along the foothills of the Sierra Nevada Mountains to Butte County, and along the Central Coast ranges up to Contra Costa County. Generally, occurs in sage scrub, dunes, alluvial scrub, annual grassland, chaparral, oak, riparian, and Joshua tree woodland, coniferous forest, and saltbush scrub. Needs loose, fine soils for burrowing, open areas for basking, and dense foliage for cover. Negatively associated with Argentine ants (*Linepithema humi*)[44].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable habitat where grassland, oak, and riparian habitat is present, particularly areas with loose fine soils for burrowing. . **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Spea hammondii **western spadefoot**	PT | SSC	Generally found in grasslands, oak woodlands, coastal sage scrub, and chaparral in washes, floodplains, alluvial fans, playas, and alkali flats. Natural and artificial water bodies are used for breeding. Specifically, vernal pools used by this species have an average ponding duration of 81 days, and successful recruitment occurs in ponds that last on average 21 days longer than larval development time. Pool temperature requirements are from 48°F to 90°F. Pools with invasive species, such as crayfish (*Pacifasticus* spp.), or bullfrogs *(Lithobates catesbeianus*) often, but not always, exclude this species[45].	**NSJWCD: Yes** **SEWD: Yes** **CS: No**	**NSJWD, SEWD:** The project components could provide suitable habitat where grasslands, oak woodlands, and bodies of water occur throughout these areas. **CS:** There is no suitable habitat present. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Thamnophis gigas **giant gartersnake**	FT | ST	Marshes, sloughs, ponds, small lakes, low gradient streams, irrigation and drainage canals, rice fields and their associated uplands. Upland habitat should have burrows or other soil crevices suitable for snakes to reside during their dormancy period (November- mid March). Formerly ranged in the Central Valley from Butte County to Buena Vista Lake in Kern County, but now thought to be absent south of Fresno and in Stanislaus	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project area provides suitable habitat where irrigated fields, agricultural ditches/canals, and other waterways and upland habitat are present. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[42] Nafis, G. (2000-2020) California Herps - A Guide to the Amphibians and Reptiles of California. Available at: http://www.californiaherps.com/.

[43] Ibid

[44] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.

[45] Ibid

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		County[46]. Require fresh-water aquatic components with protective emergent vegetative cover for foraging, upland component near aquatic habitat to be used for thermoregulation and for summer shelter in burrows, and upland refugia component that will serve as winter hibernacula[47].		
Rana boylii (pop. 4) **foothill yellow-legged frog - central coast DPS**	FT | ST	Extends south from the San Francisco Bay through the Diablo Range and through the Coast Range east of the Salinas Valley[48]. Generally found in shallow flowing streams and rivers with at least cobble sized substrate. Breeding generally occurs at the margins of wide shallow channels with reduced flow variation near tributary confluences. Specifically, egg masses are placed in low flow locations on or under rocks with preferred substrates being boulders, cobbles, or gravel[49]. Occurs in a wide variety of vegetation types including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, mixed chaparral, and wet meadow[50].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range of the CDFW designated clade and USFWS designated DPS for this species[51]. **Not Covered by any existing HCPs.**
Rana boylii (pop. 5) **foothill yellow-legged frog - south Sierra DPS**	FE | SE	Extends from the South Fork American River sub-basin to the transition zone between the Sierra Nevada and the Tehachapi Mountains that border the south end of the California Central Valley[52]**.** Generally found in shallow flowing streams and rivers with at least cobble sized substrate. Breeding generally occurs at the margins of wide shallow channels with reduced flow variation near tributary confluences. Specifically, egg masses are placed in low flow locations on or under rocks with preferred substrates being boulders, cobbles, or gravel[53]. Occurs in a wide variety of vegetation types including valley-foothill hardwood, valley-	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The species is presumed to be extirpated from San Joaquin County[55]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[46] USFWS. 2012. Giant Garter Snake (Thamnophis.gigas) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.

[47] Ibid

[48] USFWS. 2021. Species status assessment report for the foothill yellow legged frog (Rana.boylii), Version 2.0. October 2021. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California.

[49] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.

[50] Ibid

[51] Ibid

[52] Ibid

[53] Thomson, Robert C., Wright, Amber N., and Shaffer H. Bradley. 2016. California Amphibian and Reptile Species of Special Concern. University of California Press Berkeley, CA.

[55] Center for Biological Diversity. 2012. Petition to List Four California Foothill Yellow-legged Frog (Rana.boylii) Populations Under the Endagered Species Act.

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, mixed chaparral, and wet meadow[54].		
Rana draytonii **California red-legged frog**	FT | SSC	Predominately inhabit permanent fresh water sources such as streams, lakes, marshes, natural and manmade ponds, and drainages in valley bottoms and foothills. Typically, aquatic habitat contains either riparian or emergent vegetation though California red-legged frogs also are known to inhabit ephemeral creeks, drainages, and ponds with minimal riparian and emergent vegetation. California red-legged frogs use these types of aquatic features for breeding and non-breeding activities[56]. Aquatic breeding habitat is generally found in still or slow-moving water and can have a wide range of edge and emergent cover amounts. Non-breeding habitat is found in similar aquatic features as breeding habitat but these features may not hold water long enough for the species to successfully complete its aquatic life cycle. While generally found in freshwater habitats, adult California red-legged frogs can survive in saline water for short periods. Upland habitat consists of terrestrial areas adjacent to breeding and non-breeding aquatic habitats [57].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the CDFW known range for this species[58]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Birds				
Agelaius tricolor **tricolored blackbird (nesting)**	None | ST, SSC	Mostly a year-round resident in California. Common locally throughout Central Valley and in coastal districts from Sonoma County south. Breeds locally in northeastern California. In winter, becomes more widespread along the central coast and San Francisco Bay area, and can be found in portions of the Colorado Desert. Preferred nesting habitat includes cattails (*Typha* spp.), bulrushes (*Schoenoplectus* spp.), Himalayan blackberry (*Rubus armeniacus*), and agricultural silage. Dense vegetation is preferred but heavily lodged	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging and nesting habitat where dense wetland vegetation occurs near aquatic sources and cropland. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[54] Ibid

[56] USFWS. 2022. California Red -Legged Frog (Rana.draytonii): 5 Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Sacramento Fish and Wildlife Office, Sacramento, California.

[57] Ibid

[58] Ibid

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		cattails not burned in recent years may preclude settlement. Need access to open water. Strips of emergent vegetation along canals are avoided as nest sites unless they are about 30 feet or more wide but in some ponds, especially where associated with Himalayan blackberries and deep water, settlement may be in narrower fetches of cattails. Nests from mid-march to late July[59].		
Antigone canadensis canadensis **lesser sandhill crane (overwintering)**	None | SSC	Does not nest in California. Present in California as a migrant and winter resident (mainly October through March) with concentrations in the Butte Sink, Sacramento-San Joaquin River Delta, Merced County, Carrizo Plain, Tulare Basin, and Imperial Valley. Forages in agricultural fields and grasslands[60]. Use pastures, moist grasslands, alfalfa fields, and shallow wetlands for loafing sites. this highly alkaline lake. Roost sites are in a variety of wetland habitats, where cranes spend the night standing in shallow water. Sites in California have included rain pooled agricultural fields, shallow freshwater lakes and ponds, alkaline lakes, and channels of shallow rivers[61].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project components provide suitable foraging habitat where grassland, cropland, and open emergent wetlands occur in the project components. However, this species does not nest in California. **Not Covered by any existing HCPs.**
Antigone canadensis tabida **greater sandhill crane (overwintering)**	None | SE, FP	In California, breeds only in Siskiyou, Modoc, and Lassen Counties, and in Sierra Valley in Plumas and Sierra Counties. Winters primarily in the Sacramento and San Joaquin Valleys from Tehama County south to Kings County. Breeds in and near wet meadow, shallow lacustrine, and fresh emergent wetland habitats. Winters in annual and perennial grassland habitats, moist croplands with rice or corn stubble, and open, emergent wetlands. Prefers treeless plains. Nests in remote portions of extensive wetlands or sometimes shortgrass prairies. When foraging, prefers open shortgrass plains, grain fields, and open wetlands.	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project components provide suitable foraging habitat where grassland, cropland, and open emergent wetlands occur in the project components. However, species does not nest in the project area's range[63]. **Not Covered by any existing HCPs.**

[59] CWHR Project Staff 2008. "Tricolored blackbird", California Wildlife Habitat Relationships System Life History Accounts and Range Maps. Available online: https://www.wildlife.ca.gov/Data/CWHR/Life-History-and-Range. CDFW Biogeographic Data Branch; Sacramento, CA

[60] Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

[61] Ibid

[63] Beedy, E., Mewaldt, L., Granholm, S., and Duke, R. 1990. "Sandhill Crane", California Wildlife Habitat Relationships System Life History Accounts and Range Maps. Available online: https://www.wildlife.ca.gov/Data/CWHR/Life-History-and-Range. CDFW Biogeographic Data Branch; Sacramento, CA

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		Peak breeding May until July, and nesting completed by late August[62].		
Aquila chrysaetos **golden eagle (nesting)**	None | FP	Uncommon resident in hills and mountains throughout California, and an uncommon migrant and winter resident in the Central Valley and Mojave Desert. Prefers rolling foothills and mountain terrain, wide arid plateaus deeply cut by streams and canyons, open mountain slopes, cliffs, and rock outcrops[64]. Needs open terrain for hunting; grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats. Nests on cliffs of all heights and in large trees in open areas. Alternative nest sites are maintained, and old nests are reused. Rugged, open habitats with canyons and escarpments used most frequently for nesting. Nests from January through August[65].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** There is no suitable nesting habitat for this species in any of the project area. Foraging habitat is only marginal and only occurs sparsely. If this species is observed, it would likely only be as a flyover. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Asio flammeus **short-eared owl (nesting and overwintering)**	None | SSC	Found in open, treeless areas with elevated sites for perches, and dense vegetation for roosting and nesting. Associated with perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands. Breeds in coastal areas in Del Norte and Humboldt Counties, San Francisco Bay Delta, northeastern Modoc plateau, east Sierras from Lake Tahoe to Inyo County and portions of San Joaquin Valley. Winters in the Central Valley, western Sierra Nevada foothills and along the coastline[66]. Nests on dry ground in a depression concealed in vegetation, and lined with grasses, forbs, sticks, and feathers; occasionally nests in a burrow. Nests from March to July[67].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project components provide suitable foraging habitat where meadows, open grassland, and agricultural fields are present. However, the project area is outside of the known nesting range for this species[68]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[62] Beedy, E., Mewaldt, L., Granholm, S., and Duke, R. 1990. "Sandhill Crane", California Wildlife Habitat Relationships System Life History Accounts and Range Maps. Available online: https://www.wildlife.ca.gov/Data/CWHR/Life-History-and-Range. CDFW Biogeographic Data Branch; Sacramento, CA

[64] Polite, C., Pratt, J., Kiff, L. 1990. "Golden Eagle," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1681&inline=1

[65] Ibid

[66] CWHR Project Staff. 2005. "Short-eared Owl," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1879&inline=1

[67] Life history accounts for species in the California Wildlife Habitat Relationships (CWHR) System were originally published in: Zeiner, D.C., W.F.Laudenslayer, Jr., K.E. Mayer, and M. White, eds. 1988-1990. California's Wildlife. Vol. I-III. California Depart. of Fish and Game, Sacramento, California. Updates are noted in accounts that have been added or edited since original publication.

[68] CWHR Project Staff. 2005. "Short-eared Owl," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1879&inline=1

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
Athene cunicularia **burrowing owl (nesting and overwintering)**	None | SCE, SSC	Resident in much of the state in open, dry grasslands and various desert habitats. Requires open areas with mammal burrows; especially those of California ground squirrel. Inhabits rolling hills, grasslands, fallow fields, sparsely vegetated desert scrub, vacant lots and other open human disturbed lands such as airports and golf courses. Absent from northwest coast and elevations above 5,500 feet[69]. The species requires low-growing vegetation and benefits from active management of sites. Burrowing owls may use a site for breeding, wintering, foraging, and/or migration stopovers throughout California. Nests from February to August[70].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project area provides suitable foraging, nesting, and wintering habitat where sparsely vegetated fields, grasslands, fallow fields, urban disturbed areas, golf courses, etc. exist. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Buteo swainsoni **Swainson's hawk (nesting)**	None | ST	Nests in oak savanna and cottonwood riparian areas adjacent to foraging habitat of grasslands, agricultural fields, and pastures where they often follow farm equipment to gather killed and maimed rodents. Increasingly also nests in sparse stands of gum trees and Australian pines (*Casuarina equisetifolia*) and often forage along roadsides and grassy highway medians. Nests from March through September. Breeding resident in the Central Valley, Klamath Basin, Northeastern Plateau, and in juniper-sagebrush flats of Lassen County. Limited breeding reported from Lanfair Valley, Owens Valley, Fish Lake Valley, and Antelope Valley. Winters primarily in Argentina, with most birds absent from California October through February, though a few overwinter in the Sacramento-San Joaquin River Delta. Prolific migrant through southern California in spring and fall, with large mixed-age groups of birds frequently observed kettling high overhead on thermals or foraging together on freshly cut agricultural fields[71].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project area provides suitable foraging habitat where agricultural fields and open grasslands occur and nesting habitat where established riparian and large trees occur. The species does not overwinter in California, but they could be present during nesting season. **Not Covered by any existing HCPs.**
Charadrius montanus **mountain plover (wintering)**	None | SSC	Does not nest in California. Present in the state November through March in open grasslands and plowed fields with no or very short vegetation. Found in flocks mostly on the west side of the Central Valley from Colusa County south to Kern	**NSJWCD: No** **SEWD: No**	**NSJWD, SEWD, CS:** The project area is outside of the typical wintering range for this species. Additionally, there

[69] CWHR Project Staff. 1999. "Burrowing Owl," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1871&inline=1

[70] California Burrowing Owl Consortium. 1993. Burrowing Owl Survey Protocol and Mitigation Guidelines.

[71] CWHR Project Staff. 2006. "Swainson's Hawk," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1595&inline=1 | CDFW. 1994. Staff Report Regarding Mitigation for Impacts to Swainson's Hawks in the Central Valley of California. Available at: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=83992&inline

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		County, Carrizo Plain, Antelope Valley, Imperial Valley, and western Riverside County. Single individuals are rarely found on beaches or offshore islands[72].	**CS: No**	are no known occurrences within San Joaquin County. Species does not nest in California[73]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Chlidonias niger **black tern (foraging)**	None | SSC	Nests on the high plateaus of northeastern California, and locally in dwindling numbers in the Sacramento Valley from the Butte Sink to the Natomas Basin, and in the San Joaquin Valley from Merced County south to the Tulare Lake Basin. Nests in fresh emergent wetlands, lakes, ponds, moist grasslands, and flooded rice fields. On migration, some take coastal routes and forage offshore. Nests are small cuplike gatherings of vegetation usually built on floating substrates—typically anchored to (or lodged in) emergent vegetation or beds of submerged rooted aquatics—or on small mounds or other non floating substrates within a marsh matrix. Nests from early May to early August[74].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project components provide suitable foraging habitat where moist grassland, irrigated fields, and emergent wetlands occur. However, the species does not nest in the project area's range[75]. **Not Covered by any existing HCPs.**
Circus hudsonius **northern harrier (nesting and foraging)**	None | SSC	Nests on the ground in patches of dense, tall vegetation in undisturbed areas. Breed and forage in a variety of open habitats such as marshes, wet meadows, weedy borders of lakes, rivers and streams, grasslands, pastures, croplands, sagebrush flats, and desert sinks. Nests March through August[76].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging and nesting habitat for this species where agricultural and grassland occurs. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Coccyzus americanus occidentalis **yellow-billed cuckoo (foraging)**	FT | SE	Has declined drastically in California due primarily to loss of habitat. Requires riparian woodland with dense cover; primarily old-growth cottonwood (*Populus* spp.) forests with willow (*Salix* spp.) understory, but will also nest in overgrown orchards adjacent to streams and dense thickets alongside marshes. Persists in small numbers along the Sacramento River between Red Bluff and Colusa, the Feather River between Yuba City	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD: T**he project components are outside of the expected nesting range of this species, which is primarily along Mokelumne River, and they are likely to only use the area as a migratory stopover. Riparian habitat that is continuous would provide suitable foraging habitat. **SEWD, CS:** There is no suitable foraging or nesting habitat present in these project components.

[72] CWHR Project Staff. 2008. "Mountain Plover," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1733&inline=1
[73] Ibid
[74] CWHR Project Staff. 2008. "Black Tern," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1819&inline=1
[75] Ibid
[76] Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		and the Bear River, Owens Valley, the Kern River Valley, the Colorado River Valley, the Santa Ana River near Prado Basin, and the San Luis Rey River in northern San Diego County[77].		**Not Covered by any existing HCPs.**
Dendrocygna bicolor **fulvous whistling-duck**	None | SSC	Historically abundant and widespread in the San Joaquin Valley but is now possibly extirpated as a breeder in California. May have bred in the Tulare Lake Basin as recently as the mid-2000's, but in more recent years mainly appears during post-breeding dispersal on the south shore of the Salton Sea in Imperial Valley. Nesting occurs mostly in rice fields,but also occurs in freshwater marshes with dense stands of emergent or floating vegetation. Nests from late April through August, but can extend to early October[78].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** Species is likely extirpated from breeding in California, and recent populations occur primarily in southern California[79] The project area is outside of the known occupied range for this species[80]. **Not Covered by any existing HCPs.**
Elanus leucurus **white-tailed kite (nesting and foraging)**	None | FP	Fairly common resident of the Central Valley, coast, and Coast Range Mountains. Nests in oak savanna, oak and willow riparian, and other open areas with scattered trees near foraging habitat. Forages in open grasslands, meadows, farmlands, and emergent wetlands. Often seen hover foraging over roadsides or grassy highway medians. Nests from February to October, with peak breeding season occurring from May to August[81].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project area provides suitable foraging and nesting habitat for this species where grasslands, farmlands, and suitable trees occur. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Empidonax traillii brewsteri **little willow flycatcher**	None | SE	Uncommon summer resident in wet meadows and montane riparian habitats from 2,000 to 8,000 feet in elevation. Breeds in California from Tulare County north, along the western side of the Sierra Nevada and Cascade Ranges, extending to the coast in northern California.[82] Likely extirpated from the Central Valley, and primarily occurs within the Sierra Nevada range and higher elevations[83].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** Project area is outside of the known range for this species[84]. Likely extirpated from the Central Valley, with its primary range in higher elevations in the Sierra Nevada's. **Not Covered by any existing HCPs.**

[77] USFWS. 2019. ECOS Environmental Conservation Online System - Species Profile for Yellow-billed Cuckoo. Available online: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=B06R

[78] Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

[79] Ibid

[80] Ibid

[81] CWHR Project Staff. 2005. "White-tailed Kite," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1659&inline=1

[82] Craig, D. and P. L. Williams. 1998. Willow Flycatcher (Empidonax.traillii). The Riparian Bird Conservation Plan: A strategy for reversing the decline of riparian-associated birds in California. A project of California Partners in Flight and the Riparian Habitat Joint Venture.

[83] Green, Gregory, Bombay, H., Morrison, M. 2003. Conservation assessment of the Willow Flycatcher in the Sierra Nevada.

[84] Ibid

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
Gavia immer **common loon (foraging)**	None | SSC	Very unlikely to nest in California. Common September through May in estuarine and subtidal marine habitats along the entire coast. A very few non-breeding individuals over summer on the north coast. Also, less commonly winters on large, deep lakes in valleys and foothills throughout the state. For territory, requires deep freshwater lakes, either large or small, with sufficient food fish. Prefers to nest on small islets, but also uses protected sites on shore[85]	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project components do not provide suitable foraging or nesting habitat. **Not Covered by any existing HCPs.**
Geothlypis trichas sinuosa **Saltmarsh common yellowthroat**	None | SSC	Dwells only in the San Francisco Bay Area. Primarily found in brackish and fresh marshes, but also occupies salt marsh and riparian woodland habitat[86].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range for this species[87]. **Not Covered by any existing HCPs.**
Gymnogyps californianus **California condor**	FE | SE, FP	Formerly ranged across much of North America, but over the course of the 20th Century, disappeared over nearly its entire range. Dwindled to such small numbers that by the 1980's, all remaining birds were removed from the wild to a captive rearing project. The condor population in California currently occurs from Mariposa, Fresno, and Alameda counties south through San Benito, Monterey, San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Kern and Tulare Counties.[88] Nests in cavities located on steep rock formations or in the burned out hollows of old-growth coast redwoods (*Sequoia semervirens*) or giant sequoias (*Sequoiadendron giganteum*). Less commonly uses cliff ledges or large old nests of other bird species. Forages in open terrain of foothill grassland and oak savanna habitats, and at coastal sites in central California.[89]	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range for this species[90]. **Not Covered by any existing HCPs.**

[85] Granholm, S., Duke, R., Airola, D. 1990. "Common Loon," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1545&inline=1

[86] Shuford, W.D. and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento. Accessed via: https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=10427

[87] Ibid

[88] USFWS. 2023. California Condor (Gymnogyps californianus) 5-Year Review: Summary and Evaluation. USFWS; Pacific Southwest Region.

[89] USFWS. 2013. California Condor (Gymnogyps californianus) 5-Year Review: Summary and Evaluation. USFWS; Pacific Southwest Region.

[90] Ibid

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
Icteria virens **yellow-breasted chat (nesting and foraging)**	None | SSC	Nests in early-successional riparian habitats with a well-developed shrub layer and an open canopy. Restricted to narrow borders of streams, creeks, sloughs, and rivers. Often nest in dense thickets of blackberry and willow. Nests from late April to early August.[91]	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging and nesting habitat for this species in limited project components where riparian thickets occur. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Ixobrychus exilis **least bittern**	None | SSC	Fairly common summer resident at Salton Sea and in Colorado River Valley. Uncommon to rare and sporadic breeder elsewhere in the state; recorded nesting in Siskiyou, Modoc, and Lassen Counties, the Central Valley from the Butte Sink to the Yolo Bypass, along the Merced River, in the Tulare Lake Basin, Owens Valley, and spottily along the southern coast from Morro Bay to Baja California and inland to San Jacinto Valley in Riverside County. Nests in dense emergent vegetation in fresh and brackish marshes; rarely in tamarisk (*Tamarix spp.)* in desert riparian scrub. Nests May through August.[92]	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area does not have suitable foraging or nesting habitat present for this species. **Not Covered by any existing HCPs.**
Lanius ludovicianus **loggerhead shrike (nesting and foraging)**	None | SSC	Shrublands and open woodlands with a fair amount of grass cover and areas of bare ground. Requires tall shrubs or trees, fences, or power lines for hunting perches and territorial advertisement. Also requires open areas of short grasses, forbs, or bare ground for hunting, large shrubs or trees for nest placement, and thorny vegetation or barbed wire fences for impaling prey. Ranges across most of the state, but absent from the highest mountains and the northwest forests and coast.[93]	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging and nesting habitat for this species in portions of the project components where open woodlands, grasslands, trees and shrubs occur. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Laterallus jamaicensis ***coturniculus*** **California black rail**	None | ST, FP	Saline, brackish, and fresh emergent wetlands. Scarce, but true abundance difficult to determine due to small size and extremely secretive nature. Known to nest at scattered locations in the San Francisco Bay Area and Delta region, Point Reyes National Seashore, San Luis Obispo and Orange Counties, as well as the Imperial and Lower	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area does not have suitable foraging or nesting habitat present for this species. Populations are mainly known to occur within the Delta[95]. **Not Covered by any existing HCPs.**

[91] Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
[92] Shuford, W.D. and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.
[93] Ibid
[95] Ibid

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		Colorado River Valleys. Appears intermittently and sparingly at a few locations in the Sacramento Valley[94].		
Melospiza melodia mailliardi **song sparrow (Modesto population) (nesting and foraging)**	None | SSC	Often found in emergent freshwater marshes dominated by bulrushes, cattails, and willow. Also nests in riparian forests of valley oak (*Quercus lobata*) with a sufficient understory of blackberry, along vegetated irrigation canals and levees, and in recently planted valley oak restoration sites. Found throughout the Sacramento Valley, from the delta north to Chico. The highest densities of this subspecies occur in the Butte Sink Area of the northern Sacramento Valley and in the Sacramento- San Joaquin River Delta. Nests from mid-march to early August[96].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging and nesting habitat for this species in portions of the project components where emergent wetlands and riparian habitat occur. **Not Covered by any existing HCPs.**
Melospiza melodia maxillaris **Suisun song sparrow**	None | SSC	Confined to tidal salt and brackish marshes fringing Carquinez Strait and Suisun Bay east to Antioch and the confluence of the San Joaquin and Sacramento Rivers[97].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range for this species[98]. **Not Covered by any existing HCPs.**
Passerculus sandwichensis alaudinus **Bryant's savannah sparrow**	None | SSC	Ranges along the coast from Humboldt County to Santa Barbara County in low tidally influenced habitats and adjacent ruderal areas, moist grasslands within and just above the fog belt, and infrequently, drier grasslands[99].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range for this species[100]. **Not Covered by any existing HCPs.**
Pelecanus erythrorhynchos **American white pelican (foraging)**	None | SSC	In California, nests almost exclusively in large lakes in the Klamath Basin region. On migration and over winter, occurs across much of the state in open wetlands and sheltered bays and lagoons. Nests on ground on earthen, sandy, and rocky islands or rarely on peninsulas or floating tule mat islands. Nests may be in the open in the sand or interspersed with or adjacent to tall weeds and open, low-stature shrubs. Roosts along water	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project components provide suitable foraging habitat for this species in areas where larger aquatic features exist, although it is very unlikely this species would nest in the project area. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[94] CWHR Project Staff. 1999. "Black Rail," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1711&inline=1

[96] Shuford, W.D. and Gardali, T., editors. 2008. California Bird Species of Special Concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

[97] Ibid

[98] Ibid

[99] Ibid

[100] Ibid

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		edges, beaches, sandbars, or old drift wood. Nests from March through July[101]		
Progne subis **purple martin**	None | SSC	Present in California from mid-March through late September. Requires concentrations of nesting cavities, relatively open air space above accessible nest sites, and relatively abundant aerial insect prey. In the coastal mountains, Cascade Range, and Sierra Nevada foothills, inhabits open forests, woodlands, and riparian areas. Extirpated as a breeder from most of the Central Valley except the Sacramento area where it has taken to nesting in hollow-box bridges.[102] Sites that may be suitable for martin occurrence include snags, live trees, utility poles, bridges (including elevated freeways and overpasses >70 m long), and unusually, in buildings, transmission towers, and elevated pipes. All suitable nest sites are in open areas that provide flight access, often located on slopes or ridge tops usually with a water body nearby.[103]	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area provides suitable migratory foraging habitat for this species. While tree snags, utility poles, bridges, and open space could provide suitable nesting habitat, this species has been mostly extirpated from breeding in the central valley. **Not Covered by any existing HCPs.**
Rallus obsoletus obsoletus **California Ridgway's rail**	FE | SE, FP	Restricted to tidal marshes on the fringes of San Pablo Bay, San Francisco Bay, Monterey Bay, and Morro Bay. Requires intricate network of sloughs with small natural berms along tidal channels, preferably with cordgrass (*Spartina spp*.) and pickleweed (*Salicornia spp*.)[104].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range for this species[105]. **Not Covered by any existing HCPs.**
Riparia riparia **bank swallow (foraging)**	None | ST	A colonial nester in riparian and lacustrine bluffs or cliffs with fine-textured or sandy soils into which the nest cavities are dug. Also nests in earthen banks as well as sand and gravel pits. Requires fine-textured or sandy banks or cliffs to dig horizontal nesting tunnel and burrow. Nest almost always near water, and lined with grasses and other plant material and feathers. Breeds from	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging habitat for this species, however, suitable nesting habitat is dependent on soil types of the bank slopes of the Mokelumne River and other waterways present in the project components. **Not Covered by any existing HCPs.**

[101] Ibid

[102] Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento

[103] Airola, D. 2024. Survey methods for the purple martin in California. California Fish and Wildlife Journal 110:e2.

[104] USFWS. 2017. Bay Delta Fish & Wildlife Office, Species Accounts, California Ridgway's Rail (formerly California Clapper Rail). Available online: https://www.fws.gov/sfbaydelta/EndangeredSpecies/Species/Accounts/ClapperRail/ClapperRail.htm

[105] Ibid

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
		early May through July. Declined drastically in the state over the 20th Century due to loss of riparian habitat and stabilization of natural banks. Currently most numerous in the Sacramento Valley along the Sacramento, Feather, and American Rivers, and Cache Creek in western Yolo County. Scarce and very local on the central coast. Occurs elsewhere in the state as an uncommon to rare migrant.[106]		
Setophaga petechia **yellow warbler (nesting and foraging)**	None | SSC	Usually found in riparian deciduous habitats in summer: cottonwoods, willows, alders (*Alnus ssp.),* and other small trees and shrubs typical of low, open-canopy riparian woodland. Also breeds in montane shrubbery in open coniferous forests.[107]	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging and nesting habitat for this species in portions of the project components where riparian woodland occurs. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Sternula antillarum browni **California least tern**	FE | SE, FP	Breeds on the coast from San Francisco Bay south, and rarely up through the Delta to Sacramento County and at the Salton Sea. Nests and roosts in colonies on fine-grain sandy or pebbly beaches, or in smaller numbers on pebbly levees at water treatment plants or evaporation ponds. Forages over near shore ocean waters and in shallow estuaries and lagoons[108].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the known range for this species[109]. **Not Covered by any existing HCPs.**
Vireo bellii pusillus **least Bell's vireo**	FE | SE	Once occupied much of the Central Valley, but has disappeared from most its former range, and is now restricted to southern California from southern Inyo and Monterey Counties south through the South Coast and Inland Empire regions. Obligate riparian breeder, favoring cottonwood, willow, and oak (*Quercus spp*.) woodlands, and mule fat (*Baccharis salicifolia*) scrub along watercourses. They typically arrive in California breeding area by mid-march to early April, and they generally remain on breeding grounds until late September, although some post-breeding migration may begin as early as late July[110].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the typical known range for this species[111]. **Not Covered by any existing HCPs.**

[106] CWHR Project Staff. 1999. "Bank Swallow," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=1981&inline=1

[107] Ibid

[108] USFWS. 2006. California Least Tern 5-Year Review: Summary and Evaluation. USFWS; Carlsbad, CA.

[109] Ibid

[110] USFWS. 2006. Least Bell's Vireo (Vireo bellii pusillus) 5-Year Review: Summary and Evaluation. USFWS; Carlsbad, CA.

[111] Ibid

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
Xanthocephalus xanthocephalus **yellow-headed blackbird (nesting and foraging)**	None | SSC	Occurs in California primarily as a migrant and summer resident from April to early October. Breeds from mid-April to late July. Nests in fresh marshes with tall, emergent vegetation such as bulrushes (*Schoenoplectus* ssp.) and cattails generally in open areas and adjacent to deep water. Nests are fabricated from dry vegetation and placed in dense cover. Because of the need for deeper water, breeding marshes often are on the edges of water bodies such as lakes, reservoirs, or larger ponds. [112].	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** The project components provide suitable foraging and nesting habitat for this species in portions of the project components where emergent vegetation and bodies of water occur. **Not Covered by any existing HCPs.**
Mammals				
Antrozous pallidus **pallid bat**	None | SSC	Ranges across nearly all of California except for high elevation portions of the Sierra Nevada Mountains and Del Norte, western Siskiyou, Humboldt, and northern Mendocino Counties. Generally found in a wide variety of habitats but with some preference for xeric ecosystems including Great Basin, Mojave, and Sonoran Deserts. Known to roost in the basal hollows of coast redwoods and giant sequoias, bole cavities of oaks, exfoliating Ponderosa pine and valley oak bark, deciduous trees in riparian, and fruit trees in orchards[113]. Additionally, they have been known to occupy human structures such as bridges (especially wooden and concrete girder designs), barns, porches, bat boxes, and human occupied and vacant buildings[114]. Roosts generally have unobstructed entrances and exits, are high above the ground, warm and inaccessible to terrestrial predators. Winter habits are poorly known, but this species does not migrate long distances between summer and winter sites. Coastal California males and females overwinter in a primary roost. Overwintering roosts have relatively cool, stable temperatures and are located in protected structures beneath the forest canopy or on the ground out of direct sunlight. They have been	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** Only marginally suitable roosting habitat occurs throughout the project area where tree hollows, buildings, and other man-made structures with accessible crevices occur. **Not Covered by any existing HCPs.**

[112] Shuford, W. D., and Gardali, T., editors. 2008. California Bird Species of Special Concern: A Ranked Assessment of Species, Subspecies, and Distinct Populations of Birds of Immediate Conservation Concern in California. Studies of Western Birds 1. Western Field Ornithologists, Camarillo, California, and California Department of Fish and Game, Sacramento.

[113] Western Bat Working Group. 2024. Vespertilionidae / Antrozous pallidus – Identifying Characteristics and Life History. Accessed on January 9, 2025 via: https://wbwg.org/species-accounts/

[114] Harris, J., Alley, D., Duke, R. 1990. "Pallid Bat," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2349&inline=1

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		found wedged deeply into narrow fissures in mines, caves and buildings.		
Bassariscus astutus raptor **northern California ringtail**	None | SSC	Range includes most of California except the central valley, a few locations in the Mojave Desert, and the north eastern corner of California in Modoc National Forest. Suitable habitat consists of a mixture of forest and shrubland in close association with rocky areas or riparian habitats. Usually not found more than 0.6 miles from permanent water. Hollow trees, logs, snags, cavities in talus slopes and other rocky areas, and other recesses are used for cover. Requires a food base of rodents (woodrats and mice) and rabbits, but will also eat birds and eggs, invertebrates, fruits, nuts and some carrion. Nests in rock recesses, hollow trees, logs, snags, abandoned burrows, or woodrat nests[115].	**NSJWCD: Yes** **SEWD: No** **CS: Yes**	**NSJWD:** Only portions of the project area are within this species range[116]. Riparian habitat within the in-range section provides suitable habitat. **CS:** Within range for this species, portions of the project components along the natural waterways contain suitable riparian habitat for this species. **SEWD**: Outside of the known range for this species[117]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Corynorhinus townsendii **Townsend's big-eared bat**	None | SSC	Ranges throughout California except for high elevation portions of the Sierra Nevada Mountains, above 3,300 meters. Habitat associations include: coniferous forests, mixed meso-phytic forests, deserts, native prairies, riparian, active agricultural areas, and coastal habitats. This species is a moth specialist with 90% of its diet composed of lepidopterans. Forages over long distances in a single evening, over 150 kilometers, along edge habitats along streams, adjacent to and within a variety of wooded habitats. Distribution is strongly correlated with availability of caves and cave-like roosting habitat, including abandoned mines. Population centers occur in areas dominated by exposed, cavity or caverniculous forming rock and/or historic mining districts[118]. Roosting on open surfaces makes it easily detectable. Reported roosting on buildings, bridges, rock crevices, and hollow trees.[119]. Roost	**NSJWCD: Yes** **SEWD: Yes** **CS: Yes**	**NSJWD, SEWD, CS:** Only marginally suitable roosting habitat occurs throughout the project area where tree hollows, buildings, and other man-made structures with accessible crevices occur. **Not Covered by any existing HCPs.**

[115] CWHR Project Staff. 2005. "Ringtail," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2581&inline=1
[116] CDFW. 2016. Ringtail Range – CWHR M152 [ds1935]. Accessed via BIOs Viewer on January 7, 2025.
[117] Ibid
[118] Western Bat Working Group. 2025. Vespertilionidae / Corynorhinus townsendii – Identifying Characterists and Life History. Accessed on January 9, 2025 via: https://wbwg.org/species-accounts/
[119] CWHR Project Staff. 2000. "Townsend's Big-Eared Bat," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2347&inline=1

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		sites are variable within seasons and among years, although in coastal California regions high roost fidelity when roost availability is low. Roosts in size from a few individuals to several hundred during summer and winter hibernation. Seasonal movement patterns are not well understood, but some indication of local migration along altitudinal gradient.		
Eumops perotis californicus **western mastiff bat**	None | SSC	Ranges throughout all of California from the southern end to a few miles south of the Oregon border, the central coast, and the Sierra Nevada Mountains. Found in a variety of habitats from desert scrub to chaparral, oak woodlands, Ponderosa pine belt, high elevation meadows of mixed conifers. Distribution is likely geomorphically determined with species only being present where there are significant rock features offering suitable roosting habitat[120]. Maternity colonies of 30 to several hundred roost under exfoliating rock slabs, such as granite, sandstone or columnar basalt. Also found in similar crevices in large boulders and buildings[121]. Roosts are generally high above ground, allowing a clear vertical drop of at least 3 meters below for flight. Foraging habitat includes dry desert washes, flood plains, chaparral, oak woodland, open ponderosa pine forest, grassland, and agricultural areas. Diets consist primarily of moths, beetles, crickets and katydids. Does not undergo prolonged hibernation, appears to be active all winter and thus may seek winter refugia that are protected from prolonged freezing. Seasonal migrations appear to move relatively short distances.	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the typical known range for this species[122]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Lasiurus blossevillii **western red bat**	None | SSC	Ranges across the Central Valley, as well as the coast and Coast Range mountains from Mendocino County south, and east across the Los Angeles area into the Inland Empire region.	**NSJWCD: Yes** **SEWD: Yes**	**NSJWD, SEWD, CS:** Portions of the project components contain suitable roosting habitat where trees and shrubs with accessible crevices occur.

[120] Western Bat Working Group. 2025. Molossidae/ Eumops perotis – Identifying Characteristics and Life History. Accessed on January 9, 2025 via: https://wbwg.org/species-accounts/
[121] Ahlborn, G., White, M. 1990. "Western Mastiff Bat," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2357&inline=1
[122] Ibid

Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**	**Habitat Characteristics**	**Potential for Occurrence within the Project components[2]**	**Rationale & HCP Coverage**
		Solitary bat species that roosts primarily in the foliage of trees or shrubs. Day roosts are common in edge habitats[123] adjacent to streams or open fields, orchards, and sometimes urban areas. Association with intact riparian habitat particularly with willows, cottonwoods, and sycamores (*Platanus racemosa*)[124]. Roots sites are generally hidden from view, protected from above, open below, and located above dark ground-cover[125,] and are located on the south or southwest side of the tree. May occasionally use caves for roosting. Considered a highly migratory species and forages and migrates in groups. Winter behavior is poorly understood.	**CS: Yes**	**Covered by San Joaquin County Multi-Species Habitat Conservation.**
Neotoma fuscipes riparia **riparian (=San Joaquin Valley) woodrat**	FE | SSC	Only known from two sites: Caswell Memorial State Park and San Joaquin River National Wildlife Refuge (NWR). Most often observed in areas with a valley oak overstory and a wild grape (Vitis californica), willow, blackberry, wild rose (*Rosa californica*), or coyote brush (*Baccharis pilularis*) understory[126].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the typical known range for this species[127]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Reithrodontomys raviventris **salt marsh harvest mouse**	FE | SE	Generally restricted to saline or subsaline marsh habitats around the San Francisco Bay Estuary and, with some exception, mixed saline/brackish areas in the Suisun Bay area. The distribution in tidal and diked marshes closely corresponds with the abundance of pickleweed (*Sarcocornia)*, a dominant plant species of tidal marshes and a common component of brackish marsh vegetation. Viable populations of salt marsh harvest mice also appear to be limited by the distribution of high tide cover and escape habitat. Recurrent but shallow flooding by saline water is probably needed to	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the typical known range for this species[129]. **Not Covered by any existing HCPs.**

[123] Alley, D., Harris, J., Duke, R. 1990. "Western Red Bat," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2339&inline=1

[124] Western Working Bat Group. 2025. Vespertilionidae/ Lasiurus blossevillii – Identifying Characteristics and Life History. Accessed on January 9, 2025 via: https://wbwg.org/species-accounts/

[125] Alley, D., Harris, J., Duke, R. 1990. "Western Red Bat," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2339&inline=1

[126] USFWS. 2012. Riparian Woodrat (Neotoma fuscipes riparia) 5-Year Review: Summary and Evaluation. USFWS; Sacramento CA.

[127] Ibid

[129] U.S. Fish and Wildlife Service. 2013. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Sacramento, California.

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		maintain habitat that favors the salt marsh harvest mouse over its potential competitors[128].		
Sylvilagus bachmani riparius **riparian brush rabbit**	FE | SE	Found only at Caswell Memorial State Park and Oxbow Preserve on the Stanislaus River, San Joaquin County, as well as in the South Delta and at the San Joaquin River National Wildlife Refuge[130]. Occur in relatively small areas of shrub/herbaceous edge, and in early successional stages of many habitats. Generally inhabit two types of riparian vegetative communities; old-growth riparian forest (primarily dominated by valley oak with dense shrub and vine understories, and riparian communities dominated by thickets of willows, wild roses, blackberries, California grape, and other successional trees and woody plants[131].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is not within the current range of this species[132]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Taxidea taxus **American badger**	None | SSC	Ranges across nearly all of California except the northernmost Humboldt and Del Norte Counties. Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Badgers dig burrows in friable soil for cover. Frequently reuse old burrows, although some may dig a new den each night, especially in summer[133]. Badgers are sensitive to human disturbance, habitat fragmentation, and require a large home range[134, 135].	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is within range for this species. Although, recent occurrences within the vicinity are only located within the coast range or south of Turlock. Historic occurrences within the CNDDB are not located within the Stockton region, likely due to existing agriculture. The density of agricultural lands and lack of natural wild grasslands reduces the likelihood of this species occurring. **Covered by San Joaquin County Multi-Species Habitat Conservation.**
Vulpes macrotis mutica **San Joaquin kit fox**	FE | ST	Populations have persisted throughout the western portion of the San Joaquin Valley south of San Luis Reservoir to the Buena Vista Valley, in the Panoche and Cuyama Valleys, and Carrizo Plain. Populations also continue to persist in the central portion of the Valley around Kern NWR and Semitropic Ecological Reserve, in Bakersfield, and	**NSJWCD: No** **SEWD: No** **CS: No**	**NSJWD, SEWD, CS:** The project area is outside of the typical known range for this species[138]. **Covered by San Joaquin County Multi-Species Habitat Conservation.**

[128] U.S. Fish and Wildlife Service. 2013. Recovery Plan for Tidal Marsh Ecosystems of Northern and Central California. Sacramento, California.
[130] USFWS, 2024. Riparian Brush Rabbit. Accessed on October 1, 2024 via: https://www.fws.gov/species/riparian-brush-rabbit-sylvilagus-bachmani-riparius
[131] USFWS. 2020. Five-Year Status Review of Riparian Brush Rabbit (Sylvilagus.bachmani.riparius)¡.
[132] CDFW. 2016. Brush Rabbit Range – CWHR M045 [ds1839]. Accessed via BIOs Viewer on January 7, 2025.
[133] Ahlborn, G., White, M. 1990. "American Badger," California Wildlife Habitat Relationships System Life History Accounts and Range Maps. https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=2597&inline=1
[134] Government of Canada. 2024. American Badger (subspecies jeffersonii). Accessed on January 7, 2025 via: https://parks.canada.ca/pn-np/bc/kootenay/nature/conservation/especes-species/blaireau-badger
[135] EcoAdapt. 2019. American Badger (Taxidea taxus) & Western Burrowing Owl (Athene cunicularia hypugaea) - Climate Change Vulnerability Assessment for the Santa Cruz Mountains Climate Adaptation Project. Accessed on January 7, 2025 via: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://ecoadapt.org/data/documents/EcoAdapt_MidpenVASummary_BadgerBurrowingOwl_FINAL_Mar2021.pdf
[138] USFWS. 2020. San Joaquin Kit Fox (Vulpes.macrotis.mutica) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.

Scientific Name Common Name	Federal & State Status (F|S)[1]	Habitat Characteristics	Potential for Occurrence within the Project components[2]	Rationale & HCP Coverage
		in the southeastern portion of the Valley north to Porterville[136]. Occurs in desert-like habitats characterized by sparse or absent shrub cover, sparse ground cover, and short vegetative structure. Prefers areas with open, level, sandy ground[137].		

Notes: CNDDB = California Natural Diversity Database; CS = City of Stockton; DPS = Distinct Population Segment; NSJWCD = North San Joaquin Water Conservation District; NWR = National Wildlife Refuge; SEWD = Stockton Each Water District

1 - Status Definitions

E = Listed as Endangered under the Federal (FE) or State (SE) Endangered Species Acts
T = Listed as Threatened under the Federal (FT) or State (SE) Endangered Species Acts
C = Candidate for listing as Threatened or Endangered under the Federal or State Endangered Species Acts
P = Proposed for listing as Threatened or Endangered under the Federal or State Endangered Species Acts
FP = Fully Protected under the California Fish and Game Code
SSC = California Species of Special Concern
None = No status

2 - Potential for Occurrence within the Project components

Yes = proposed project component is located within the extant range of the species and suitable habitat is available in the proposed project component; known occurrences may be present in the project component and vicinity.
No = The project component is located outside of the species' extant range and/or potential habitat to support the species is not present.

Species Names and Status Follows; California Department of Fish and Wildlife. October 2024. Special Animals List. Available on-line: https://www.wildlife.ca.gov/Data/CNDDB/Plants-and-Animals CDFW Biogeographic Data Branch. Sacramento, CA.

[136] USFWS. 2020. San Joaquin Kit Fox (Vulpes.macrotis.mutica) 5-Year Review: Summary and Evaluation. USFWS; Sacramento, CA.
[137] Ibid

Appendix E3

District Species Tables

		North San Joaquin Water Conservation District (NSJWCD)				SEWD				City of Stockton			
		Operation	Construction			Operation	Construction			Operation	Construction		
		Method of Groundwater Recharge	New Recharge Facilities	Existing or Expanded Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR Wells, Dry Wells…)	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions
	District Component Activities	Ag/in-lieu ASR Direct Recharge FloodMAR	Yes	Yes **Existing and Expanded River Diversions and new Aqueduct turnout.**	Yes	ASR Direct Recharge FloodMAR	Yes	Yes. **Aqueduct turnout only.**	Yes	ASR Direct Recharge	Yes	**Yes. Existing River diversion only.**	No
Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
Carex comosa **bristly sedge**	None|None|2B.1	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Castilleja campestris var. succulenta **succulent owl's-clover**	FT|CE|1B.2	ASR FloodMAR	Y	–	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	–	–	–
Chloropyron palmatum **palmate-bracted bird's-beak**	FE|CE|1B.1	ASR Direct Recharge FloodMAR	Y	Y	–	ASR Direct Recharge	Y	–	At tie in location to Mosher Creek Upper Recharge Area	ASR Direct Recharge	Y	–	–
Cirsium crassicaule **slough thistle**	None|None|1B.1	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Delphinium recurvatum **recurved larkspur**	None|None|1B.2	ASR Direct Recharge FloodMAR	Y	Y	–	ASR Direct Recharge	Y	–	At tie in location to Mosher Creek Upper Recharge Area	ASR Direct Recharge	Y	Y	–
Downingia pusilla **dwarf downingia**	None|None|2B.2	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	–	–
Eryngium racemosum	None|CE|1B.1	ASR	Y	Y	Only at tie in	ASR	Y	–	At locations where pipe	ASR	Y	Y	–

		North San Joaquin Water Conservation District (NSJWCD)				SEWD				City of Stockton			
		Operation	Construction			Operation	Construction			Operation	Construction		
		Method of Groundwater Recharge	New Recharge Facilities	Existing or Expanded Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR Wells, Dry Wells…)	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions
	District Component Activities	Ag/in-lieu ASR Direct Recharge FloodMAR	Yes	Yes **Existing and Expanded River Diversions and new Aqueduct turnout.**	Yes	ASR Direct Recharge FloodMAR	Yes	Yes. **Aqueduct turnout only.**	Yes	ASR Direct Recharge	Yes	**Yes. Existing River diversion only.**	No
Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
Delta button-celery		Direct Recharge FloodMAR			locations to riverine				crosses waterways				
Gratiola heterosepala **Boggs Lake hedge-hyssop**	None|CE|1B.2	ASR FloodMAR	Y	–	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	–	–
Hibiscus lasiocarpos var. occidentalis **woolly rose-mallow**	None|None|1B.2	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Lathyrus jepsonii var. jepsonii **Delta tule pea**	None|None|1B.2	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Legenere limosa **legenere**	None|None|1B.1	ASR FloodMAR	Y	–	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	–	–	–
Lilaeopsis masonii ***Mason's lilaeopsis***	None|CR|1B.1	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Limosella australis **Delta mudwort**	None|None|2B.1	ASR Direct Recharge	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–

		North San Joaquin Water Conservation District (NSJWCD)				SEWD				City of Stockton			
		Operation	Construction			Operation	Construction			Operation	Construction		
		Method of Groundwater Recharge	New Recharge Facilities	Existing or Expanded Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR Wells, Dry Wells…)	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions
	District Component Activities	Ag/in-lieu ASR Direct Recharge FloodMAR	Yes	Yes **Existing and Expanded River Diversions and new Aqueduct turnout.**	Yes	ASR Direct Recharge FloodMAR	Yes	Yes. **Aqueduct turnout only.**	Yes	ASR Direct Recharge	Yes	**Yes. Existing River diversion only.**	No
Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
		FloodMAR											
Sagittaria sanfordii **Sanford's arrowhead**	None|None|1B.2	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Scutellaria galericulata **marsh skullcap**	None|None|2B.2	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Scutellaria lateriflora **side-flowering skullcap**	None|None|2B.2	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Trichocoronis wrightii var. wrightii **Wright's trichocoronis**	None|None|2B.1	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR	Y	–	Y	ASR	Y	Y	–
Trifolium hydrophilum **saline clover**	None|None|1B.2	ASR FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	Y	–
Tuctoria greenei **Greene's tuctoria**	FE|CR|1B.1	ASR FloodMAR	Y	–	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	–	–	–

		North San Joaquin Water Conservation District (NSJWCD)				SEWD				City of Stockton			
		Operation	**Construction**			**Operation**	**Construction**			**Operation**	**Construction**		
		Method of Groundwater Recharge	**New Recharge Facilities**	**Existing or Expanded Stations at Diversion Points**	**Pipeline Improvements and Extensions**	**Method of Groundwater Recharge**	**New Recharge Facilities (ASR**	**New or Existing Stations at Diversion Points**	**Pipeline Improvements and Extensions**	**Method of Groundwater Recharge**	**New Recharge Facilities (ASR Wells, Dry Wells…)**	**New or Existing Stations at Diversion Points**	**Pipeline Improvements and Extensions**
	District Component Activities	Ag/in-lieu ASR Direct Recharge FloodMAR	Yes	Yes **Existing and Expanded River Diversions and new Aqueduct turnout.**	Yes	ASR Direct Recharge FloodMAR	Yes	Yes. **Aqueduct turnout only.**	Yes	ASR Direct Recharge	Yes	**Yes. Existing River diversion only.**	No
Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
Bombus crotchii **Crotch bumble bee**	None | CE	Ag/in-lieu ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge	Y	Y	–
Branchinecta conservatio **conservancy fairy shrimp**	FE | None	ASR FloodMAR	Y	–	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	–	–	–
Branchinecta lynchi **vernal pool fairy shrimp**	FT | None	ASR FloodMAR	Y	–	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	–	–	–
Danaus plexippus (pop. 1) **monarch (California overwintering population)**	PT | None	Ag/in-lieu ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge	Y	Y	–
Desmocerus californicus dimorphus **valley elderberry longhorn beetle**	FT | None	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	Y	–	At locations where pipe crosses waterways	Direct Recharge FloodMAR	Y	–	–	–

		North San Joaquin Water Conservation District (NSJWCD)				SEWD				City of Stockton			
		Operation	Construction			Operation	Construction			Operation	Construction		
		Method of Groundwater Recharge	New Recharge Facilities	Existing or Expanded Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR Wells, Dry Wells…)	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions
	District Component Activities	Ag/in-lieu ASR Direct Recharge FloodMAR	Yes	Yes **Existing and Expanded River Diversions and new Aqueduct turnout.**	Yes	ASR Direct Recharge FloodMAR	Yes	Yes. **Aqueduct turnout only.**	Yes	ASR Direct Recharge	Yes	**Yes. Existing River diversion only.**	No
Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
Lepidurus packardi **vernal pool tadpole shrimp**	FE | None	ASR FloodMAR	Y	–	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	–	–	–
Acipenser medirostris **green sturgeon (southern DPS)**	FT | SSC	–	–	–	–	–	–	–	–	Y	Y	Y	–
Acipenser transmontanus **white sturgeon**	None | SC, SSC	Y	–	Y	Y	–	–	–	–	Y	Y	Y	–
Cottus gulosus **riffle sculpin**	None | SSC	Y	Y	Y	Y	Y	Y	–	Y	Y	Y	Y	–
Entosphenus Tridentatus **Pacific lamprey**	None | SSC	Y	Y	Y	Y	Y	Y	–	Y	Y	Y	Y	–
Hesperoleucus symmetricus symmetricus **central California roach**	None | SSC	Y	Y	Y	Y	Y	Y	–	Y	Y	Y	Y	–
Hypomesus transpacificus **delta smelt**	FT | SE	–	–	–	–	–	–	–	–	Y	Y	Y	–
Spirinchus thaleichthys **Longfin smelt**	CE | ST	–	–	–	–	–	–	–	–	Y	Y	Y	–
Lampetra Ayresii	None | SSC	Y	Y	Y	Y	Y	Y	–	Y	Y	Y	Y	–

		North San Joaquin Water Conservation District (NSJWCD)				SEWD				City of Stockton			
		Operation	Construction			Operation	Construction			Operation	Construction		
		Method of Groundwater Recharge	New Recharge Facilities	Existing or Expanded Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions	Method of Groundwater Recharge	New Recharge Facilities (ASR Wells, Dry Wells…)	New or Existing Stations at Diversion Points	Pipeline Improvements and Extensions
	District Component Activities	Ag/in-lieu ASR Direct Recharge FloodMAR	Yes	Yes **Existing and Expanded River Diversions and new Aqueduct turnout.**	Yes	ASR Direct Recharge FloodMAR	Yes	Yes. **Aqueduct turnout only.**	Yes	ASR Direct Recharge	Yes	**Yes. Existing River diversion only.**	No
Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
western river lamprey													
Lavinia exilicauda exilicauda **Sacramento hitch**	None | SSC	Y	Y	Y	Y	Y	Y	_	Y	Y	Y	Y	_
Mylopharodon conocephalus **hardhead**	None | SSC	Y	_	Y	Y	Y	Y	_	Y	Y	Y	Y	_
Oncorhynchus mykiss irideus (pop. 11) **steelhead (central valley DPS)**	FT | SSC	Y	_	Y	Y	Y	Y	_	Y	Y	Y	Y	_
Oncorhynchus tshawytscha (pop. 11) **Central Valley spring-run chinook salmon**	FT | ST	Y	_	Y	Y	Y	Y	_	Y	Y	Y	Y	_
Oncorhynchus tshawytscha (pop. 13) **Central Valley fall/late fall-run Chinook salmon**	None | SSC	Y	_	Y	Y	Y	Y	_	Y	Y	Y	Y	_
Pogonichthys Macrolepidotus **Sacramento splittail**	None | SSC	_	_	_	_	Y	Y	_	Y	Y	Y	Y	_

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Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
Actinemys marmorata **northwestern pond turtle**	PT | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	At locations where pipe crosses waterways and at tie in location to Mosher Creek Upper Recharge Area	ASR Direct Recharge	Y	Y	–
Anniella pulchra **northern California legless lizard**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	At locations where pipe crosses waterways and at tie in location to Mosher Creek Upper Recharge Area	ASR Direct Recharge	Y	Y	–
Ambystoma californiense pop. 1 **California tiger salamander - central California DPS**	FT | ST	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	–	–
Phrynosoma blainvillii **coast horned lizard**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	Y	ASR Direct Recharge	Y	Y	–
Spea hammondii	PT | SSC	ASR Direct Recharge	Y	Y	Only at tie in	ASR	Y	–	At locations where pipe crosses	ASR Direct Recharge	Y	Y	–

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Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
western spadefoot		FloodMAR			locations to riverine	Direct Recharge			waterways and at tie in location to Mosher Creek Upper Recharge Area				
Thamnophis gigas **giant gartersnake**	FT | ST	ASR Direct Recharge FloodMAR	Y	–	–	ASR Direct Recharge	Y	–	At locations where pipe crosses non-primary waterways	ASR Direct Recharge	Y	–	–
Agelaius tricolor **tricolored blackbird (nesting colony)**	None | ST, SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–
Antigone canadensis canadensis **lesser sandhill crane**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	–	–
Antigone canadensis tabida **greater sandhill crane**	None | SE, FP	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	–	–
Asio flammeus **short-eared owl**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	–	–
Athene cunicularia **burrowing owl (burrow sites**	None | SCE, SSC	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	Y	–

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Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
and some wintering sites)													
Buteo swainsoni **Swainson's hawk (nesting)**	None | ST	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	Y	Dry wells ASR Direct Recharge	Y	Y	–
Chlidonias niger **black tern**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Y	ASR Direct Recharge FloodMAR	Y	–	Y	ASR Direct Recharge	Y	–	–
Circus hudsonius **northern harrier (nesting)**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	At locations where pipe crosses waterways and at tie in location to Mosher Creek Upper Recharge Area	ASR Direct Recharge	Y	Y	–
Elanus leucurus **white-tailed kite (nesting)**	None | FP	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	Y	ASR Direct Recharge	Y	Y	–
Icteria virens **yellow-breasted chat**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	Y	ASR Direct Recharge	Y	–	–

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Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
Lanius ludovicianus **loggerhead shrike**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	Y	ASR Direct Recharge	Y	Y	–
Melospiza melodia mailliardi **song sparrow (Modesto population)**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	At locations where pipe crosses waterways and at tie in location to Mosher Creek Upper Recharge Area	ASR Direct Recharge	Y	Y	–
Riparia riparia **bank swallow**	None | ST	–	–	Y	Only at tie in locations to riverine	–	–	–	At locations where pipe crosses waterways and at tie in location to Mosher Creek Upper Recharge Area	–	–	Y	–
Setophaga petechia **yellow warbler**	None | SSC	ASR Direct Recharge FloodMAR	Y	Y	Only at tie in locations to riverine	ASR Direct Recharge	Y	–	Y	ASR Direct Recharge	Y	–	–
Xanthocephalus xanthocephalus	None | SSC	ASR Direct Recharge	Y	Y	Only at tie in locations to riverine	ASR	Y	–	At locations where pipe crosses waterways	ASR	Y	Y	–

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		Operation	Construction			Operation	Construction			Operation	Construction		
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Scientific Name **Common Name**	**Federal & State Status (F|S)[1]**												
yellow-headed blackbird (nesting)		FloodMAR											
Antrozous pallidus **pallid bat**	None | SSC	–	Y	Y	Y	–	Y	Y	Y	–	Y	Y	–
Bassariscus astutus raptor **northern California ringtail**	None | SSC	Direct Recharge FloodMAR	Y	Only west of North Bruella Road	–	ASR Direct Recharge	Y	–	Y	ASR Direct Recharge	Y	–	–
Corynorhinus townsendii **Townsend's big-eared bat**	None | SSC	–	Y	–	At tie in locations and at Acampo Road	–	Y	–	–	–	Y	Y	–
Lasiurus blossevillii **western red bat**	None | SSC	–	Y	Y	Y	–	Y	Y	Y	–	Y	Y	–

Appendix F

Cultural Resources AB 52 Consultation Letters

SAN JOAQUIN COUNTY
Greatness grows here.

Public Works
Working for YOU

Department of Public Works

Fritz Buchman, Director
Alex Chetley, *Deputy Director - Development*
Kristi Rhea, *Deputy Director - Administration*
David Tolliver, *Deputy Director - Operations*
Najee Zarif, *Deputy Director - Engineering*

CERTIFIED MAIL
7019 2970 0001 2081 8685

July 17, 2024

Wilton Rancheria
Antonio Ruiz Jr., Cultural Resources Officer
9728 Kent Street
Elk Grove, California 95624

SUBJECT: ASSEMBLY BILL 52 CONSULTATION, MOKELUMNE RIVER INTEGRATED CONJUNCTIVE USE PROGRAM ENVIRONMENTAL IMPACT REPORT IN SAN JOAQUIN COUNTY

Dear Mr. Ruiz,

The San Joaquin County Department of Public Works (County) is preparing an Environmental Impact Report (EIR), pursuant to the California Environmental Quality Act (CEQA), for the proposed Mokelumne River Integrated Conjunctive Use Program (MICUP). MICUP would entail diverting unappropriated Mokelumne River water to either: serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge water into underground storage for later extraction to meet such demands. Under Water Right Application 29835, MICUP would divert up to 110,000 acre-feet per year (AFY) and up to 620 cubic feet per second (CFS) between December 1st and June 30th during wet years, using a combination of existing and proposed infrastructure. In addition, up to 48,000 AFY could be stored in the Camanche Reservoir and/or Pardee Reservoir, subject to available capacity. The County would implement MICUP and associated projects together with the following Partner Agencies: North San Joaquin Water Conservation District, Stockton East Water District, City of Stockton, Woodbridge Irrigation District, East Bay Municipal Utilities District, and California Water Service. This overall planning effort includes the preparation of a program-and project-level EIR to evaluate the potential environmental impacts of MICUP operation and construction. The program area is the Eastern San Joaquin Groundwater Subbasin, including the Place of Use for Water Right Application 29835 (see enclosed Program Location Map).

MICUP must comply with California Public Resources Code §21080.3.1 (Assembly Bill [AB] 52 of 2014), which requires local governments to conduct meaningful consultation with California Native American tribes that have requested to be notified by lead agencies of proposed plans and projects in the geographic area with which the tribe is traditionally and culturally affiliated.

ASSEMBLY BILL 52 CONSULTATION, MOKELUMNE RIVER INTEGRATED CONJUNCTIVE USE PROGRAM ENVIRONMENTAL IMPACT REPORT IN SAN JOAQUIN COUNTY

Your tribe's input is important to the County's planning process. The County requests that you advise us as early as possible if you wish to consult regarding the MICUP EIR. Under AB 52 you have 30 days from the date of receipt of this notice to advise the County in writing if you are interested in consultation.

Your assistance with this request is appreciated. If you require additional information or have questions, please contact Ashley Couch, Water Resources Manager, at (209) 468-3089 or by e-mail at acouch@sjgov.org.

Sincerely,

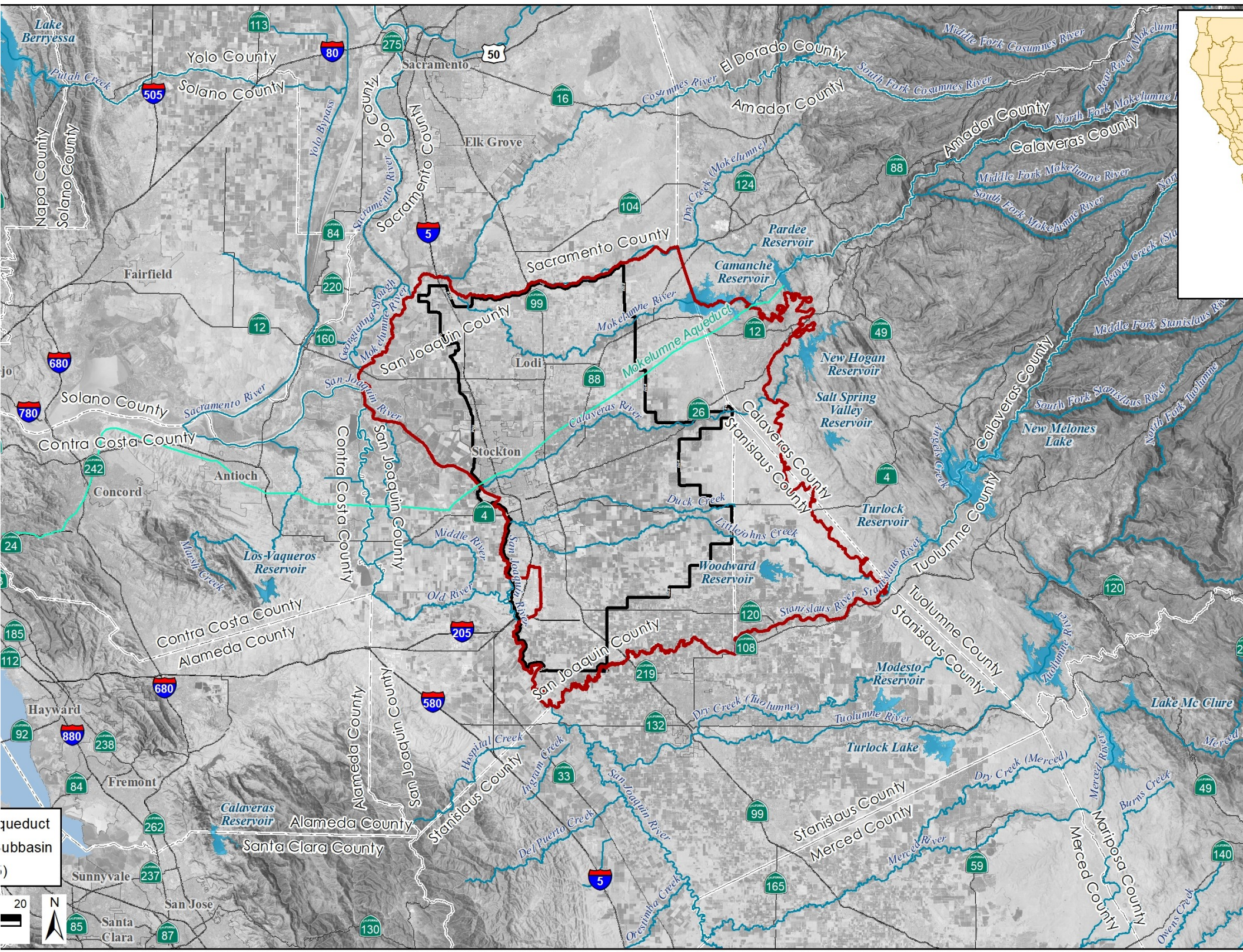
Alex Chetley

ALEX CHETLEY
Deputy Director - Development

AC:ML:nm
TE-24G029-NM1-AB52-Wilton

Enclosure

c: Ashley Couch, Water Resources Manager


Lake Berryessa
Putah Creek
Yolo County
Solano County
Napa County
Solano County
Yolo Bypass
Sacramento
Yolo County
Sacramento County
Elk Grove
Sacramento River
Cosumnes River
El Dorado County
Amador County
Middle Fork Cosumnes River
South Fork Cosumnes River
Bear River (Mokelumne)
Amador County
North Fork Mokelumne River
Calaveras County
Middle Fork Mokelumne River
South Fork Mokelumne River
Dry Creek (Mokelumne)
Pardee Reservoir
Camanche Reservoir
Sacramento County
Fairfield
Cosumnes River
Mokelumne River
Mokelumne Aqueduct
San Joaquin County
Lodi
Middle Fork Stanislaus River
New Hogan Reservoir
Salt Spring Valley Reservoir
Calaveras County
South Fork Stanislaus River
New Melones Lake
North Fork Tuolumne
Solano County
Sacramento River
San Joaquin River
Calaveras River
Stanislaus County
Contra Costa County
Stockton
Antioch
Concord
Contra Costa County
San Joaquin County
Duck Creek
Littlejohns Creek
Turlock Reservoir
Tuolumne County
Middle River
Marsh Creek
Los Vaqueros Reservoir
Woodward Reservoir
Old River
Stanislaus River
Tuolumne County
Stanislaus County
Contra Costa County
Alameda County
San Joaquin River
San Joaquin County
Modesto Reservoir
Tuolumne River
Lake Mc Clure
Hayward
Dry Creek (Tuolumne)
Hospital Creek
Ingram Creek
Turlock Lake
Dry Creek (Merced)
Merced River
Burns Creek
Fremont
Alameda County
San Joaquin County
Del Puerto Creek
San Joaquin River
Stanislaus County
Merced County
Calaveras Reservoir
Alameda County
Santa Clara County
Stanislaus County
Merced County
Mariposa County
Merced River
Orestimba Creek
Sunnyvale
San Jose
Santa Clara
Owens Creek
queduct
ubbasin
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Department of Public Works

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David Tolliver, *Deputy Director - Operations*
Najee Zarif, *Deputy Director - Engineering*

CERTIFIED MAIL
7019 2970 0001 2081 8890

July 17, 2024

Ione Band of Miwok Indians
The Honorable Crystal Martinez, Chairperson
Post Office Box 699
Plymouth, California 95669

SUBJECT: ASSEMBLY BILL 52 CONSULTATION, MOKELUMNE RIVER INTEGRATED CONJUNCTIVE USE PROGRAM ENVIRONMENTAL IMPACT REPORT IN SAN JOAQUIN COUNTY

Dear Chairperson Martinez,

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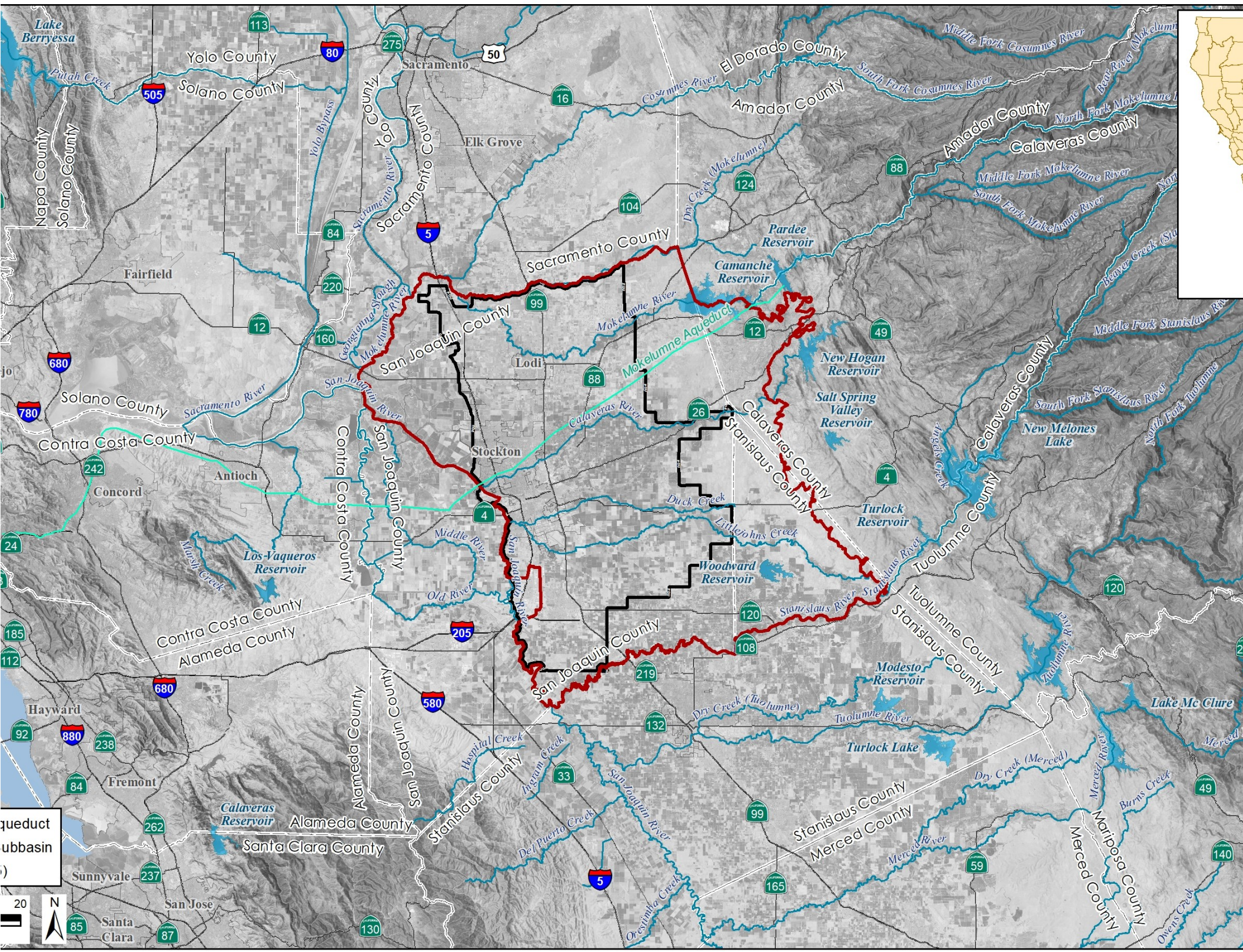


ALEX CHETLEY
Deputy Director - Development

AC:ML:nm
TE-24G029-NM2-AB52-Miwok

Enclosure

c: Ashley Couch, Water Resources Manager


Lake Berryessa
Putah Creek
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queduct
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CERTIFIED MAIL
7019 2970 0001 2081 8920

July 17, 2024

Ione Band of Miwok Indians
Randy Yonemura
4305 39th Avenue
Sacramento, California 95824

SUBJECT: ASSEMBLY BILL 52 CONSULTATION, MOKELUMNE RIVER INTEGRATED CONJUNCTIVE USE PROGRAM ENVIRONMENTAL IMPACT REPORT IN SAN JOAQUIN COUNTY

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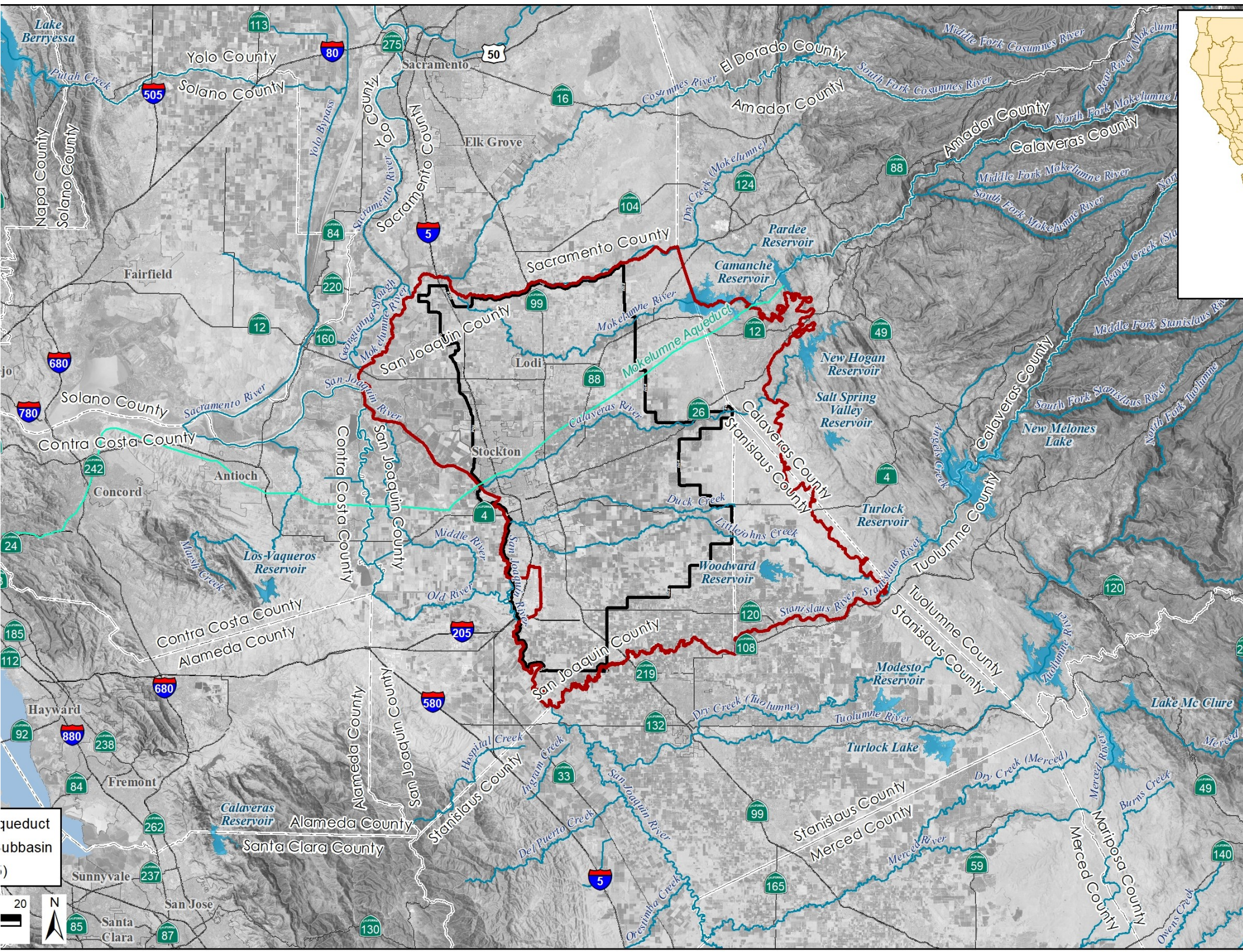
Alex Chetley

ALEX CHETLEY
Deputy Director - Development

AC:ML:nm
TE-24G029-NM3-AB52-Miwok

Enclosure

c: Ashley Couch, Water Resources Manager


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San Joaquin River
Calaveras River
Stanislaus County
Contra Costa County
Stockton
Antioch
Concord
Contra Costa County
San Joaquin County
Duck Creek
Littlejohns Creek
Turlock Reservoir
Tuolumne County
Middle River
Marsh Creek
Los Vaqueros Reservoir
Woodward Reservoir
Old River
Stanislaus River
Tuolumne County
Stanislaus County
Contra Costa County
Alameda County
San Joaquin River
San Joaquin County
Modesto Reservoir
Tuolumne River
Lake Mc Clure
Hayward
Dry Creek (Tuolumne)
Hospital Creek
Ingram Creek
Turlock Lake
Dry Creek (Merced)
Merced River
Burns Creek
Fremont
Alameda County
San Joaquin County
Del Puerto Creek
San Joaquin River
Stanislaus County
Merced County
Calaveras Reservoir
Alameda County
Santa Clara County
Stanislaus County
Merced County
Mariposa County
Merced River
Orestimba Creek
Sunnyvale
San Jose
Santa Clara
Owens Creek
queduct
ubbasin
20
N

SAN JOAQUIN COUNTY
Greatness grows here.

Public Works
Working for YOU

Department of Public Works

Fritz Buchman, Director
Alex Chetley, *Deputy Director - Development*
Kristi Rhea, *Deputy Director - Administration*
David Tolliver, *Deputy Director - Operations*
Najee Zarif, *Deputy Director - Engineering*

CERTIFIED MAIL
7019 2970 0001 2081 8937

July 17, 2024

United Auburn Indian Community of the Auburn Rancheria
The Honorable Gene Whitehouse, Chairperson
10720 Indian Hill Road
Auburn, California 95603

SUBJECT: ASSEMBLY BILL 52 CONSULTATION, MOKELUMNE RIVER INTEGRATED CONJUNCTIVE USE PROGRAM ENVIRONMENTAL IMPACT REPORT IN SAN JOAQUIN COUNTY

Dear Chairperson Whitehouse,

The San Joaquin County Department of Public Works (County) is preparing an Environmental Impact Report (EIR), pursuant to the California Environmental Quality Act (CEQA), for the proposed Mokelumne River Integrated Conjunctive Use Program (MICUP). MICUP would entail diverting unappropriated Mokelumne River water to either: serve existing beneficial uses, such as agricultural irrigation and municipal and industrial water supply, or to recharge water into underground storage for later extraction to meet such demands. Under Water Right Application 29835, MICUP would divert up to 110,000 acre-feet per year (AFY) and up to 620 cubic feet per second (CFS) between December 1st and June 30th during wet years, using a combination of existing and proposed infrastructure. In addition, up to 48,000 AFY could be stored in the Camanche Reservoir and/or Pardee Reservoir, subject to available capacity. The County would implement MICUP and associated projects together with the following Partner Agencies: North San Joaquin Water Conservation District, Stockton East Water District, City of Stockton, Woodbridge Irrigation District, East Bay Municipal Utilities District, and California Water Service. This overall planning effort includes the preparation of a program-and project-level EIR to evaluate the potential environmental impacts of MICUP operation and construction. The program area is the Eastern San Joaquin Groundwater Subbasin, including the Place of Use for Water Right Application 29835 (see enclosed Program Location Map).

MICUP must comply with California Public Resources Code §21080.3.1 (Assembly Bill [AB] 52 of 2014), which requires local governments to conduct meaningful consultation with California Native American tribes that have requested to be notified by lead agencies of proposed plans and projects in the geographic area with which the tribe is traditionally and culturally affiliated.

Your tribe's input is important to the County's planning process. The County requests that you advise us as early as possible if you wish to consult regarding the MICUP EIR. Under AB 52 you have 30 days from the date of receipt of this notice to advise the County in writing if you are interested in consultation.

Your assistance with this request is appreciated. If you require additional information or have questions, please contact Ashley Couch, Water Resources Manager, at (209) 468-3089 or by e-mail at acouch@sjgov.org.

Sincerely,

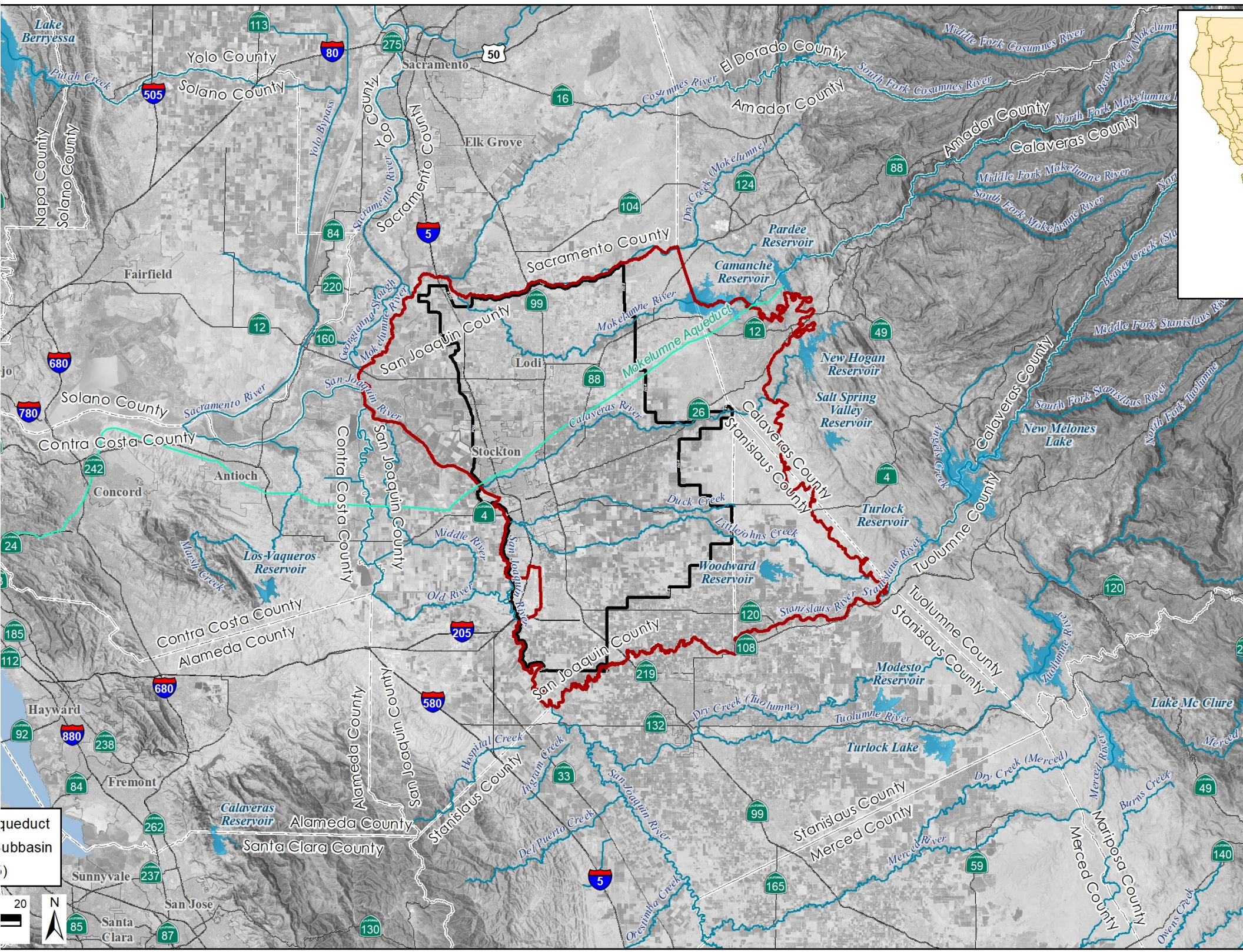
Alex Chetley

ALEX CHETLEY
Deputy Director - Development

AC:ML:nm
TE-24G029-NM4-AB52-Auburn

Enclosure

c: Ashley Couch, Water Resources Manager


Lake Berryessa
Putah Creek
Yolo County
Solano County
Napa County
Solano County
Yolo Bypass
Sacramento
Yolo County
Sacramento County
Elk Grove
Sacramento River
Cosumnes River
El Dorado County
Amador County
Middle Fork Cosumnes River
South Fork Cosumnes River
Bear River (Mokelumne)
Amador County
North Fork Mokelumne River
Calaveras County
Middle Fork Mokelumne River
South Fork Mokelumne River
Dry Creek (Mokelumne)
Pardee Reservoir
Camanche Reservoir
Sacramento County
Fairfield
Cosumnes River
Mokelumne River
Mokelumne Aqueduct
San Joaquin County
Lodi
Middle Fork Stanislaus River
New Hogan Reservoir
Salt Spring Valley Reservoir
Calaveras County
South Fork Stanislaus River
New Melones Lake
North Fork Tuolumne
Solano County
Sacramento River
San Joaquin River
Calaveras River
Stanislaus County
Contra Costa County
Stockton
Antioch
Concord
Contra Costa County
San Joaquin County
Duck Creek
Littlejohns Creek
Turlock Reservoir
Tuolumne County
Middle River
Marsh Creek
Los Vaqueros Reservoir
Woodward Reservoir
Old River
Stanislaus River
Tuolumne County
Stanislaus County
Contra Costa County
Alameda County
San Joaquin River
San Joaquin County
Modesto Reservoir
Tuolumne River
Lake Mc Clure
Hayward
Dry Creek (Tuolumne)
Hospital Creek
Ingram Creek
Turlock Lake
Dry Creek (Merced)
Merced River
Burns Creek
Fremont
Alameda County
San Joaquin County
Del Puerto Creek
San Joaquin River
Stanislaus County
Merced County
Calaveras Reservoir
Alameda County
Santa Clara County
Stanislaus County
Merced County
Mariposa County
Merced River
Orestimba Creek
Sunnyvale
San Jose
Santa Clara
Owens Creek
queduct
ubbasin
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N

Appendix G

GHG Emissions and Energy Model Outputs

Appendix G1

Assumptions

Table 3-12 Estimated Construction Schedule - NSJWCD

Part of Project	Work Months	Days	Years
North System	36	720	3
South System	28	560	2.33333333
Existing POD Flood-MAR	58	1160	4.83333333
ASR Wells	80	1600	6.66666667
Recharge Basins	100	2000	8.33333333

Table 3-13 Estimated Construction Schedule - SEWD

Part of Project	Work Months	Days	Years
Beckman ASR Well	4	80	1
West Linden Project	24	480	2
Recharge Basins	6	120	1

Table 3-14 Estimated Construction Schedule - WID

Part of Project	Work Months	Days	Years
Recharge Basins	30	600	2.5

Table 3-15 Estimated Construction Schedule – City of Stockton

Part of Project	Work Months	Days	Years
Dry Wells	4	80	1
Recharge Basins	30	600	2.5

Notes:

If the years are < 1, assumed 1 year for the purpose of converting lifetime emissions to annual averages

CalEEMod assumes 20 working days per month

Table 3-7: Estimated Construction Equipment Use - NSJWCD

Equipment			Part of Project – Equivalent Usage (Days)					
General Name	HP	Specific Name	North System	South System	PODs	ASR Wells	Recharge Basins	Total
Dozer	130	Catepillar D4, John Deere 650	0	0	0	0	840	840
Excavator (M)	200	John Deere 245G, 328D	175	148	106	150	1035	1614
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	125	83	180	0	0	388
Compactor	150	Catepillar CP-653E	254	186	286	150	195	1071
Loader (S)	80	John Deere 210LE	150	115	233	325	315	1128
Loader (L)	150	Volvo L120C	209	186	106	150	0	844
Telehandler	120	JLG 943	41	93	180	0	0	314
Water Truck	400	8000 gal.	150	93	233	325	2070	2871
Scraper	700	Catepillar 637E	0	0	0	0	2520	2520
Drill Rig	400	Estimated Ford truck F550 HP	0	0	0	250	0	250

Table 3-8: SEWD Estimated Construction Equipment Use - SEWD

Equipment			Part of Project – Equivalent Usage (Days)			
General Name	HP	Specific Name	West Linden Project	Mosher Creek	East Mosher Creek	Total
Dozer	130	Catepillar D4, John Deere 650	0	73	56	126
Excavator (M)	200	John Deere 245G, 328D	361	90	69	520
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	154	0	0	154
Compactor	150	Catepillar CP-653E	469	17	13	499
Loader (S)	80	John Deere 210LE	469	27	21	517
Loader (L)	150	Volvo L120C	364	0	0	364
Telehandler	120	JLG 943	128	0	0	128
Water Truck	400	8000 gal.	359	179	138	676
Scraper	700	Catepillar 637E	0	218	168	386
Drill Rig	400	Estimated Ford truck F550 HP	213	0	0	213

Table 3-9: Estimated Construction Equipment Use - WID

Equipment			Part of Project – Equivalent Usage (Days)		
General Name	HP	Specific Name	Storm Drain Basins	Recharge Basins	Total
Dozer	130	Catepillar D4, John Deere 650	63	245	308
Excavator (M)	200	John Deere 245G, 328D	78	302	380
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	0	0	0
Compactor	150	Catepillar CP-653E	15	57	72
Loader (S)	80	John Deere 210LE	24	92	116
Loader (L)	150	Volvo L120C	0	0	0
Telehandler	120	JLG 943	0	0	0
Water Truck	400	8000 gal.	156	604	760
Scraper	700	Catepillar 637E	189	735	924
Drill Rig	400	Estimated Ford truck F550 HP	0	0	0

Table 3-10: Estimated Construction Equipment Use – City of Stockton

Equipment			Part of Project – Equivalent Usage (Days)		
General Name	HP	Specific Name	Dry Wells	Recharge Basins	Total
Dozer	130	Catepillar D4, John Deere 650	0	245	245
Excavator (M)	200	John Deere 245G, 328D	18	302	320
Excavator (L)	350	Hitachi 450/470 Catepillar CP-653E	8	0	8
Compactor	150	Catepillar CP-653E	24	57	81
Loader (S)	80	John Deere 210LE	24	92	116
Loader (L)	150	Volvo L120C	18	0	18
Telehandler	120	JLG 943	0	0	0
Water Truck	400	8000 gal.	18	604	622
Scraper	700	Catepillar 637E	0	735	735
Drill Rig	400	Estimated Ford truck F550 HP	12	0	12

Notes:

Drill rig will operate for 24 hours "for a limited period of time" - assumption applied to max daily emissions.

Table 3-11 Estimated Excavation for Various Pipe Sizes

Pipe Diameter (inches)	Typical Depth of Excavation (feet)	Max Expected Excavation (feet)	Width of Trenches (feet)
60	9	15	7
48	8	15	6
42	7.5	15	5.5
30	6.5	15	4.5
20	6	15	3.7
18	6	15	3.5
14	5.5	15	3.2

Table 3-4 NSJWCD Proposed Upgraded and New Pipelines

	Approximate Pipeline Length (ft)	Excavation Amounts (ft3)	Excavation Amounts (CY)	Pipeline Diameter (inches)
North and CalFed Systems	19,000	182,801	6,770	42
	1,300	12,507	463	42
	1,400	6,872	255	30
	1,400	1,497	55	14
	2,000	4,363	162	20
	20,000	62,832	2,327	24
	26,000	250,149	9,265	42
South System	11,500	225,802	8,363	60
	2,100	26,389	977	48
	16,000	201,062	7,447	48
	650	8,168	303	48
	50,000	157,080	5,818	24
Expanded Use of Private Pumps (PODs)	22,000	26,998	1,000	15
ASR Wells	11,000	34,558	1,280	24
	16,000	19,635	727	15

Table 3-5 SEWD Proposed New Pipelines

Approximate Pipeline Length (ft)	Excavation Amounts (ft3)	Excavation Amounts (CY)	Pipeline Diameter
66,000	1,295,907	47,997	60
7,000	137,445	5,091	60
7,000	137,445	5,091	60
10,000	17,671	654	18

Table 3-6 WID Proposed Lateral Pipelines

	Approximate Pipeline Length (ft)	Excavation Amounts (ft3)	Excavation Amounts (CY)	Pipeline Diameter
Lateral Pipelines	22,000	38,877	1,440	18

Notes:

No new pipelines are anticipated to be constructed for the City of Stockton

Excavation amounts for export were based on pipe area x length.

Excavation amounts were used to determine quantity of haul truck trips

CalEEMod Default

MASTER LIST				g/bhp-hr								
General Name	**CalEEMod Name**	**HP**	**Load Facto**	**ROG**	**NOx**	**CO**	**SO2**	**PM10E**	**PM2.5E**	**CO2**	**CH4**	**N2O**
Dozer	Rubber Tired Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004
Excavator (M)	Excavators	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004
Excavator (L)	Excavators	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004
Compactor	Plate Compactors	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005
Loader (S)	Tractors/Loaders/Backhoes	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004
Loader (L)	Tractors/Loaders/Backhoes	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004
Telehandler	Forklifts	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004
Water Truck	Off-Highway Trucks	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004
Scraper	Scrapers	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004
Drill Rig	Bore/Drill Rigs	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004
			HP Weighted EF:	0.219194	2.007985	2.112201	0.005224	0.085769	0.078638			

TIER 4

MASTER LIST				g/bhp-hr								
General Name	**CalEEMod Name**	**HP**	**Load Facto**	**ROG**	**NOx**	**CO**	**SO2**	**PM10E**	**PM2.5E**	**CO2**	**CH4**	**N2O**
Dozer	Rubber Tired Dozer	130	0.4	0.05	0.26	3.7	0.005	0.01	0.01	528	0.021	0.004
Excavator (M)	Excavators	200	0.38	0.05	0.26	2.6	0.005	0.01	0.01	528	0.021	0.004
Excavator (L)	Excavators	350	0.38	0.05	0.26	2.6	0.005	0.01	0.01	527	0.021	0.004
Compactor	Plate Compactors	150	0.43	0.05	0.26	3.7	0	0.01	0.01	0	0	0
Loader (S)	Tractors/Loaders/Backhoes	80	0.37	0.05	0.26	3.7	0.005	0.01	0.01	530	0.021	0.004
Loader (L)	Tractors/Loaders/Backhoes	150	0.37	0.05	0.26	3.7	0.005	0.01	0.01	526	0.021	0.004
Telehandler	Forklifts	120	0.2	0.05	0.26	3.7	0.005	0.01	0.01	527	0.021	0.004
Water Truck	Off-Highway Trucks	400	0.38	0.05	0.26	2.6	0.005	0.01	0.01	529	0.021	0.004
Scraper	Scrapers	700	0.48	0.05	0.26	2.6	0.005	0.01	0.01	528	0.021	0.004
Drill Rig	Bore/Drill Rigs	400	0.5	0.05	0.26	2.6	0.005	0.01	0.01	521	0.021	0.004
			HP Weighted EF:	0.05	0.26	2.858582	0.00472	0.01	0.01			
			% Reduction Tier 4:	77%	87%	-35%	10%	88%	87%			

Appendix G2

Emissions Summary

Individual Project Summaries:		CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O
NSJWCD		lbs per day			MT/Year			Total MT		
Offroad Equipment	North System	5022.87	0.20	0.04	368.59	0.01	0.00	369.76	0.01	0.00
	South System	5022.87	0.20	0.04	276.25	0.01	0.00	276.25	0.01	0.00
	PODs	5022.87	0.20	0.04	431.23	0.02	0.00	441.80	0.02	0.00
	ASR Wells	9076.91	0.36	0.07	1009.18	0.04	0.01	1066.95	0.04	0.01
	Recharge Basins	6661.90	0.27	0.05	740.88	0.03	0.01	5533.15	0.22	0.04
Material Movement	North System	-	-	-	-	-	-	-	-	-
	South System	-	-	-	-	-	-	-	-	-
	PODs	-	-	-	-	-	-	-	-	-
	ASR Wells	-	-	-	-	-	-	-	-	-
	Recharge Basins	-	-	-	-	-	-	-	-	-
Hauling Emissions	North System	230.37	0.00	0.04	28.80	0.00	0.00	75.39	0.00	0.01
	South System	351.61	0.00	0.06	43.95	0.00	0.01	89.50	0.00	0.01
	PODs	7.41	0.00	0.00	0.93	0.00	0.00	3.91	0.00	0.00
	ASR Wells	10.78	0.00	0.00	1.35	0.00	0.00	7.84	0.00	0.00
Vendor Emissions	North System	577.61	0.00	0.09	72.20	0.00	0.01	189.04	0.00	0.03
	South System	577.61	0.00	0.09	72.20	0.00	0.01	147.03	0.00	0.02
	PODs	577.61	0.00	0.09	72.20	0.00	0.01	304.56	0.00	0.05
	ASR Wells	495.10	0.00	0.08	61.89	0.00	0.01	360.07	0.00	0.06
	Recharge Basins	495.10	0.00	0.08	61.89	0.00	0.01	450.09	0.00	0.07
Worker Emissions	North System	211.51	0.00	0.00	26.44	0.00	0.00	69.22	0.00	0.00
	South System	211.51	0.00	0.00	26.44	0.00	0.00	53.84	0.00	0.00
	PODs	211.51	0.00	0.00	26.44	0.00	0.00	111.52	0.00	0.00
	ASR Wells	181.30	0.00	0.00	22.66	0.00	0.00	131.85	0.00	0.00
	Recharge Basins	181.30	0.00	0.00	22.66	0.00	0.00	164.81	0.00	0.00
Roadway Dust	North System	-	-	-	-	-	-	-	-	-
	South System	-	-	-	-	-	-	-	-	-
	PODs	-	-	-	-	-	-	-	-	-
	ASR Wells	-	-	-	-	-	-	-	-	-
Arch. Coatings	All	-	-	-	-	-	-	-	-	-
Project Totals	**North System**	**6,042**	**0.20**	**0.17**	**496**	**0.02**	**0.02**	**703**	**0.02**	**0.05**
	South System	**6,164**	**0.20**	**0.19**	**419**	**0.01**	**0.02**	**567**	**0.01**	**0.04**
	PODs	**5,819**	**0.20**	**0.13**	**531**	**0.02**	**0.02**	**862**	**0.02**	**0.05**
	ASR Wells	**9,764**	**0.37**	**0.15**	**1,095**	**0.04**	**0.02**	**1,567**	**0.04**	**0.07**
	Recharge Basins	**7,338**	**0.27**	**0.13**	**825**	**0.03**	**0.02**	**6,148**	**0.22**	**0.12**
Max Emissions:		**9,764**	**0.37**	**0.19**	**1,095**	**0.04**	**0.02**	**6,148**	**0.22**	**0.12**
SJVAPCD	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
	Exceed SJVAPCD Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Exceed Federal De Minimis Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

		CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O
SEWD		lbs per day			MT/Year			Total MT		
Offroad Equipment	West Linden	5022.87	0.20	0.04	682.40	0.03	0.01	728.98	0.03	0.01
	Mosher Creek	6661.90	0.27	0.05	478.84	0.02	0.00	478.84	0.02	0.00
	East Mosher Creek	6661.90	0.27	0.05	368.88	0.01	0.00	368.88	0.01	0.00
Material Movement	West Linden	-	-	-	-	-	-	-	-	-
	Mosher Creek	-	-	-	-	-	-	-	-	-
	East Mosher Creek	-	-	-	-	-	-	-	-	-
Hauling Emissions	All	743.66	0.00	0.12	92.96	0.00	0.01	229.86	0.00	0.04
Vendor Emissions	All	660.13	0.00	0.10	82.52	0.00	0.01	204.04	0.00	0.03
Worker Emissions	All	241.73	0.00	0.00	30.22	0.00	0.00	74.72	0.00	0.00
Roadway Dust	All	-	-	-	-	-	-	-	-	-
Arch. Coatings	All	-	-	-	-	-	-	-	-	-
Project Totals	**West Linden Project**	**6,668**	**0.20**	**0.26**	**888**	**0.03**	**0.03**	**1,238**	**0.03**	**0.08**
	Mosher Creek	**8,307**	**0.27**	**0.28**	**685**	**0.02**	**0.03**	**987**	**0.02**	**0.07**
	East Mosher Creek	**8,307**	**0.27**	**0.28**	**575**	**0.02**	**0.03**	**877**	**0.02**	**0.07**
Max Emissions:		**8,307**	**0.27**	**0.28**	**888**	**0.03**	**0.03**	**1,238**	**0.03**	**0.08**
SJVAPCD	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
	Exceed SJVAPCD Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Exceed Federal De Minimis Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

MICUP Construction
Greenhouse Gas Emissions
Unmitigated + Fleetwide Tier 4 Mitigated Analysis

WID		CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O
		lbs per day			MT/Year			Total MT		
Offroad Equipment	Stormwater Basins	6661.90	0.27	0.05	415.75	0.02	0.00	415.75	0.02	0.00
	Recharge Basins	6661.90	0.27	0.05	415.75	0.02	0.00	415.75	0.02	0.00
Material Movement	Stormwater Basins	-	-	-	-	-	-	-	-	-
	Recharge Basins	-	-	-	-	-	-	-	-	-
Hauling Emissions	All	20.63	0.00	0.00	2.58	0.00	0.00	5.63	0.00	0.00
Vendor Emissions	All	495.10	0.00	0.08	61.89	0.00	0.01	135.03	0.00	0.02
Worker Emissions	All	181.30	0.00	0.00	22.66	0.00	0.00	49.44	0.00	0.00
Roadway Dust	All	-	-	-	-	-	-	-	-	-
Arch. Coatings	All	-	-	-	-	-	-	-	-	-
Project Totals	**Storm Drain Basins**	**7,358.92**	**0.27**	**0.14**	**502.87**	**0.02**	**0.01**	**605.84**	**0.02**	**0.03**
	Recharge Basins	**7,358.92**	**0.27**	**0.14**	**502.87**	**0.02**	**0.01**	**605.84**	**0.02**	**0.03**
Max Emissions:		**7,359**	**0.27**	**0.14**	**503**	**0.02**	**0.01**	**606**	**0.02**	**0.03**
SJVAPCD	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
	Exceed SJVAPCD Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Exceed Federal De Minimis Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

City of Stockton		CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O
		lbs per day			MT/Year			Total MT		
Offroad Equipment	Dry Wells	4799.79	0.19	0.04	46.19	0.00	0.00	36.17	0.00	0.00
	Recharge Basins	6661.90	0.27	0.05	679.38	0.03	0.01	1614.09	0.06	0.01
Material Movement	Dry Wells	-	-	-	-	-	-	-	-	-
	Recharge Basins	-	-	-	-	-	-	-	-	-
Hauling Emissions	All	0.00	0.00	0.00	0.00	0.00	0.00	1.00	2.00	3.00
Vendor Emissions	All	495.10	0.00	0.08	61.89	0.00	0.01	153.03	0.00	0.02
Worker Emissions	All	181.30	0.00	0.00	22.66	0.00	0.00	56.04	0.00	0.00
Roadway Dust	All	-	-	-	-	-	-	-	-	-
Arch. Coatings	All	-	-	-	-	-	-	-	-	-
Project Totals	**Dry Wells**	**5,476.18**	**0.19**	**0.12**	**130.74**	**0.00**	**0.01**	**246.24**	**2.00**	**3.03**
	Recharge Basins	**7,338.30**	**0.27**	**0.13**	**763.93**	**0.03**	**0.02**	**1,824.15**	**2.06**	**3.04**
Max Emissions:		**7,338**	**0.27**	**0.13**	**764**	**0.03**	**0.02**	**1,824**	**2.06**	**3.04**
SJVAPCD	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
	Exceed SJVAPCD Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Exceed Federal De Minimis Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

Overlapping Project Summaries:		CO2	CH4	N2O	CO2	CH4	N2O	CO2	CH4	N2O
UNMITIGATED		lbs per day			MT/Year			Total MT		
NSJWCD		35,127.74	1.24	0.78	3,366.16	0.11	0.09	9,846.59	0.31	0.32
SEWD		23,283.21	0.74	0.82	2,147.19	0.06	0.10	3,102.54	0.07	0.22
WID		14,717.85	0.53	0.27	1,005.75	0.03	0.03	1,211.69	0.03	0.05
City of Stockton		12,814.48	0.46	0.25	894.67	0.03	0.03	2,070.39	4.07	6.06
All Project Components		**85,943.28**	**2.97**	**2.12**	**7,413.77**	**0.24**	**0.24**	**16,231.21**	**4.48**	**6.66**
SJVAPCD	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
Federal De Minimis	**Significance Thresholds**	-	-	-	-	-	-	-	-	-
	Exceed SJVAPCD Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Exceed Federal De Minimis Threshold?	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*

Notes:
Although the region is in attainment for SO2, because SO2 is a precursor for PM2.5, the PM2.5 General Conformity de minimis thresholds are used. For PM2.5 and SO2, the de minimis
Offroad emissions are based on the # of equipment days. The total lifetime project emissions for offroad equipment and material movement was calculated then divided by the project

Appendix G3

Offroad Emissions Calculations

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)									
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04	[Same emission factors apply]	276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05		514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

OFFROAD

NSJWCD North System	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	175	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.04	0.04	0.00	0.00	0.00	0.02	0.12	0.13	0.00	0.00	0.00	56.30	0.00	0.00	56.30	0.00	0.00
Excavator (L)	125	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.01	0.03	0.05	0.00	0.00	0.00	0.02	0.10	0.15	0.00	0.00	0.00	70.24	0.00	0.00	70.24	0.00	0.00
Compactor	254	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.03	0.20	0.17	0.00	0.01	0.01	0.08	0.60	0.50	0.00	0.02	0.02	73.43	0.00	0.00	74.60	0.00	0.00
Loader (S)	150	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.05	0.00	0.00	0.00	0.01	0.08	0.14	0.00	0.00	0.00	18.87	0.00	0.00	18.87	0.00	0.00
Loader (L)	209	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.01	0.04	0.11	0.00	0.00	0.00	0.02	0.12	0.32	0.00	0.01	0.01	48.91	0.00	0.00	48.91	0.00	0.00
Telehandler	41	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	4.16	0.00	0.00	4.16	0.00	0.00
Water Truck	150	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.07	0.08	0.00	0.00	0.00	0.04	0.22	0.24	0.00	0.01	0.01	96.69	0.00	0.00	96.69	0.00	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**1.89**	**13.54**	**17.18**	**0.05**	**0.52**	**0.48**	**5022.87**	**0.20**	**0.04**	**0.06**	**0.42**	**0.50**	**0.00**	**0.02**	**0.01**	**0.17**	**1.25**	**1.50**	**0.00**	**0.05**	**0.04**	**368.59**	**0.01**	**0.00**	**369.76**	**0.01**	**0.00**

NSJWCD South System	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	148	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.04	0.05	0.00	0.00	0.00	0.01	0.10	0.11	0.00	0.00	0.00	47.61	0.00	0.00	47.61	0.00	0.00
Excavator (L)	83	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.00	0.03	0.04	0.00	0.00	0.00	0.01	0.07	0.10	0.00	0.00	0.00	46.64	0.00	0.00	46.64	0.00	0.00
Compactor	186	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.02	0.19	0.16	0.00	0.01	0.01	0.06	0.44	0.37	0.00	0.02	0.02	54.63	0.00	0.00	54.63	0.00	0.00
Loader (S)	115	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.01	0.06	0.10	0.00	0.00	0.00	14.46	0.00	0.00	14.46	0.00	0.00
Loader (L)	186	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.01	0.05	0.12	0.00	0.00	0.00	0.01	0.11	0.28	0.00	0.01	0.00	43.53	0.00	0.00	43.53	0.00	0.00
Telehandler	93	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.03	0.06	0.00	0.00	0.00	9.43	0.00	0.00	9.43	0.00	0.00
Water Truck	93	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.06	0.06	0.00	0.00	0.00	0.02	0.14	0.15	0.00	0.00	0.00	59.95	0.00	0.00	59.95	0.00	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**1.89**	**13.54**	**17.18**	**0.05**	**0.52**	**0.48**	**5022.87**	**0.20**	**0.04**	**0.06**	**0.40**	**0.50**	**0.00**	**0.02**	**0.01**	**0.13**	**0.94**	**1.17**	**0.00**	**0.04**	**0.03**	**276.25**	**0.01**	**0.00**	**276.25**	**0.01**	**0.00**

NSJWCD PODS	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	106	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.07	0.08	0.00	0.00	0.00	34.10	0.00	0.00	34.10	0.00	0.00
Excavator (L)	180	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.01	0.03	0.05	0.00	0.00	0.00	0.02	0.15	0.22	0.00	0.01	0.00	101.14	0.00	0.00	101.14	0.00	0.00
Compactor	286	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.02	0.14	0.12	0.00	0.01	0.01	0.09	0.67	0.56	0.00	0.03	0.02	73.43	0.00	0.00	84.00	0.00	0.00
Loader (S)	233	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.01	0.12	0.21	0.00	0.00	0.00	29.30	0.00	0.00	29.30	0.00	0.00
Loader (L)	106	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.06	0.16	0.00	0.00	0.00	24.81	0.00	0.00	24.81	0.00	0.00
Telehandler	180	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.06	0.12	0.00	0.00	0.00	18.25	0.00	0.00	18.25	0.00	0.00
Water Truck	233	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.07	0.08	0.00	0.00	0.00	0.06	0.34	0.37	0.00	0.01	0.01	150.20	0.01	0.00	150.20	0.01	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**1.89**	**13.54**	**17.18**	**0.05**	**0.52**	**0.48**	**5022.87**	**0.20**	**0.04**	**0.04**	**0.31**	**0.36**	**0.00**	**0.01**	**0.01**	**0.21**	**1.48**	**1.72**	**0.01**	**0.06**	**0.05**	**431.23**	**0.02**	**0.00**	**441.80**	**0.02**	**0.00**

NSJWCD ASR Wells	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	150	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.01	0.02	0.00	0.00	0.00	0.01	0.10	0.11	0.00	0.00	0.00	48.25	0.00	0.00	48.25	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	150	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.05	0.04	0.00	0.00	0.00	0.05	0.35	0.30	0.00	0.01	0.01	44.06	0.00	0.00	44.06	0.00	0.00
Loader (S)	325	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.03	0.04	0.00	0.00	0.00	0.02	0.17	0.30	0.00	0.01	0.01	31.44	0.00	0.00	40.87	0.00	0.00
Loader (L)	150	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.09	0.23	0.00	0.00	0.00	35.11	0.00	0.00	35.11	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	325	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.07	0.08	0.00	0.00	0.00	0.08	0.47	0.51	0.00	0.02	0.02	161.15	0.01	0.00	209.50	0.01	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	250	1.08	8.73	10.40	0.05	0.32	0.29	5513.31	0.22	0.04	0.02	0.16	0.20	0.00	0.01	0.01	0.13	1.09	1.30	0.01	0.04	0.04	689.16	0.03	0.01	689.16	0.03	0.00
Total Equipment:	6	**2.62**	**19.89**	**23.80**	**0.09**	**0.75**	**0.68**	**9076.91**	**0.36**	**0.07**	**0.05**	**0.34**	**0.41**	**0.00**	**0.01**	**0.01**	**0.30**	**2.28**	**2.74**	**0.01**	**0.08**	**0.08**	**1009.18**	**0.04**	**0.01**	**1066.95**	**0.04**	**0.01**

NSJWCD Recharge Basins	Number of Days	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
		ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	840	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.02	0.21	0.17	0.00	0.01	0.01	0.20	1.72	1.42	0.00	0.11	0.10	55.03	0.00	0.00	184.89	0.01	0.00
Excavator (M)	1035	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.08	0.09	0.00	0.00	0.00	0.09	0.68	0.76	0.00	0.02	0.02	80.42	0.00	0.00	332.96	0.01	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	195	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.06	0.05	0.00	0.00	0.00	0.06	0.46	0.38	0.00	0.02	0.02	57.27	0.00	0.00	57.27	0.00	0.00
Loader (S)	315	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.02	0.17	0.29	0.00	0.01	0.01	31.44	0.00	0.00	39.62	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	2070	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.06	0.36	0.39	0.00	0.01	0.01	0.49	3.02	3.25	0.01	0.11	0.10	161.15	0.01	0.00	1334.35	0.05	0.01
Scraper	2520	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.25	3.11	2.68	0.00	0.13	0.12	2.07	25.91	22.33	0.04	1.07	0.98	355.56	0.01	0.00	3584.06	0.14	0.03
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.35**	**3.84**	**3.41**	**0.01**	**0.16**	**0.15**	**2.93**	**31.97**	**28.43**	**0.06**	**1.33**	**1.22**	**740.88**	**0.03**	**0.01**	**5533.15**	**0.22**	**0.04**

Notes:
ASR projects will use 24 hour per day drill rigs "for a limited period of time". The maximum daily emissions have been updated for those to reflect this construction schedule.
Tons per year are based on total tons calculated for each component and then divided by the respective component schedule.

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)								
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04		276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05	[Same emission factors apply]	514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

SEWD	Number of	lbs per day									Tons/year						Total Tons						MT/Year			Total MT		
West Linden	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	361	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.02	0.12	0.13	0.00	0.00	0.00	0.03	0.24	0.27	0.00	0.01	0.01	80.42	0.00	0.00	116.13	0.00	0.00
Excavator (L)	154	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.01	0.06	0.09	0.00	0.00	0.00	0.02	0.13	0.19	0.00	0.00	0.00	86.53	0.00	0.00	86.53	0.00	0.00
Compactor	469	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.07	0.55	0.46	0.00	0.02	0.02	0.15	1.10	0.93	0.00	0.04	0.04	73.43	0.00	0.00	137.75	0.01	0.00
Loader (S)	469	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.01	0.12	0.21	0.00	0.00	0.00	0.02	0.25	0.43	0.00	0.01	0.01	31.44	0.00	0.00	58.98	0.00	0.00
Loader (L)	364	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.01	0.11	0.28	0.00	0.01	0.00	0.03	0.21	0.55	0.00	0.01	0.01	58.51	0.00	0.00	85.19	0.00	0.00
Telehandler	128	0.09	0.70	1.34	0.00	0.04	0.03	223.07	0.01	0.00	0.00	0.02	0.04	0.00	0.00	0.00	0.01	0.04	0.09	0.00	0.00	0.00	12.98	0.00	0.00	12.98	0.00	0.00
Water Truck	359	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.04	0.26	0.28	0.00	0.01	0.01	0.09	0.52	0.56	0.00	0.02	0.02	161.15	0.01	0.00	231.42	0.01	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	213	1.08	8.73	10.40	0.05	0.32	0.29	0.00	0.00	0.00	0.02	0.15	0.18	0.00	0.01	0.01	0.04	0.31	0.37	0.00	0.01	0.01	177.93	0.01	0.00	0.00	0.00	0.00
Total Equipment:	8	**2.97**	**22.27**	**27.58**	**0.10**	**0.84**	**0.77**	**5022.87**	**0.20**	**0.04**	**0.19**	**1.40**	**1.69**	**0.01**	**0.05**	**0.05**	**0.38**	**2.81**	**3.37**	**0.01**	**0.11**	**0.10**	**682.40**	**0.03**	**0.01**	**728.98**	**0.03**	**0.01**

SEWD	Number of	lbs per day									Tons/year						Total Tons						MT/Year			Total MT		
Mosher Creek	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	73	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.02	0.15	0.12	0.00	0.01	0.01	0.02	0.15	0.12	0.00	0.01	0.01	16.07	0.00	0.00	16.07	0.00	0.00
Excavator (M)	90	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.06	0.07	0.00	0.00	0.00	0.01	0.06	0.07	0.00	0.00	0.00	28.95	0.00	0.00	28.95	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	17	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.04	0.03	0.00	0.00	0.00	0.01	0.04	0.03	0.00	0.00	0.00	4.99	0.00	0.00	4.99	0.00	0.00
Loader (S)	27	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.40	0.00	0.00	3.40	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	179	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.04	0.26	0.28	0.00	0.01	0.01	0.04	0.26	0.28	0.00	0.01	0.01	115.39	0.00	0.00	115.39	0.00	0.00
Scraper	218	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.18	2.24	1.93	0.00	0.09	0.08	0.18	2.24	1.93	0.00	0.09	0.08	310.05	0.01	0.00	310.05	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.25**	**2.77**	**2.46**	**0.01**	**0.12**	**0.11**	**0.25**	**2.77**	**2.46**	**0.01**	**0.12**	**0.11**	**478.84**	**0.02**	**0.00**	**478.84**	**0.02**	**0.00**

SEWD	Number of	lbs per day									Tons/year						Total Tons						MT/Year			Total MT		
East Mosher Creek	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	56	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.01	0.11	0.09	0.00	0.01	0.01	0.01	0.11	0.09	0.00	0.01	0.01	12.33	0.00	0.00	12.33	0.00	0.00
Excavator (M)	69	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.05	0.05	0.00	0.00	0.00	0.01	0.05	0.05	0.00	0.00	0.00	22.20	0.00	0.00	22.20	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	13	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	3.82	0.00	0.00	3.82	0.00	0.00
Loader (S)	21	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	2.64	0.00	0.00	2.64	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	138	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.03	0.20	0.22	0.00	0.01	0.01	0.03	0.20	0.22	0.00	0.01	0.01	88.96	0.00	0.00	88.96	0.00	0.00
Scraper	168	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.14	1.73	1.49	0.00	0.07	0.07	0.14	1.73	1.49	0.00	0.07	0.07	238.94	0.01	0.00	238.94	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.20**	**2.13**	**1.90**	**0.00**	**0.09**	**0.08**	**0.20**	**2.13**	**1.90**	**0.00**	**0.09**	**0.08**	**368.88**	**0.01**	**0.00**	**368.88**	**0.01**	**0.00**

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)								
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04		276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05	[Same emission factors apply]	514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

WID	Number of	lbs per day									Tons/year						Tons/year						MT/Year			Total MT		
Stormwater Basins	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	63	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.01	0.05	0.04	0.00	0.00	0.00	0.02	0.13	0.11	0.00	0.01	0.01	13.87	0.00	0.00	13.87	0.00	0.00
Excavator (M)	78	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.02	0.02	0.00	0.00	0.00	0.01	0.05	0.06	0.00	0.00	0.00	25.09	0.00	0.00	25.09	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	15	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00	4.41	0.00	0.00	4.41	0.00	0.00
Loader (S)	24	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.02	0.00	0.00	3.02	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	156	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.09	0.10	0.00	0.00	0.00	0.04	0.23	0.24	0.00	0.01	0.01	100.56	0.00	0.00	100.56	0.00	0.00
Scraper	189	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.06	0.78	0.67	0.00	0.03	0.03	0.16	1.94	1.67	0.00	0.08	0.07	268.80	0.01	0.00	268.80	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.09**	**0.96**	**0.85**	**0.00**	**0.04**	**0.04**	**0.22**	**2.40**	**2.13**	**0.00**	**0.10**	**0.09**	**415.75**	**0.02**	**0.00**	**415.75**	**0.02**	**0.00**

WID	Number of	lbs per day									Tons/year						Tons/year						MT/Year			Total MT		
Recharge Basins	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	63	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.01	0.05	0.04	0.00	0.00	0.00	0.02	0.13	0.11	0.00	0.01	0.01	13.87	0.00	0.00	13.87	0.00	0.00
Excavator (M)	78	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.02	0.02	0.00	0.00	0.00	0.01	0.05	0.06	0.00	0.00	0.00	25.09	0.00	0.00	25.09	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	15	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.04	0.03	0.00	0.00	0.00	4.41	0.00	0.00	4.41	0.00	0.00
Loader (S)	24	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.02	0.00	0.00	3.02	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	156	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.01	0.09	0.10	0.00	0.00	0.00	0.04	0.23	0.24	0.00	0.01	0.01	100.56	0.00	0.00	100.56	0.00	0.00
Scraper	189	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.06	0.78	0.67	0.00	0.03	0.03	0.16	1.94	1.67	0.00	0.08	0.07	268.80	0.01	0.00	268.80	0.01	0.00
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.09**	**0.96**	**0.85**	**0.00**	**0.04**	**0.04**	**0.22**	**2.40**	**2.13**	**0.00**	**0.10**	**0.09**	**415.75**	**0.02**	**0.00**	**415.75**	**0.02**	**0.00**

MASTER LIST			g/bhp-hr									Hours per	Daily Emissions (lbs/day)									
General Name	HP	Load Factor	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	day	ROG	NOx	CO	SO2	PM10	PM2.5		CO2	CH4	N2O
Dozer	130	0.4	0.522	4.47	3.69	0.005	0.29	0.267	528	0.021	0.004	8	0.48	4.10	3.38	0.00	0.27	0.24		484.24	0.02	0.00
Excavator (M)	200	0.38	0.133	0.987	1.1	0.005	0.033	0.03	528	0.021	0.004	8	0.18	1.32	1.47	0.01	0.04	0.04		707.74	0.03	0.01
Excavator (L)	350	0.38	0.115	0.714	1.04	0.005	0.025	0.023	527	0.021	0.004	8	0.27	1.67	2.44	0.01	0.06	0.05		1236.19	0.05	0.01
Compactor	150	0.43	0.547	4.14	3.47	0.009	0.162	0.149	568	0.023	0.005	8	0.62	4.71	3.95	0.01	0.18	0.17		646.15	0.03	0.01
Loader (S)	80	0.37	0.196	2.01	3.48	0.005	0.077	0.071	530	0.021	0.004	8	0.10	1.05	1.82	0.00	0.04	0.04	[Same emission factors apply]	276.69	0.01	0.00
Loader (L)	150	0.37	0.162	1.18	3.09	0.005	0.059	0.054	526	0.021	0.004	8	0.16	1.16	3.02	0.00	0.06	0.05		514.88	0.02	0.00
Telehandler	120	0.2	0.21	1.66	3.17	0.005	0.085	0.078	527	0.021	0.004	8	0.09	0.70	1.34	0.00	0.04	0.03		223.07	0.01	0.00
Water Truck	400	0.38	0.177	1.09	1.17	0.005	0.038	0.035	529	0.021	0.004	8	0.47	2.92	3.14	0.01	0.10	0.09		1418.15	0.06	0.01
Scraper	700	0.48	0.277	3.47	2.99	0.005	0.143	0.131	528	0.021	0.004	8	1.64	20.56	17.72	0.03	0.85	0.78		3128.94	0.12	0.02
Drill Rig	400	0.5	0.102	0.825	0.983	0.005	0.03	0.027	521	0.021	0.004	8	0.36	2.91	3.47	0.02	0.11	0.10		1837.77	0.07	0.01

City of Stockton	Number of	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
Dry Wells	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Excavator (M)	18	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	5.79	0.00	0.00	5.79	0.00	0.00
Excavator (L)	8	0.27	1.67	2.44	0.01	0.06	0.05	1236.19	0.05	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	4.50	0.00	0.00	4.50	0.00	0.00
Compactor	24	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.06	0.05	0.00	0.00	0.00	0.01	0.06	0.05	0.00	0.00	0.00	7.05	0.00	0.00	7.05	0.00	0.00
Loader (S)	24	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	3.02	0.00	0.00	3.02	0.00	0.00
Loader (L)	18	0.16	1.16	3.02	0.00	0.06	0.05	514.88	0.02	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.00	0.01	0.03	0.00	0.00	0.00	4.21	0.00	0.00	4.21	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	18	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.00	0.03	0.03	0.00	0.00	0.00	0.00	0.03	0.03	0.00	0.00	0.00	11.60	0.00	0.00	11.60	0.00	0.00
Scraper	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Drill Rig	12	1.08	8.73	10.40	0.05	0.32	0.29	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	0.00	0.02	0.02	0.00	0.00	0.00	10.02	0.00	0.00	0.00	0.00	0.00
Total Equipment:	7	**2.89**	**21.56**	**26.24**	**0.10**	**0.80**	**0.73**	**4799.79**	**0.19**	**0.04**	**0.02**	**0.14**	**0.17**	**0.00**	**0.01**	**0.00**	**0.02**	**0.14**	**0.17**	**0.00**	**0.01**	**0.00**	**46.19**	**0.00**	**0.00**	**36.17**	**0.00**	**0.00**

City of Stockton	Number of	lbs per day									Tons/year							Total Tons						MT/Year			Total MT		
Recharge Basins	Days	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	ROG	NOx	CO	SO2	PM10E	PM2.5E	ROG	NOx	CO	SO2	PM10E	PM2.5E	CO2	CH4	N2O	CO2	CH4	N2O
Dozer	245	0.48	4.10	3.38	0.00	0.27	0.24	484.24	0.02	0.00	0.02	0.20	0.17	0.00	0.01	0.01	0.06	0.50	0.41	0.00	0.03	0.03	53.93	0.00	0.00	53.93	0.00	0.00
Excavator (M)	302	0.18	1.32	1.47	0.01	0.04	0.04	707.74	0.03	0.01	0.01	0.08	0.09	0.00	0.00	0.00	0.03	0.20	0.22	0.00	0.01	0.01	80.42	0.00	0.00	97.15	0.00	0.00
Excavator (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compactor	57	0.62	4.71	3.95	0.01	0.18	0.17	646.15	0.03	0.01	0.01	0.05	0.05	0.00	0.00	0.00	0.02	0.13	0.11	0.00	0.01	0.00	16.74	0.00	0.00	16.74	0.00	0.00
Loader (S)	92	0.10	1.05	1.82	0.00	0.04	0.04	276.69	0.01	0.00	0.00	0.02	0.03	0.00	0.00	0.00	0.00	0.05	0.08	0.00	0.00	0.00	11.57	0.00	0.00	11.57	0.00	0.00
Loader (L)	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Telehandler	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water Truck	604	0.47	2.92	3.14	0.01	0.10	0.09	1418.15	0.06	0.01	0.06	0.35	0.38	0.00	0.01	0.01	0.14	0.88	0.95	0.00	0.03	0.03	161.15	0.01	0.00	389.35	0.02	0.00
Scraper	735	1.64	20.56	17.72	0.03	0.85	0.78	3128.94	0.12	0.02	0.24	3.02	2.60	0.00	0.12	0.11	0.60	7.56	6.51	0.01	0.31	0.29	355.56	0.01	0.00	1045.35	0.04	0.01
Drill Rig	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Equipment:	6	**3.50**	**34.67**	**31.48**	**0.07**	**1.48**	**1.36**	**6661.90**	**0.27**	**0.05**	**0.34**	**3.73**	**3.32**	**0.01**	**0.16**	**0.14**	**0.85**	**9.32**	**8.29**	**0.02**	**0.39**	**0.36**	**679.38**	**0.03**	**0.01**	**1614.09**	**0.06**	**0.01**

Appendix G4

Mobile Source Emissions Calculations

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Hauling Emissions

							g/mile							
		ROG	NOx	CO	SO2		PM10 F	PM10 F	PM2.5E	PM2.5 F	PM2.5 F	CO2	CH4	N2O
Trip Length (mi)	Year	ROG_RUNEX	NOx_RUNEX	CO_RUNEX	SOx_RUNEX	PM10_RUNEX	PM10_PMTW	PM10_PMBW	PM2.5_RUNEX	PM2.5_PMTW	PM2.5_PMBV	CO2_RUNEX	H4_RUNEN	N2O_RUNEX
20	2025	0.014	1.65	0.0674	0.0148	0.0281	0.0354	0.0764	0.0269	0.0089	0.0267	1559.5203	0.0007	0.2457
20	2026	0.01	1.60	0.0639	0.0145	0.0280	0.0354	0.0768	0.0268	0.0089	0.0269	1534.2146	0.0006	0.2417
20	2027	0.01	1.56	0.0609	0.0143	0.0279	0.0354	0.0775	0.0267	0.0089	0.0271	1507.0742	0.0006	0.2374

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
NSJWCD	North System	19,297	16	2,412	3	720	20	67	16,751
NSJWCD	South System	22,907	16	2,863	5	560	20	102	25,566
NSJWCD	PODs	1,000	16	125	0	1160	20	2	539
NSJWCD	ASR Wells	2,007	16	251	0	1600	20	3	784
			Total:	**5,651**	**9**	**Total**			

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
SEWD	All Project Components	58,832	16	7,354	11	680	20	216	54,074
			Total:	**7,354**	**11**	680	20	216	54,074

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
WID	All Project Components	1,440	16	180	0.3	600	20	6	1,500
			Total:	**180**	**0.3**	600	20	6	1,500

	Phase	Excavation (CY)	Haul Truck Capacity (CY)	Total No. of One-Way Hauling Trips	No. of One-Way Hauling Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
City of Stockton	All Project Components	-	16	-	-	680	20	-	-
			Total:	**-**		680	20	-	-

Max Daily Emissions

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
NSJWCD	North System	0.00	0.24	0.01	0.00	0.00	0.02	0.00	0.01	230.37	0.00	0.04
NSJWCD	South System	0.00	0.37	0.02	0.00	0.01	0.03	0.01	0.01	351.61	0.00	0.06
NSJWCD	PODs	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	7.41	0.00	0.00
NSJWCD	ASR Wells	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	10.78	0.00	0.00
		0.0032	**0.3723**	**0.0152**	**0.0033**	**0.0063**	**0.0252**	**0.0061**	**0.0080**	**351.6060**	**0.0002**	**0.0554**

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
SEWD	All Project Components	0.01	0.79	0.03	0.01	0.01	0.05	0.01	0.02	743.66	0.00	0.12
	Total:											

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
WID	All Project Components	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	20.63	0.00	0.00
	Total:											

						lbs/day						
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
City of Stockton	All Project Components	-	-	-	-	-	-	-	-	-	-	-

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Hauling Emissions

Max Annual Emissions

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
NSJWCD	North System	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	28.80	0.00	0.00	75.39	0.00	0.01
NSJWCD	South System	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	43.95	0.00	0.01	89.50	0.00	0.01
NSJWCD	PODs	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.93	0.00	0.00	3.91	0.00	0.00
NSJWCD	ASR Wells	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.35	0.00	0.00	7.84	0.00	0.00
		0.0004	**0.0465**	**0.0019**	**0.0004**	**0.0008**	**0.0032**	**0.0008**	**0.0010**	**43.9507**	**0.0000**	**0.0069**	**89.4997**	**0.0000**	**0.0141**

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
SEWD	All Project Components	0.00	0.10	0.00	0.00	0.00	0.01	0.00	0.00	92.96	0.00	0.01	229.86	0.00	0.04
	Total:														

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
WID	All Project Components	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.58	0.00	0.00	5.63	0.00	0.00
	Total:														

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
City of Stockton	All Project Components	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Notes:
250 is # of work days CalEEmod assumes in a year
Haul trip length based on CalEEMod defaults.
EMFAC2021 HHDT emission factors from 2025 were used in this assessment.

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Worker Trip Emissions

	g/mile												
Year	ROG ROG_RUNEX	NOx NOx_RUNEX	CO CO_RUNEX	SO2 SOx_RUNEX	PM10_RUNEX	PM10 F PM10_PMTW	PM10 F PM10_PMBW	PM2.5E PM2.5_RUNEX	PM2.5 F PM2.5_PMTW	PM2.5 F PM2.5_PMBW	CO2 CO2_RUNEX	CH4 CH4_RUNEX	N2O N2O_RUNEX
2025	0.0100	0.0482	0.8119	0.0028	0.0014	0.0080	0.0090	0.0013	0.0020	0.0031	285.5337	0.0026	0.0050
2026	0.0089	0.0431	0.7612	0.0027	0.0013	0.0080	0.0090	0.0012	0.0020	0.0031	278.0093	0.0024	0.0046
2027	0.0081	0.0391	0.7245	0.0027	0.0013	0.0080	0.0091	0.0012	0.0020	0.0032	272.3481	0.0022	0.0044

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
NSJWCD	North System	28	720	12	336	84,000
NSJWCD	South System	28	560	12	336	84,000
NSJWCD	PODs	28	1160	12	336	84,000
NSJWCD	ASR Wells	24	1600	12	288	72,000
NSJWCD	Recharge Basins	24	2000	12	288	72,000
	Total:	**132**				

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
SEWD	All Project Compon	32	680	12	384	96,000
	Total:	**32**	680	12	1	141

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
WID	All Project Compon	24	600	12	288	72,000
	Total:	**24**	600	12	0	120

	Phase	No. of One-Way Worker Trips Per Day	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
City of Stockton	All Project Compon	24	680	12	288	72,000
	Total:	**24**	680	12	0	106

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Worker Trip Emissions

Max Daily Emissions

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
NSJWCD	North System	0.01	0.04	0.60	0.00	0.00	0.01	0.00	0.00	211.51	0.00	0.00
NSJWCD	South System	0.01	0.04	0.60	0.00	0.00	0.01	0.00	0.00	211.51	0.00	0.00
NSJWCD	PODs	0.01	0.04	0.60	0.00	0.00	0.01	0.00	0.00	211.51	0.00	0.00
NSJWCD	ASR Wells	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00
NSJWCD	Recharge Basins	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00
		0.0074	**0.0357**	**0.6014**	**0.0021**	**0.0010**	**0.0126**	**0.0009**	**0.0038**	**211.5111**	**0.0019**	**0.0037**

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
SEWD	All Project Compon	0.01	0.04	0.69	0.00	0.00	0.01	0.00	0.00	241.73	0.00	0.00
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
WID	All Project Compon	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
City of Stockton	All Project Compon	0.01	0.03	0.52	0.00	0.00	0.01	0.00	0.00	181.30	0.00	0.00

Max Annual Emissions

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
NSJWCD	North System	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	26.44	0.00	0.00	69.22	0.00	0.00
NSJWCD	South System	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	26.44	0.00	0.00	53.84	0.00	0.00
NSJWCD	PODs	0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	26.44	0.00	0.00	111.52	0.00	0.00
NSJWCD	ASR Wells	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	131.85	0.00	0.00
NSJWCD	Recharge Basins	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	164.81	0.00	0.00
		0.0009	**0.0045**	**0.0752**	**0.0003**	**0.0001**	**0.0016**	**0.0001**	**0.0005**	**26.4389**	**0.0002**	**0.0005**	**164.8138**	**0.0015**	**0.0029**

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
SEWD	All Project Compon	0.00	0.01	0.09	0.00	0.00	0.00	0.00	0.00	30.22	0.00	0.00	74.72	0.00	0.00

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
WID	All Project Compon	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	49.44	0.00	0.00

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
City of Stockton	All Project Compon	0.00	0.00	0.06	0.00	0.00	0.00	0.00	0.00	22.66	0.00	0.00	56.04	0.00	0.00

# of 1-way worker trips based on assumption of 2 workers per piece of construction equipment

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Vendor Trip Emissions

						g/mile							
Year	ROG ROG_RUNEX	NOx NOx_RUNEX	CO CO_RUNEX	SO2 SOx_RUNEX	PM10_RUNEX	PM10 F PM10_PMTW	PM10 F PM10_PMBW	PM2.5E PM2.5_RUNEX	PM2.5 F PM2.5_PMTW	PM2.5 F PM2.5_PMBW	CO2 CO2_RUNE	CH4 CH4_RUNEX	N2O N2O_RUNEX
2025	0.0144	1.6514	0.0674	0.0148	0.0281	0.0354	0.0764	0.0269	0.0089	0.0267	#######	0.0007	0.2457
2026	0.0140	1.6036	0.0639	0.0145	0.0280	0.0354	0.0768	0.0268	0.0089	0.0269	#######	0.0006	0.2417
2027	0.0136	1.5601	0.0609	0.0143	0.0279	0.0354	0.0775	0.0267	0.0089	0.0271	#######	0.0006	0.2374

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
NSJWCD	North System	14	720	12	168	42,000
NSJWCD	South System	14	560	12	168	42,000
NSJWCD	PODs	14	1160	12	168	42,000
NSJWCD	ASR Wells	12	1600	12	144	36,000
NSJWCD	Recharge Basins	12	2000	12	144	36,000
	Total:	**66**				

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
SEWD	All Project Components	16	680	12	192	48,000
	Total:	**-**	680	12	-	-

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
WID	All Project Components	12	600	12	144	36,000
	Total:	**12**	600	12	0	60

	Phase	No. of One-Way Vendor Trips	No. of Work Days (Max)	Trip Length (mi)	VMT/day	VMT/year
City of Stockton	All Project Components	12	680	12	144	36,000
	Total:	**12**	680	12	0	53

MICUP Construction
Air Quality and Greenhouse Gas Emissions
Vendor Trip Emissions

Max Daily Emissions

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
NSJWCD	North System	0.01	0.61	0.02	0.01	0.01	0.04	0.01	0.01	577.61	0.00	0.09
NSJWCD	South System	0.01	0.61	0.02	0.01	0.01	0.04	0.01	0.01	577.61	0.00	0.09
NSJWCD	PODs	0.01	0.61	0.02	0.01	0.01	0.04	0.01	0.01	577.61	0.00	0.09
NSJWCD	ASR Wells	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
NSJWCD	Recharge Basins	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
	Total:	**0.0053**	**0.6116**	**0.0250**	**0.0055**	**0.0104**	**0.0414**	**0.0100**	**0.0132**	**577.6129**	**0.0002**	**0.0910**

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
SEWD	All Project Components	0.01	0.70	0.03	0.01	0.01	0.05	0.01	0.02	660.13	0.00	0.10
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
WID	All Project Components	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
	Total:											

		lbs/day										
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O
City of Stockton	All Project Components	0.00	0.52	0.02	0.00	0.01	0.04	0.01	0.01	495.10	0.00	0.08
	Total:											

Max Annual Emissions

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
NSJWCD	North System	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	72.20	0.00	0.01	189.04	0.00	0.03
NSJWCD	South System	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	72.20	0.00	0.01	147.03	0.00	0.02
NSJWCD	PODs	0.00	0.08	0.00	0.00	0.00	0.01	0.00	0.00	72.20	0.00	0.01	304.56	0.00	0.05
NSJWCD	ASR Wells	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	360.07	0.00	0.06
NSJWCD	Recharge Basins	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	450.09	0.00	0.07
	Total:	**0.0007**	**0.0765**	**0.0031**	**0.0007**	**0.0013**	**0.0052**	**0.0012**	**0.0016**	**72.2016**	**0.0000**	**0.0114**	**450.0879**	**0.0002**	**0.0709**

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
SEWD	All Project Components	0.00	0.09	0.00	0.00	0.00	0.01	0.00	0.00	82.52	0.00	0.01	204.04	0.00	0.03

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
WID	All Project Components	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	135.03	0.00	0.02

		Tons/year								MT/year			Total MT		
	Phase	ROG	NOx	CO	SO2	PM10E	PM10F	PM2.5E	PM2.5F	CO2	CH4	N2O	CO2	CH4	N2O
City of Stockton	All Project Components	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00	61.89	0.00	0.01	153.03	0.00	0.02

Notes:
250 is # of work days CalEEmod assumes in a year
EMFAC2021 HHDT emission factors from 2025 were used in this assessment.
Trip length based on CalEEMod default for worker trips, rounded up. Conservatively applied to vendor trip lengths, which tend to be smaller.
# of 1-way vendor trips based on assumption of 1 vendor per piece of construction equipment

Appendix H

Hazardous Materials Database Search Results

ENVIROSTC	PROJECT NAME	STATUS	PROJECT TYPE	ADDRESS	CITY	
39340018	ACME-STOCKTON GALVANIZING WORKS	Certified O&M - Land Use Restrictions Only	State Response	540 WEST SCOTTS AVENUE	STOCKTON	1
71003576	Advanced Metal Plating	Inactive - Needs Evaluation	Tiered Permit	4421 Giannecchini Lane	Stockton	1
60002888	ALCO IRON & METAL COMPANY	Inactive - Needs Evaluation	Evaluation	1815 NAVY DR	STOCKTON	1
39390001	ALEX G. SPANOS ELEMENTARY SCHOOL	Certified	School Cleanup	East Church Street/American Street	Stockton	1
39280006	AMADOR CHEMICAL CORPORATION	Inactive - Needs Evaluation	Evaluation	4801 EAST CARPENTER ROAD	STOCKTON	1
80000959	ANTIOCH BOMB TARGET	Inactive - Action Required	State Response	Latitude: N 38" 01.596' Longitude: W 121' 3	Antioch	1
71002273	Applied Aerospace Structures Corp.	Refer: Other Agency	Tiered Permit	3437 S. Airport Way	Stockton	1
39490001	ARCADY OIL COMPANY	Refer: RWQCB	Evaluation	9001 WEST MCDONALD ROAD	STOCKTON	1
39280002	BEAVER CHEMICAL COMPANY, INC	Refer: RWQCB	Evaluation	1448 SHAW ROAD	STOCKTON	1
60001131	Bob's Sheet Metal	Inactive - Needs Evaluation	Evaluation	404 N. San Jose Street	Stockton	1
39720023	BOBSON CLEANERS INC	Active	State Response	600 N MAIN ST	MANTECA	1
39070063	BREA AGRICULTURAL SERVICE #1	Refer: EPA	Evaluation	7666 S HARLAN RD	FRENCH CAMP	1
39280016	BREA AGRICULTURAL SERVICE #2	Refer: RWQCB	Evaluation	1905 NORTH BROADWAY	STOCKTON	1
60000317	Cabral - McAdams Property	Active	Voluntary Cleanup	4204 - 4208 North Sutter Street	Stockton	1
39280039	CAL-FARM SUPPLY	Refer: RWQCB	Evaluation	2040 W. WASHINGTON	STOCKTON	1
39510034	CALIFORNIA TANK LINES, INC	Refer: RWQCB	Evaluation	3105 SOUTH EL DORADO STREET	STOCKTON	1
71002144	California Tank Lines, Inc.	Inactive - Needs Evaluation	Tiered Permit	3105 S. El Dorado Street	Stockton	1
60003271	CANNON CLEANERS	Active	State Response	48 West Harding Way	Stockton	1
60002021	Chaderjian Youth Correctional Facility	Refer: RWQCB	Voluntary Cleanup	7650 South Newcastle Road	Stockton	1
39420008	CHEROKEE TRUCK STOP	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	3535 CHEROKEE RD	STOCKTON	1
07460001	CHEVRON OLD VALLEY PIPELINE RIGHT-OF-WAY	Refer: RWQCB	Voluntary Cleanup	BRUNS AND BYRON ROADS	BYRON	1
60000351	Children's Museum of Stockton	Inactive - Needs Evaluation	Voluntary Cleanup	402 W. Weber Avenue	Stockton	1
60002998	Claus Road Property	Active	School Cleanup	6145 and 6129 Claus Road	Riverbank	1
39440001	COLBERG BOAT WORKS	Active	Voluntary Cleanup	848 W. FREMONT STREET	STOCKTON	1
60000470	Colon Property	Inactive - Needs Evaluation	Voluntary Cleanup	5681 East Marsh Road	Stockton	1
39500001	COVE CONTRACTORS	Refer: RWQCB	Evaluation	3242 S EL DORADO	STOCKTON	1
80001279	DEFENSE DIST DEPOT/SAN JOAQUIN/SHARPE	Certified	Corrective Action	ROTH ROAD BLDG S-4	LATHROP	1
80001260	DEFENSE DISTRIBUTION DEPOT SAN JOAQUIN/	Refer: SMBRP	Corrective Action	25600 S CHRISMAN ROAD	TRACY	1
39970003	Defense Distribution San Joaquin (DDJC) Tracy	Active	Federal Superfund	25600 S CHRISMAN RD	TRACY	1
39000004	DELTA GATEWAY APARTMENTS, STOCKTON	Refer: RWQCB	Voluntary Cleanup	720/802 WEST WEBER AVENUE	STOCKTON	1
71003777	Delta Plating, Inc.	Active	Tiered Permit	818 South Stanislaus Street	Stockton	1
50490012	EATON ROAD DISPOSAL SITE	Refer: CalRecycle	Evaluation	10937 EATON ROAD	OAKDALE	1
80001706	ELDORADO CHEMICAL CO INC	Refer: RWQCB	Corrective Action	1805 E CHARTER WAY	STOCKTON	1
50550002	ELMWOOD ESTATES	Refer: Other Agency	Evaluation	5536 ROSELLE AVENUE	RIVERBANK	1
39490011	EQUINOA PROPERTY	Inactive - Action Required	Voluntary Cleanup	4599 MANTHEY ROAD	FRENCH CAMP	1
60003272	FAVORITE CLEANERS	Active	Evaluation	622 East Charter Way	Stockton	1
CAD08968	FORMER ELDORADO CHEMICAL CO INC	PROTECTIVE FILER	Non-Operating	1805 MARTIN LUTHER KING JR BLVD	STOCKTON	1
80001513	FORWARD INC	Certified	Corrective Action	1145 W CHARTER WAY	STOCKTON	1
60001130	Gleason Park Apartment	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	411 S. Stanislaus Street	Stockton	1
60000746	Gordon Research Company	Certified	State Response	1085 South Union Road	Manteca	1
60000564	Great Valley Parkway (Former Shea Homes - Neighborhood C)	Certified / Operation & Maintenance	Voluntary Cleanup	19855 West Grant Line Road	Tracy	1
39280008	GREAT WESTERN CHEMICAL COMPANY	Certified	State Response	826 SOUTH CENTER STREET	STOCKTON	1
39420006	H & M TRANSPORT INC	Refer: Other Agency	Evaluation	707 E ROTH RD	French Camp	1

39070037	HALEY FLYING SERVICE	Refer: RWQCB	Voluntary Cleanup	21000 S PARADISE RD	TRACY	1
71003207	HEUBLEIN WINES	Inactive - Needs Evaluation	Tiered Permit	21801 Highway 120	Escalon	1
60001584	Huffco Manufacturing	Refer: Local Agency	Evaluation	4447 Airport Way	Stockton	1
39360016	INTERCIRCUITS	Certified	State Response	2700 S CALIFORNIA ST	STOCKTON	1
71003510	ISE Labs, Inc., Assembly Operations	Inactive - Needs Evaluation	Tiered Permit	400 Industrial Park Drive	Manteca	1
CAD98081	J R SIMPLOT COMPANY - LATHROP	UNDERGOING CLOSURE	Non-Operating	16777 HOWLAND AVE	LATHROP	1
80001748	J.R. Simplot Lathrop	Inactive - Needs Evaluation	Corrective Action	16777 HOWLAND AVE	LATHROP	1
39280033	JOHN TAYLOR FERTILIZER	Refer: Other Agency	Evaluation	1819 SOUTH ARGONAUT	STOCKTON	1
50010022	JOSEPH A. GREGORI HIGH SCHOOL SITE	Certified	School Cleanup	3701 Pirrone Road	Modesto	1
80001474	KEARNEY-KPF	Refer: HWMP	Corrective Action	1624 E ALPINE AVE	STOCKTON	1
39510031	LAGUE SALES	Certified	State Response	2112 EAST LOUISE AVE	LATHROP	1
39500016	LEARNER COMPANY, THE	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	2711 NAVY DRIVE	STOCKTON	1
39320011	LIBBEY-OWENS-FORD GLASS CO	Refer: RWQCB	Evaluation	500 EAST LOUISE AVENUE	LATHROP	1
39360019	LIKA CORPORATION - NAVY DRIVE	Certified	State Response	2041 NAVY DRIVE	STOCKTON	1
39360018	LIKA CORPORATION-FIELD AVENUE	Certified	State Response	1856 FIELD AVE	STOCKTON	1
60003556	Manteca High School Improvements	Active	School Investigation	450 East Yosemite Avenue	Manteca	1
80001605	MARLEY COOLING TOWER CO STOCKTON PLANT	Refer: SMBRP	Corrective Action	150 NORTH SINCLAIR AVENUE	STOCKTON	1
39240014	MARLEY COOLING TOWER COMPANY	Certified / Operation & Maintenance	State Response	200 North Wagner Avenue	Stockton	1
39240015	MARLEY COOLING TOWER-RCRA POND CLOSURE	Certified	State Response	150 N SINCLAIR AVE	STOCKTON	1
39300004	MARTIN METAL FINISHING INC	Inactive - Needs Evaluation	Evaluation	1250 SOUTH WILSON WAY	STOCKTON	1
60003373	Martin Metal Finishing Inc.	Active	Voluntary Cleanup	1250 South Wilson Way	Stockton	1
39240001	MCCORMICK & BAXTER CREOSOTING CO	Active	Federal Superfund	1214 W. WASHINGTON STREET	STOCKTON	1
80001587	MCCORMICK AND BAXTER CREOSOTING COMPANY	Refer: SMBRP	Corrective Action	1214 W WASHINGTON ST	STOCKTON	1
50140001	MODESTO SAND & GRAVEL	Refer: RWQCB	Evaluation	6137 HAMMET RD.	MODESTO	1
39280010	MORTON PAINT COMPANY	Refer: Other Agency	Evaluation	SOUTH LINCOLN & WEST MAIN	STOCKTON	1
60001217	Mountain House Development Site #3	Refer: RWQCB	Voluntary Cleanup	West Byron Road	Mountain House	1
60003742	Mountain House Proposed School	Active	School Investigation	1200 and 1525 S. Traditions Street	Mountain House	1
50510026	NAMOLCO INC	Certified	State Response	PORT ROAD	STOCKTON	1
80001243	NAVCOMTELSTA SAN DIEGO DET STOCKTON CA	Active	Corrective Action	305 FYFFE AVE/CODE 43	STOCKTON	1
39200004	NESTLE COMPANY, INC	Refer: RWQCB	Evaluation	230 INDUSTRIAL AVENUE	RIPON	1
39720027	NORGE CLEANING VILLAGE - STOCKTON	Refer: RWQCB	State Response	505 LINCOLN CENTER	STOCKTON	1
39750010	NORTH SHORE PROPERTY	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	423 N MADISON ST	STOCKTON	1
60002155	Northern 2-Acre Portion of Colberg Boat Works	Active	Voluntary Cleanup	848 W. Fremont Street	Stockton	1
60002130	Nur-Al-Huda Academy	Certified	State Response	1085 South Union Road	Manteca	1
50010020	OAKDALE HIGH SCHOOL EXPANSION	Certified	School Cleanup	400 Hinkley Street	Oakdale	1
39460005	OLD VALLEY PIPELINE (LAURELBROOK)	Refer: RWQCB	Voluntary Cleanup	MILEPOST 216.9	TRACY	1
80001617	OxyChem Agrochemical Plant Lathrop	Refer: HWMP	Corrective Action	16777 HOWLAND RD	LATHROP	1
39070065	OxyChem Agrochemical Plant Lathrop (Voluntary Agreement S	Refer: HWMP	Voluntary Cleanup	16777 HOWLAND ROAD	LATHROP	1
39280005	OxyChem Magnesium Plant Lathrop	Certified	State Response	2715 E LOUISE AVE	LATHROP	1
CAD02948	OXYCHEM STOCKTON	PROTECTIVE FILER	Non-Operating	1904 W CHARTER WAY	STOCKTON	1
39360005	PARSONS OF CALIFORNIA	Refer: Other Agency	Evaluation	3437 S AIRPORT WAY	STOCKTON	1
71003568	Pearl Crop	Certified O&M - Land Use Restrictions Only	Tiered Permit	1550 Industrial Drive	Stockton	1
60000643	PG&E MGP Oakdale	Certified / Operation & Maintenance	Voluntary Cleanup	811 West "J" Street	Oakdale	1
39490015	PG&E, STOCKTON	Certified / Operation & Maintenance	Voluntary Cleanup	530 SOUTH CENTER STREET	STOCKTON	1

60000642	PG&E, Tracy MGP	Certified	Voluntary Cleanup	502 E. Grant Line Road	Tracy	1
60000071	Podesta Ranch Elementary School	Certified	School Cleanup	Lower Sacramento Road	Stockton	1
80000656	POLLOCK STOCKTON SHIPYARD	Inactive - Needs Evaluation	Military Evaluation		Stockton	1
60000847	Proposed Alternative Education School	Certified	School Cleanup	1013 S. Yosemite Avenue	Oakdale	1
71003156	Qualex, Inc. - Manteca	Inactive - Needs Evaluation	Tiered Permit	555 Industrial Park Drive	Manteca	1
60003273	QUALITY CLEANERS	Active	Evaluation	845 S CALIFORNIA ST	STOCKTON	1
60002170	Quality Cleaners, Tracy	Active	Voluntary Cleanup	3081 North Tracy Blvd.	Tracy	1
60003199	Quest Industries, LLC - Stockton Facility	Active	Tiered Permit	2518 Boeing Way	Stockton	1
39200019	RAINBOW BREAD COMPANY	Refer: Other Agency	Evaluation	2651 SOUTH AIRPORT WAY	STOCKTON	1
39650001	RENOWN HOMES	Refer: RWQCB	State Response	CORNER OF TRACY BLVD AND BEECHNUT /	TRACY	1
39070046	RHODES BEAN AND SUPPLY	Refer: Other Agency	Evaluation	24710 SOUTH HIGHWAY 33	TRACY	1
39820002	RICHARD PITTMAN ELEMENTARY SCHOOL	Certified	School Cleanup	510 East Magnolia Street	Stockton	1
39070006	RIPON FARM SERVICE	Refer: Other Agency	Evaluation	HWY 99 AND JACK TONE ROAD	RIPON	1
39200003	RIPON-PACIFIC, INC	Refer: RWQCB	Evaluation	5050 EAST CARPENTER ROAD	STOCKTON	1
60001402	Rite Way Cleaners	Inactive - Needs Evaluation	Evaluation	700 East Market Street	Stockton	1
60003818	River Islands Woodlands East District K-8 School	Active	School Investigation	Parito Emata Way and Branton Avenue	Lathrop	1
50490001	RIVERBANK DUMP SITE	Active	Voluntary Cleanup	TERMINAL AVE	RIVERBANK	1
39760006	ROTOR BLADES, INC	Active	Voluntary Cleanup	1514 EAST SCOTTS AVENUE	STOCKTON	1
71002606	Rotor Blades, Inc.	Refer: SMBRP	Tiered Permit	1514 E. Scotts Avenue	Stockton	1
39750008	ROY'S AUTO WRECKING	Inactive - Needs Evaluation	Evaluation	3570 EAST MINER AVENUE	STOCKTON	1
71003522	Santa Fe Pacific Pipeline LP	Refer: Other Agency	Tiered Permit	2947 Navy Drive, Stockton Terminal	Stockton	1
60000626	Satellite Housing	Inactive - Action Required	Voluntary Cleanup	280 and 282 N. Airport	Manteca	1
39070036	SCHMIEDT SOIL SERVICE, INC	Refer: Other Agency	Evaluation	20696 SOUTH MANTECA ROAD	MANTECA	1
39970002	Sharpe Army Depot	Active	Federal Superfund	60 MI EA OF SAN FRANCISCO, CA	LATHROP	1
80000610	SHARPE GENERAL DEPOT	Inactive - Needs Evaluation	Military Evaluation		Stockton	1
50510006	SHELL BIOLOGICAL SCIENCES RESEARCH CENTE	Refer: RWQCB	Voluntary Cleanup	5901 STODDARD ROAD	SALIDA	1
71002128	Shell Oil Co. - Stockton Plant	Refer: Other Agency	Tiered Permit	3515 Navy Drive	Stockton	1
39240003	SJRRC Maintenance Facility	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	West Lane and Alpine Avenue	STOCKTON	1
60003274	SNOW CLEANERS INC	Active	Evaluation	38 West Sonora Street	Stockton	1
60001406	South Pointe	Active	Voluntary Cleanup	701, 705, 833, and 855 West Weber Avenue	Stockton	1
39290009	SOUTH SHORE PROPERTY	Refer: RWQCB	Voluntary Cleanup	WEST WEBER AVENUE	STOCKTON	1
39460001	SOUTHERN PACIFIC PIPELINE SPILL	Refer: RWQCB	Voluntary Cleanup	W SIDE OF COOK RD, 2000 FT N OF HOLT R	HOLT	1
39290006	SOUTHERN PACIFIC TRANS CO - FRENCH CAMP	Certified	State Response	20 FEET EAST OF HARLAN ROAD	FRENCH CAMP	1
60001556	Stockton Iron Works	Refer: EPA	Evaluation	600 W. Lindsay Street	Stockton	1
39450003	STOCKTON METRO AIRPORT	Refer: Other Agency	Evaluation	5000 S AIRPORT WY RM 202	STOCKTON	1
39970004	STOCKTON NAVAL COMMUNICATION STATION	Active	State Response	1,459 ACRE ISLAND; 40MI SE OF SACRAME	STOCKTON	1
60000493	Stockton Plating	Refer: Local Agency	Evaluation	632 South El Dorado Street	Stockton	1
71002280	Stockton Plating, Inc.	Refer: Local Agency	Tiered Permit	632 S. El Dorado Street	Stockton	1
39420010	STOCKTON, ROUGH AND READY ISLAND	Active	State Response	2201 W. WASHINGTON STREET	STOCKTON	1
71002643	Sumiden Wire Products Corp. - Stockton	Refer: Other Agency	Tiered Permit	1412 El Pinal Drive	Stockton	1
50420008	SWARD TRUCKING,INC	Refer: RWQCB	Evaluation	5225 OAKDALE-WATERFORD HWY	OAKDALE	1
71002866	T-C Etching Corp.	Inactive - Needs Evaluation	Tiered Permit	584 Hi-Tech Parkway	Oakdale	1
60003421	TERRACES AT BETHANY RESIDENTIAL DEVELOPMENT	Active	Voluntary Cleanup	816 West Main Street	Ripon	1
71003499	Tesoro Refining Marketing & Company	Refer: Other Agency	Tiered Permit	3003 Navy Drive	Stockton	1

50240002	THUNDERBOLT WOOD PRESERVING	Refer: RWQCB	Evaluation	3400 PATTERSON ROAD	RIVERBANK	1
71002617	Thunderbolt Wood Treating Co.	Refer: RWQCB	Tiered Permit	3400 Patterson Road	Riverbank	1
39510030	TIME OIL COMPANY	Refer: Other Agency	Evaluation	3015 NAVY DRIVE	STOCKTON	1
60002637	Tracy High School Parking Lot Expansion	Certified O&M - Land Use Restrictions Only	School Cleanup	455 East 11th Street	Tracy	1
71002665	Tyco Printed Circuit Grp. - Stockton	Certified O&M - Land Use Restrictions Only	Tiered Permit	1950 W. Fremont Street	Stockton	1
39400006	UNION PACIFIC RAILROAD - STOCKTON	Certified / Operation & Maintenance	Voluntary Cleanup	833 EAST EIGHTH STREET	STOCKTON	1
39400007	UNION PACIFIC RAILROAD, FORMER TRACY RAILYARD	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	780 EAST 6TH STREET	TRACY	1
39510023	UNITED AGRI PRODUCTS	Refer: Other Agency	Evaluation	301 WETMORE	MANTECA	1
71003289	US Chemical	Inactive - Needs Evaluation	Tiered Permit	1448 Shaw Road	Stockton	1
71002712	Viktron California	Active	Tiered Permit	1443 Navy Drive	Stockton	1
39720013	VILLAGE CLEANERS	Refer: RWQCB	Evaluation	6725 PACIFIC AVE	STOCKTON	1
39750009	WEBER BLOCK	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	WEBER AVE. AND EL DORADO ST.	STOCKTON	1
60000674	West Weber Site	Certified O&M - Land Use Restrictions Only	Voluntary Cleanup	West Weber Avenue	Stockton	1
39010032	WILHELMINA HENRY ELEMENTARY SCHOOL	Certified	School Cleanup	4860/4798/4708/4642 East Main Street	Stockton	1
39240018	WORK NET PROJECT, STOCKTON	Refer: RWQCB	Voluntary Cleanup	40 LINCOLN STREET (BOUND BY LINCOLN S	STOCKTON	1
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SITE NAME	GLOBAL ID	SITE_TYPE	STATUS	STATUS DA	ADDRESS	CITY	LATITUDE	LONGITUDE
99 AUTO RECYCLING (DE ROSE PROPERTY)	T10000008	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT		430 MOFFA	MANTECA	37.79309	-121.212
ACME GALVANIZING	SLT5S0283	CLEANUP PROGRAM SITE	OPEN - INACTIVE		540 WEST S	STOCKTON	37.94377	-121.296
ANDERSON-BARNGROVER RANCH	T10000020	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT		14290 E. C(	LINDEN	38.03687	-121.142
APACHE PLASTICS	T06077002	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT		2050 FREM	STOCKTON	37.96205	-121.265
APN 075-2007 & 2008	SLT5S0393	CLEANUP PROGRAM SITE	OPEN - INACTIVE		VAN DUSEI	RIVERBANK	37.71965	-120.932
ARCO #0595	T06077003	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING		6100 HWY !	STOCKTON	38.02102	-121.256
ARCO #2168 (FORMER)	T06077005	LUST CLEANUP SITE	OPEN - REMEDIATION		441 CHART	STOCKTON	37.93795	-121.294
BARNES TRUCKING	T06077005	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT		1817 FRESI	STOCKTON	37.93148	-121.313
BETHEL ISLAND GOLF COURSE	T06013789	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT		3303 GATE\	BETHEL ISL	38.02251	-121.635
BOULEVARD AUTOMOTIVE	T06077000	LUST CLEANUP SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION		2151 COUI	STOCKTON	37.96608	-121.33
BP/ AA- STOCKTON	SL1854329	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING		3437 SOUT	STOCKTON	37.91786	-121.263
CALIFORNIA TANK LINES	T06077004	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING		3105 EL DC	STOCKTON	37.91845	-121.279
CANCUN RESTAURANT	T06077158	LUST CLEANUP SITE	OPEN - REMEDIATION		135 MINER	STOCKTON	37.95607	-121.29
CANEPA'S CAR WASH PACIFIC	T10000003	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT		6230 PACIF	STOCKTON	38.00696	-121.318
CANEPA'S CAR WASH PARK	T06077004	LUST CLEANUP SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION		248 PARK S	STOCKTON	37.959663	-121.29
CARGILL (FORMER PM AG PRODUCTS, FORMER PUREGRO CO.)	SLT5S5653	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT		2130 WEST	STOCKTON	37.94424	-121.321
CHANNEL CONSTRUCTION ALONG SHULTE ROAD	SLT5S0733	CLEANUP PROGRAM SITE	OPEN - INACTIVE		SHULTE RO	LATHROP	37.81944	-121.284
CHEVRON #9-2033	T06077007	LUST CLEANUP SITE	OPEN - REMEDIATION		508 CHART	STOCKTON	37.93721	-121.294
CHEVRON #9-7127	T06001022	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT		10 GRANT L	MOUNTAIN	37.73924	-121.585
CHEVRON BANTA TERMINAL - CHEVRON BANTA TERMINAL	T06077000	CLEANUP PROGRAM SITE	OPEN - REMEDIATION		22888 KAS!	TRACY	37.75056	-121.347
CHEVRON, ALDEN PARK, TRACY	SL0607758	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING		CITY OF TR/	TRACY	37.7349	-121.441
CHEVRON, FORMER TRACY PUMP STA., 1428 WEST GRANTLINE RO	SL0607707	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION		BYRON RD	TRACY	37.758606	-121.494
CHEVRON, SURLAND, TRACY	SL0607766	CLEANUP PROGRAM SITE	OPEN - ELIGIBLE FOR CLOSURE		LOWELL AV	TRACY	37.7461	-121.463
CHEVRON, TAOC TRACY GRAVEL PITS	SL0607723	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT		VALPICO S1	TRACY	37.71224	-121.423
CHEVRON, TAOC 6TH STREET, TRACY RAIL YARD	T10000001	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT		6TH STREE1	TRACY	37.7347	-121.426
CHILDREN'S MUSEUM OF STOCKTON	T10000001	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT		402 WEST \	STOCKTON	37.95212	-121.297
CHLORINATED SOLVENT CASE - CORNER OF EAST MAIN STREET AI	SLT5S3083	CLEANUP PROGRAM SITE	OPEN - INACTIVE		EAST MAIN	STOCKTON	37.95426	-121.281
CITY OF LODI GROUNDWATER PLUMES - CITY OF LODI GROUNDW/	T10000002	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING		1129 SOUT	LODI	38.11605	-121.274
CITY OF LODI GROUNDWATER PLUMES - RANDTRON FACILITY (FOI	SL0002050	CLEANUP PROGRAM SITE	OPEN - INACTIVE		1300 SOUT	LODI	38.11694	-121.273
CITY OF STOCKTON REDEVELOPMENT AGENCY	T06077551	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT		216 NORTH	STOCKTON	37.95586	-121.285
COLOMBO/TOSCANA	T06077006	LUST CLEANUP SITE	OPEN - REMEDIATION		1444 LINC(	STOCKTON	37.93695	-121.293
CONTINENTAL GRAIN CO	SL1861429	CLEANUP PROGRAM SITE	OPEN - REMEDIATION		9504 HARL	FRENCH C/	37.87571	-121.276
CRYSTAL CREAM & BUTTER	T06077000	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING		404 FREMC	STOCKTON	37.95631	-121.298
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - ALL SITE ACTI	DOD10040	MILITARY CLEANUP SITE	OPEN - REMEDIATION		ROTH ROAI	LATHROP	37.854	-121.27
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - CENTRAL ARE	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION			LATHROP	37.844479	-121.273
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - NORTH BALL(	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION		850 ROTH F	LATHROP	37.85211	-121.272
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-011 / S	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION		850 ROTH F	LATHROP	37.85012	-121.268
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-034 / S	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION		ROTH ROAI	LATHROP	37.85222	-121.274
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-036 / S	DOD10040	MILITARY CLEANUP SITE	OPEN - REMEDIATION		ROTH ROAI	LATHROP	37.82907	-121.265
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-036 / S	DOD10040	MILITARY CLEANUP SITE	OPEN - REMEDIATION		ROTH ROAI	LATHROP	37.82834	-121.264
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-036 / S	DOD10040	MILITARY CLEANUP SITE	OPEN - REMEDIATION		ROTH ROAI	LATHROP	37.82843	-121.265
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-038 / S	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION		850 ROTH F	LATHROP	37.82736	-121.266
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-041 / S	DOD10041	MILITARY CLEANUP SITE	OPEN - REMEDIATION		ROTH ROAI	LATHROP	37.82714	-121.267
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-042 / S	DOD10040	MILITARY CLEANUP SITE	OPEN - REMEDIATION		ROTH ROAI	LATHROP	37.841	-121.273
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-044 / S	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION		850 ROTH F	LATHROP	37.82959	-121.265

DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-136 / U	T06077007	MILITARY UST SITE	OPEN - LONG TERM MANAGEMENT	850 ROTH F	LATHROP	37.84951	-121.265
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SHAD-148 / S	T10000001	MILITARY CLEANUP SITE	OPEN - SITE ASSESSMENT	850 ROTH F	LATHROP	37.84866	-121.271
DEFENSE DISTRIBUTION SAN JOAQUIN CA-SHARPE - SOUTH BALL(	DOD10041	MILITARY CLEANUP SITE	OPEN - REMEDIATION	ROTH ROAI	LATHROP	37.829062	-121.271
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - ALL SITE ACTIVI	DOD10008	MILITARY CLEANUP SITE	OPEN - REMEDIATION	25600 CHR	TRACY	37.7221	-121.397
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - AREA 1/BUILDII	T10000002	MILITARY CLEANUP SITE	OPEN - REMEDIATION	25600 CHR	TRACY	37.72109	-121.393
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - AREA 3	T10000002	MILITARY CLEANUP SITE	OPEN - REMEDIATION	25600 CHR	TRACY	37.72039	-121.388
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - GROUNDWATE	T06077710	MILITARY CLEANUP SITE	OPEN - REMEDIATION	25600 CHR	TRACY	37.72658	-121.389
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - GROUNDWATE	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION	25600 CHR	TRACY	37.72183	-121.397
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - GROUNDWATE	T10000001	MILITARY CLEANUP SITE	OPEN - REMEDIATION	25600 CHR	TRACY	37.72149	-121.397
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - NORTHEAST BA	T10000002	MILITARY CLEANUP SITE	OPEN - VERIFICATION MONITORING	BANTA ROA	TRACY	37.72579	-121.379
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - NORTHWEST C	T10000001	MILITARY CLEANUP SITE	OPEN - VERIFICATION MONITORING	25600 CHR	TRACY	37.72409	-121.397
DEFENSE DISTRIBUTION SAN JOAQUIN CA-TRACY - SWMU 1 / AREA	T10000002	MILITARY CLEANUP SITE	OPEN - VERIFICATION MONITORING	25600 CHR	TRACY	37.72168	-121.39
DEL MONTE FOODS, PLANT #33	SLT5S1173	CLEANUP PROGRAM SITE	OPEN - INACTIVE	2716 EAST	STOCKTON	37.9634	-121.252
DELTA MARINE SALES AND SERVICES	T10000002	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	401 NORTH	STOCKTON	37.95412	-121.307
DELTA PUMPING PLANT	T10000020	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	5280 BRUN	BYRON	37.80016	-121.62
DEUEL VOCATIONAL INSTITION - MAINTENANCE BLDG	T06077000	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	23500 KAS	TRACY	37.74668	-121.327
DEUEL VOCATIONAL INSTITUTION - FIRE PIT	SL2053630	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	23500 KAS	TRACY	37.74902	-121.327
DIAMOND FOODS	T06077003	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	1050 SOUT	STOCKTON	37.95001	-121.254
EL CAMINO AVE UNKNOWN PCE	T10000010	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	EL CAMINO	STOCKTON	38.02294	-121.326
ELLIS RANCH	T10000005	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	SOUTH LAI	TRACY	37.699	-121.465
EXXON #7-3942	T06077000	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING	4444 PERSI	STOCKTON	37.98654	-121.32
FERNANDO'S PLACE	T06077006	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	1201 CENT	STOCKTON	37.94034	-121.288
FORMER ARCO STATION #443 (DIGGLER & WAD LLC)	T06077980	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	2478 E. OA	STOCKTON	37.96566	-121.257
FORMER GLO DRY CLEANING	T10000007	CLEANUP PROGRAM SITE	OPEN - INACTIVE	6025-6045	STOCKTON	38.00532	-121.319
FORMER PILKINGTON NORTH AMERICA GLASS DISPOSAL	T10000007	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	500 EAST L(	LATHROP	37.807669	-121.289
FORMER RIPON CLEANERS	T10000017	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	311 WEST M	RIPON	37.739648	-121.126
FORMER SUPREMA CHEESE WASTEWATER PONDS	SL0607706	CLEANUP PROGRAM SITE	OPEN - INACTIVE	N/A N. OF L	MANTECA	37.83349	-121.26
FORMER TEXACO STATION	T06077001	LUST CLEANUP SITE	OPEN - REMEDIATION	440 CHART	STOCKTON	37.93732	-121.294
FORMER ZACKY FARMS	T10000022	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	1111 NAVY	STOCKTON	37.93836	-121.305
FOSTER FARMS NELSON RANCH (NP# 1221)	SL0609990	CLEANUP PROGRAM SITE	OPEN - INACTIVE	14455 CLA	OAKDALE	37.71096	-120.729
FRANK'S ONE STOP	T06077005	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING	2072 YOSE	MANTECA	37.79703	-121.252
FRENCH CAMP HOLDING CORP	T10000019	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	2546 FREN	STOCKTON	37.922829	-121.292
FRENCH CLEANERS	T10000005	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	416 WEST M	MANTECA	37.7973	-121.221
GASCO	T06077003	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	749 CHART	STOCKTON	37.94071	-121.277
HALEY'S FLYING SERVICE	SL0607752	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	2395 E PES	TRACY	37.76196	-121.39
HAWKE DUSTERS (HAWKE AG AVIATION)	SLT5S5263	CLEANUP PROGRAM SITE	OPEN - INACTIVE	5800 LANG	OAKDALE	37.72235	-120.892
HESS-DUBOIS CLEANERS (FORMER)	SLT5S1553	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	348 W HAR	STOCKTON	37.966254	-121.3
HIWAY 99 INDUSTRIAL SITES, LLC	SL0607706	CLEANUP PROGRAM SITE	OPEN - INACTIVE	4105 N. WI	STOCKTON	37.99762	-121.263
HUMAN SERVICES AGENCY	T06077002	LUST CLEANUP SITE	OPEN - REMEDIATION	145 SUTTEI	STOCKTON	37.95155	-121.286
HUNTER STREET PCE	T10000021	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	610 N. HUN	STOCKTON	37.95924	-121.29
HYDROAGRI NORTH AMERICA	SLT5S1623	CLEANUP PROGRAM SITE	OPEN - INACTIVE	3019 NAVY	STOCKTON	37.94674	-121.335
INDUSTRIAL DRIVE, LLC	T10000004	CLEANUP PROGRAM SITE	OPEN - LONG TERM MANAGEMENT - LAND USE RESTRICTIONS	248 INDUS	STOCKTON	37.90646	-121.271
ISE LABS INCORPORATED	SLT5S1663	CLEANUP PROGRAM SITE	OPEN - INACTIVE	400-560 IN	MANTECA	37.78648	-121.212
J. R. SIMPLOT COMPANY	T06077001	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	16777 HOV	LATHROP	37.80727	-121.277
J.R. SIMPLOT COMPANY	SL0607731	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	16777 HOV	LATHROP	37.80743	-121.276
JOHN TAYLOR FERTILIZERS - STOCKTON	SL1861929	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	1819 SOUT	STOCKTON	37.93271	-121.303

KEARNEY KPF	SL2053330	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	1624 E. ALF	STOCKTON	37.98444	-121.279
KMEP - STOCKTON TERMINAL	SL3735136	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	2947 NAVY	STOCKTON	37.94171	-121.333
KMEP HOLT PETROLEUM PIPELINE RELEASE	SL2053730	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	3851 SOUT	HOLT	37.93365	-121.436
KOPPEL STOCKTON - KOPPEL STOCKTON TERMINAL	SL1853729	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	2025 WEST	STOCKTON	37.94251	-121.319
LA PASSEGGIATA APARTMENTS	T10000019	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	622 EAST LI	STOCKTON	37.957450	-121.284
LARRY'S AUTO	T06077001	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING	308 GRANT	STOCKTON	37.95768	-121.281
LAWRENCE LIVERMORE NATIONAL LABORATORIES SITE 300 - LLNL	T10000005	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	CORRAL H(	TRACY	37.67252	-121.545
LAWRENCE LIVERMORE NATIONAL LABORATORIES SITE 300 - LLNL	T10000007	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	CORRAL H(	TRACY	37.67106	-121.541
LEPRINO FOODS CO	SL3735836	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	2401 N. MA	TRACY	37.755688	-121.415
LINCOLN CENTER	SL2051329	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	N/A PACIFI(	STOCKTON	38.01157	-121.323
MARINA WEST MARINE SERVICES	SL0607767	CLEANUP PROGRAM SITE	OPEN - INACTIVE	6651 EMBA	STOCKTON	38.00189	-121.367
MARLEY COOLING TOWER COMPANY	SLT5S0013	CLEANUP PROGRAM SITE	OPEN - REMEDIATION - LAND USE RESTRICTIONS	200 NORTH	STOCKTON	37.96624	-121.234
MCBILLIN REAL ESTATE INVESTMENT	T10000002	LUST CLEANUP SITE	OPEN - REMEDIATION	2154 SOUT	STOCKTON	37.9293	-121.282
MCCORMICK & BAXTER CREOSOTING	T06077002	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	1214 WASH	STOCKTON	37.94761	-121.307
MODESTO POLANCO- PROMENADE SHOPPING CENTER	SL0609910	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	3501 MCHE	MODESTO	37.69076	-120.995
MODESTO SAND AND GRAVEL	T10000013	CLEANUP PROGRAM SITE	OPEN - LONG TERM MANAGEMENT	6137 HAMN	MODESTO	37.72845	-121.11
NAPOLEON MINE	T10000013	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	TELEGRAPH	TELEGRAPH	37.92731	-120.73
NCTS STOCKTON - AOC 01	T10000022	MILITARY CLEANUP SITE	OPEN - SITE ASSESSMENT	CAVANAUG	STOCKTON	37.95901	-121.363
NCTS STOCKTON - AOC 02	T10000022	MILITARY CLEANUP SITE	OPEN - SITE ASSESSMENT	JAMES DRI\	STOCKTON	37.94934	-121.348
NCTS STOCKTON - AOC 03	T10000022	MILITARY CLEANUP SITE	OPEN - SITE ASSESSMENT	WEST FYFF	STOCKTON	37.95039	-121.377
NCTS STOCKTON - IRP SITE 03	T10000013	MILITARY CLEANUP SITE	OPEN - SITE ASSESSMENT	305 FYFFE /	STOCKTON	37.94466	-121.361
NCTS STOCKTON - IRP SITE 45	T10000022	MILITARY CLEANUP SITE	OPEN - SITE ASSESSMENT	ELLSBERG	STOCKTON	37.95117	-121.365
NESTLE USA - BEVERAGE DIVISION, INC FACILITY	SL2050129	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	230 INDUS	RIPON	37.73801	-121.121
NOMELLINI PROPERTY	T06077002	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING	1045 CHAR	STOCKTON	37.93565	-121.303
NORTH RIPON ROAD SPILL	SLT5S2023	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	21800 NOR	RIPON	37.76099	-121.124
NUSTAR	SL0607733	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	2941 NAVY	STOCKTON	37.94115	-121.332
NUTRIEN AG SOLUTIONS (CROP PRODUCTION SERVICES), MODES	SL2058330	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	3348 CLAU	MODESTO	37.68737	-120.921
NUTRIEN AG SOLUTIONS (CROP PRODUCTION SERVICES), STOCK	SL2058430	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	1905 NORT	STOCKTON	37.98071	-121.253
OCCIDENTAL CHEMICAL AGRICULTURAL PRODUCTS COMPANY	SLT5S0033	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	16777 HOV	LATHROP	37.80743	-121.276
OLIN CHLOR ALKALI PRODUCTS	SL1854229	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	26700 SOU	TRACY	37.71177	-121.379
OXYCHEM STOCKTON	SL2057630	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	1904 CHAR	STOCKTON	37.93155	-121.316
PACIFIC COAST RECREATI0N	T06077000	LUST CLEANUP SITE	OPEN - ELIGIBLE FOR CLOSURE	3755 MUNI	STOCKTON	37.92974	-121.229
PARADISE POINT MARINA	T10000007	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	8095 RIO B	STOCKTON	38.04416	-121.418
PARCEL B (APN 198-120-09)	T10000012	CLEANUP PROGRAM SITE	OPEN - REMEDIATION - LAND USE RESTRICTIONS	17100 MUI	LATHROP	37.806	-121.287
PARK WOODS SHOPPING CENTER	T10000010	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	1762 WEST	STOCKTON	38.02045	-121.335
PARKING GARAGE	T06077006	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	130 HUNTE	STOCKTON	37.9546	-121.289
PG&E - FORMER MGP, OAKDALE	SLT5S2163	CLEANUP PROGRAM SITE	OPEN - INACTIVE	811 WEST	OAKDALE	37.75787	-120.854
PG&E - STOCKTON FORMER MGP	SL2051229	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	535 SOUTH	STOCKTON	37.94674	-121.29
PG&E TRANSFORMER OIL RELEASE	T10000003	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	103 NORTH	STOCKTON	37.95982	-121.26
PORT OF STOCKTON ROUGH & READY ISLAND - BUILDING 810	T10000022	MILITARY PRIVATIZED SITE	OPEN - SITE ASSESSMENT	GILMORE A	STOCKTON	37.9548	-121.364
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ	SL0607749	MILITARY PRIVATIZED SITE	OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	2201 W. W/	STOCKTON	37.94766	-121.361
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ	DOD10031	MILITARY PRIVATIZED SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION - LAND USE RESTRICTIONS	DAVIS AVEI	STOCKTON	37.9495	-121.365
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ	DOD10031	MILITARY PRIVATIZED SITE	OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	DAVIS AVEI	STOCKTON	37.94961	-121.366
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ	DOD10040	MILITARY PRIVATIZED SITE	OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95787	-121.376
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ	DOD10040	MILITARY PRIVATIZED SITE	OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95733	-121.376
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ	DOD10040	MILITARY PRIVATIZED SITE	OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95293	-121.376

PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.94987	-121.375
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.94982	-121.374
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95394	-121.374
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	NORTHERN	STOCKTON	37.96059	-121.374
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	NORTHERN	STOCKTON	37.96025	-121.377
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95778	-121.374
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.9569	-121.375
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95616	-121.373
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95245	-121.373
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10031 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	305 FYFFE /	STOCKTON	37.94507	-121.371
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10039 MILITARY PRIVATIZED SITE		OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION - LAND USE RESTRICTIONS	305 FYFFE /	STOCKTON	37.94466	-121.361
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10039 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	305 FYFFE /	STOCKTON	37.95181	-121.349
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10039 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	305 FYFFE /	STOCKTON	37.94985	-121.376
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10039 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	305 FYFFE /	STOCKTON	37.95482	-121.374
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ T10000002 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	305 FYFFE /	STOCKTON	37.95058	-121.377
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10031 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	305 FYFFE /	STOCKTON	37.94731	-121.368
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	NORTHERN	STOCKTON	37.96105	-121.376
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	NORTHERN	STOCKTON	37.9598	-121.375
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.95093	-121.373
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10040 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	FYFFE AVEI	STOCKTON	37.950864	-121.365
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10031 MILITARY PRIVATIZED SITE		OPEN - REMEDIATION - LAND USE RESTRICTIONS	2201 W. W/	STOCKTON	37.94728	-121.352
PORT OF STOCKTON ROUGH & READY ISLAND - ROUGH AND READ DOD10030 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT - LAND USE RESTRICTIONS	DAVIS AVEI	STOCKTON	37.95044	-121.366
PORT OF STOCKTON ROUGH & READY ISLAND - SITE 8 - DRAINAGE T10000022 MILITARY PRIVATIZED SITE		OPEN - SITE ASSESSMENT	HUMPHERY	STOCKTON	37.95511	-121.368
PORT OF STOCKTON SHIP LOADING	SLT5S2313 CLEANUP PROGRAM SITE	OPEN - INACTIVE	STOCKTON	STOCKTON	37.97758	-121.304
PRIVATE RESIDENCE	T06077006 LUST CLEANUP SITE	OPEN - REMEDIATION	PRIVATE RE	STOCKTON	37.96719	-121.171
PRIVATE RESIDENCE	SLT5S4823 CLEANUP PROGRAM SITE	OPEN - INACTIVE	PRIVATE RE	MANTECA	37.77177	-121.215
QUICK-N-SAVE #1	T06077009 LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	1901 EL DC	STOCKTON	37.93276	-121.285
QUICK-N-SAVE #2	T06077009 LUST CLEANUP SITE	OPEN - REMEDIATION	2057 SOUT	STOCKTON	37.9303	-121.284
RAINWATER CAR WASH	T06077006 LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	420 YOSEM	MANTECA	37.7972	-121.222
RAYMOND INVESTMENTS CORPORATION - HELENA CHEMICAL	T10000005 CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	2245 WEST	STOCKTON	37.93223	-121.317
RF LAND	SL0607777 CLEANUP PROGRAM SITE	OPEN - REMEDIATION	938 FRONT	RIPON	37.75049	-121.137
RIVERBANK AAP - RIVERBANK AAP	DOD10036 MILITARY CLEANUP SITE	OPEN - REMEDIATION - LAND USE RESTRICTIONS	5300 CLAU	RIVERBANK	37.71577	-120.919
RIVERBANK ARMY AMMUNITION PLANT - BASEWIDE ISSUES (PAREI	SLT5SOO5: CLEANUP PROGRAM SITE	OPEN - REMEDIATION	5300 CLAU	RIVERBANK	37.72367	-120.922
ROY'S AUTO WRECKING YARD	SLT5S2433 CLEANUP PROGRAM SITE	OPEN - INACTIVE	3570 EAST	STOCKTON	37.96533	-121.244
SAN JOAQUIN COGEN LLC	T10000011 CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	17200 MUI	LATHROP	37.80573	-121.291
SANTA FE RAILYARD (FORMER RIVERBANK RAILYARD)	SL0609918 CLEANUP PROGRAM SITE	OPEN - INACTIVE	TERMINAL /	RIVERBANK	37.73269	-120.931
SHELL OPUS - STOCKTON TERMINAL	T06077001 CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	3515 NAVY	STOCKTON	37.9513	-121.345
SOUTHERN PACIFIC TRANSPORATION CO	SL1851128 CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	780 EAST 6	TRACY	37.73677	-121.433
STALLWORTH AUTO DETAIL	T06077005 LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	602 CALIFC	STOCKTON	37.95974	-121.286
STOCKTON CAARNG - CALIFORNIA ARMY NATIONAL GUARD STOCI	T10000017 MILITARY CLEANUP SITE	OPEN - SITE ASSESSMENT	2000 STIMS	STOCKTON	37.88623	-121.242
STOCKTON CAARNG - CALIFORNIA ARMY NATIONAL GUARD STOCI	T06077007 MILITARY CLEANUP SITE	OPEN - REMEDIATION	8020 SOUT	STOCKTON	37.884852	-121.247
STOCKTON CAARNG - CALIFORNIA ARMY NATIONAL GUARD STOCI	SL1864036 MILITARY CLEANUP SITE	OPEN - REMEDIATION	2000 STIMS	STOCKTON	37.88578	-121.246
STOCKTON CITY CAB CO	T06077008 LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING	2085 FREM	STOCKTON	37.96249	-121.265
STOCKTON METROPOLITAN AIRPORT	T10000012 CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	5000 S. AIR	STOCKTON	37.90594	-121.242
STOCKTON PROPELLER INC.	T10000017 CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	2478 WILC	STOCKTON	37.987490	-121.244
STOCKTON REDEVEL. AGENCY - BANNER ISLAND BALLPARK	SLT5S2713 CLEANUP PROGRAM SITE	OPEN - INACTIVE	W. FREMOI	STOCKTON	37.97758	-121.304

STOCKTON REDEVELOPEMENT- NORTHSHORE PARCELS	SL0607769	CLEANUP PROGRAM SITE	OPEN - INACTIVE	248 W FRE	STOCKTON	37.9565	-121.296
STOCKTON TERMINALS TECHNICAL COMMITTEE - ARCO PRODUCT	SL3735636	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	2700 WEST	STOCKTON	37.943594	-121.333
STOCKTON TERMINALS TECHNICAL COMMITTEE - STOCKTON TERM	SL0607737	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	PORT OF ST	STOCKTON	37.94284	-121.334
STOCKTON TERMINALS TECHNICAL COMMITTEE - TESORO STOCKT	SL3754536	CLEANUP PROGRAM SITE	OPEN - VERIFICATION MONITORING	3003 NAVY	STOCKTON	37.94262	-121.333
STOCKTON TERMINALS TECHNICAL COMMITTEE - TIME OIL STOCK	T06077005	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	3015 NAVY	STOCKTON	37.9432	-121.335
STOCKTON WATERFRONT SOUTH SHORE - CITY OF STOCKTON L&M	SL0002050	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	666 WEST V	STOCKTON	37.95161	-121.299
STOCKTON WATERFRONT SOUTH SHORE - CITY OF STOCKTON MO	SL0002050	CLEANUP PROGRAM SITE	OPEN - INACTIVE	17 S. LINC	STOCKTON	37.95029	-121.298
STOCKTON WATERFRONT SOUTH SHORE - CITY OF STOCKTON PR	SL0607727	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	701 W.WEB	STOCKTON	37.9522	-121.303
STOCKTON WATERFRONT SOUTH SHORE - CITY OF STOCKTON ST	SL0607727	CLEANUP PROGRAM SITE	OPEN - INACTIVE	56 S. LINC	STOCKTON	37.95105	-121.297
STOCKTON WATERFRONT SOUTH SHORE - CITY OF STOCKTON UN	SL0002050	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	504 WEST V	STOCKTON	37.9519	-121.298
STOCKTON WATERFRONT SOUTH SHORE - WOTOA PARKING LOT	T10000004	CLEANUP PROGRAM SITE	OPEN - INACTIVE	666 WEST V	STOCKTON	37.9526	-121.3
TEAM ENTERPRISES, INC.	SL0609986	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	2400 COFF	MODESTO	37.67712	-120.975
THE LANDING SHOPPING CENTER	SL0607773	CLEANUP PROGRAM SITE	OPEN - INACTIVE	3422 W. HA	STOCKTON	38.02026	-121.361
THE LEARNER COMPANY	SL0607782	CLEANUP PROGRAM SITE	OPEN - INACTIVE	2711 NAVY	STOCKTON	37.94003	-121.332
TOP FILLING STATION	T06077002	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING	101 WILSO	STOCKTON	37.95456	-121.271
TOSCO/UNOCAL #05643 AKA: #4409	T06077008	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	1502 EL DO	STOCKTON	37.96778	-121.294
TOYOTA TOWN INC	T06077001	LUST CLEANUP SITE	OPEN - VERIFICATION MONITORING	610 HUNTE	STOCKTON	37.95919	-121.29
TRACY RESERVOIR BOOSTER STATION 4	T10000021	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	5403 TRAC	TRACY	37.69153	-121.487
UNIFIRST CORPORATION	SL0607793	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	819 NORTH	STOCKTON	37.96123	-121.291
UNION PACIFIC FORMER BUNKER C VAULT (TRACY)	T10000021	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	780 EAST 6	TRACY	37.73335	-121.423
UNION PACIFIC RAILROAD - TRACY YARD	SL1851028	CLEANUP PROGRAM SITE	OPEN - REMEDIATION	720 EAST 6	TRACY	37.73711	-121.416
UNITED STATES NAVAL COMPUTER & TELECOMMUNICATIONS	SL1861529	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	305 FYFFE /	STOCKTON	37.97758	-121.304
UNKNOWN DCE AND TCE WATERLOO ROAD STOCKTON	T10000021	CLEANUP PROGRAM SITE	OPEN - INACTIVE	WATERLOC	STOCKTON	37.98834	-121.243
UNKNOWN PCE	T10000023	CLEANUP PROGRAM SITE	OPEN - INACTIVE	300 BLOCK	STOCKTON	37.95768	-121.282
USA #110	T06077000	LUST CLEANUP SITE	OPEN - REMEDIATION	2132 MARI	STOCKTON	37.93816	-121.242
VACANT PROPERTY MOUNTAIN HOUSE	T10000016	CLEANUP PROGRAM SITE	OPEN - ASSESSMENT & INTERIM REMEDIAL ACTION	23577 SOU	TRACY	37.744767	-121.54
WATERLOO FOOD & FUEL	T06077008	LUST CLEANUP SITE	OPEN - SITE ASSESSMENT	3032 WATE	STOCKTON	37.98094	-121.255
WHITE ARROW	T10000006	CLEANUP PROGRAM SITE	OPEN - SITE ASSESSMENT	2402 SOUT	STOCKTON	37.92737	-121.276
WILBUR-ELLIS CO, FORMERLY VALLEY FERTILIZER (212 INDUSTRIA	SLT5S4833	CLEANUP PROGRAM SITE	OPEN - INACTIVE	212 INDUS	STOCKTON	37.90635	-121.272

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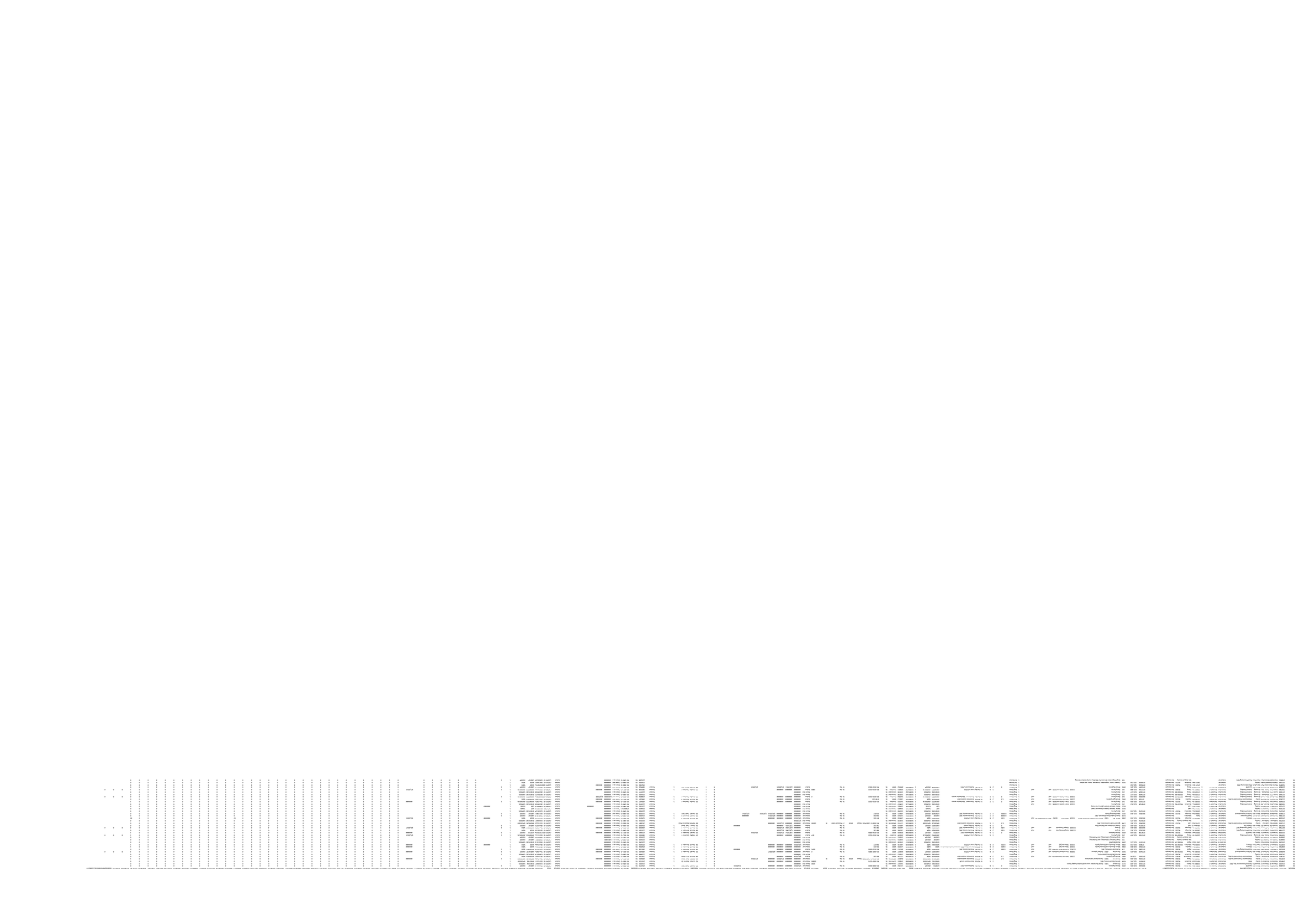
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State: CA

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Last updated on December 17, 2024



SITES IDENTIFIED WITH WASTE CONSTITUENTS ABOVE HAZARDOUS WASTE LEVELS OUTSIDE THE WASTE MANAGEMENT UNIT

COUNTY	CITY	REGION	SWAT F	WASTE DISCHARGER SYSTEM NO.	SOLID WASTE ID NO.	WASTE MANAGEMENT UNIT NAME	FACILITY NAME	AGENCY NAME
DEL NORTE	CRESCENT CITY	1	2	1A880520NSL-01		DEL NORTE COUNTY- PESTICIDE STORAGE	DEL NORTE PESTICIDE STORAGE AR	DEL NORTE, COUNTY OF
CONTRA COSTA	PITTSBURG	2	1	2 071059002-02	07-A1-0001	U.S. STEEL CORP.-PITTSBURG SITE LA	WDR-USS-POSCO	USS-POSCO
SOLANO	VALLEJO	2	1	2 482011003-01	48-AA-0008	US NAVY MARE ISLAND SANITARY LANDFILL	WDR-NAVAL SHIPYARD/CLASS I LAN	MARE ISLAND NAVAL SHIPYARD
CONTRA COSTA	RICHMOND	2	3	2 071007002-01		CHEVRON CHEMICAL COMPANY-OLD SITES	WDR-ORTHO DIV-RICHMOND PLANT	CHEVRON CHEMICAL COMPANY
MONTEREY	FORT ORD (Marina)	3	1	3 270301004-01	27-AA-0015	FORT ORD LANDFILL	SANITARY LANDFILL	U.S. ARMY, FORT ORD
SANTA BARBARA	LOMPOC	3	3	3 420305001-01	42-AA-0017	LOMPOC CITY LANDFILL	SOLID WASTE DISPOSAL SITE	LOMPOC CITY
LOS ANGELES	MONTEREY PARK	4	1	4B190332001-01	19-AM-0001	OPERATING INDUSTRIES LANDFILL	OPERATING INDUSTRIES, INC.	OPERATING INDUSTRIES, INC.
TULARE	WOODLAKE	5F	1	5D540300010-01	54-AA-0007	TULARE COUNTY-WOODLAKE LANDFILL	WOODLAKE SWDS	TULARE, COUNTY OF
FRESNO	FRESNO	5F	2	5D100300001-01		MCKINLEY AVE. YARD	T.H. AGRICULTURE AND NUTRITION	NORTH AMERICAN PHILLIPS
KINGS	CORCORAN	5F	2	5D160302001-01	16-AA-0011	KINGS COUNTY-CORCORAN LANDFILL	CORCORAN SWDS	KINGS COUNTY WASTE MGMT AUTH.
FRESNO	FRESNO	5F	3	5D100319001-01	10-AA-0013	ORANGE AVENUE DISPOSAL COMPANY	ORANGE AVENUE LANDFILL	ORANGE AVENUE DISP CO. INC
TULARE	EXETER	5F	3	5D540300003-01	54-AA-0002	TULARE COUNTY-EXETER DISPOSAL SITE	EXETER SWDS	TULARE, COUNTY OF
MERCED	ATWATER	5F	4	5C240115001-01		ATWATER CITY	BERT CRANE ROAD LANDFILL	ATWATER, CITY OF
FRESNO	FOWLER	5F	5	5D100325N01-01		FOWLER CITY	FOWLER CITY LANDFILL (OLD)	FOWLER, CITY OF
BUTTE	OROVILLE	5R	2	5A042005001-01		KOPPERS COMPANY-OROVILLE SITE	KOPPERS WOOD PRESERVING ISW	KOPPERS INDUSTRIES INC.
BUTTE	CHICO	5R	4	5A040302N01-01		CHICO CITY BURN DUMP	HUMBOLDT ROAD LANDFILL	CHICO, CITY OF
SACRAMENTO	SACRAMENTO	5S	1	5A340700003-01	34-AA-0008	US AIR FORCE-MCCLELLAN AFB LANDFILL	CLASS III SITE 8 (CLOSURE)	US AIR FORCE-MCCLELLAN AFB
SACRAMENTO	MATHER (Rancho Cordova)	5S	2	5A340700001-01		US AIR FORCE-MATHER FIELD LANDFILL	MATHER AFB ENVIRONMENTAL MGMT	US AIR FORCE – MATHER AFB
SACRAMENTO	SACRAMENTO	5S	3	5B342000N01-01		SACRAMENTO ARMY DEPOT	SACRAMENTO ARMY DEPOT	U.S. ARMY
SAN JOAQUIN	STOCKTON	5S	3	5 390002NUR-01	39-AA-0006	US NAVY COMMUNICATIONS LANDFILL	U.S.N. COMMUNICATION STA. LANDF	U.S. NAVY COMMUNICATIONS
SAN JOAQUIN	FRENCH CAMP	5S	3	5 390003NUR-01		US ARMY-SHARPE ARMY DEPOT	US ARMY-SHARPE ARMY DEPOT	US ARMY
SAN JOAQUIN	TRACY	5S	5	5 390006NUR-01		SITE 300 (OTHER 39 WMUS)	LAWRENCE LIVERMORE LAB	LAWRENCE LIVERMORE LABS
INYO	KEELER	6V	1	6B142000041-01	14-AA-0008	US TUNGSTEN OWENS LAKE LANDFILL	OWENS LAKE LANDFILL	UMETCO MINERALS CORPORATION
ORANGE	FULLERTON	8	1	8300002NUR-01		MCCOLL SITE	MCCOLL SLUDGE DISPOSAL SITE	TOXIC SUBSTANCES CONTROL DIVIS
RIVERSIDE	RIVERSIDE	8	1	8 330325001-01		STRINGFELLOW QUARRY ACID PITS	STATE OF CALIFORNIA-STRINGFELLOW	TOXIC PROGRAM MANAGEMENT SECT

SITE / FACII	ENVIROSTC	PROGRAM	STATUS	STATUS DA	ADDRESS D	CITY	ZIP	CALENVIRC	COUNTY	SITE CODE	LATITUDE	LONGITUDE
BOBSON C	39720023	STATE RESI	ACTIVE	3/1/2022	600 N MAIN	MANTECA	95336	85-90%	SAN JOAQUIN	108009	37.80653	-121.217
CANNON C	60003271	STATE RESI	ACTIVE	3/1/2022	48 WEST H/	STOCKTON	95204	90-95%	SAN JOAQUIN	108010	37.96696	-121.296
MARLEY CC	39240014	STATE RESI	CERTIFIED	2/11/2002	200 NORTH	STOCKTON	95215	90-95%	SAN JOAQUIN	100102	37.96771	-121.234
MCCORMIC	39240001	FEDERAL S	ACTIVE	5/1/1986	1214 W. W/	STOCKTON	95203	95-100%	SAN JOAQUIN	100108	37.9486	-121.307
STOCKTON	39420010	STATE RESI	ACTIVE - LA	10/1/2003	2201 W. W/	STOCKTON	95203	90-95%	SAN JOAQUIN	100113, 1(	37.95097	-121.36

Appendix I

Hydrology and Groundwater Technical

Appendix I-1

MICUP Groundwater Modeling Technical Memorandum

Technical Memorandum: Groundwater Modeling

11010 White Rock Road, Suite 200 ● Rancho Cordova, CA 95670 ● 916.631.4500

To: San Joaquin County Public Works
From: Sevim Onsoy, PhD, and Amy McBride
Reviewed by: Michael Cornelius, P.G.
cc: Robert Granberg, P.E., and Barbara Brenner, LLP
Date: May 12, 2026
Re: Mokelumne River Conjunctive Use Program (MICUP)
Ground Water Modeling
San Joaquin County, CA
Project No. 2303724

I. Introduction

The purpose of this Technical Memorandum (TM) is to document the groundwater modeling analysis performed in support of the Environmental Impact Report (EIR) for the Mokelumne River Integrated Conjunctive Use Program (MICUP). This analysis evaluated the effects on groundwater levels and groundwater storage in the Eastern San Joaquin Groundwater Subbasin (ESJ Subbasin or Subbasin) resulting from the 17 proposed MICUP project components.

This modeling analysis includes development of two modeling scenarios to evaluate potential effects of the MICUP project components on groundwater resources:

- Current Conditions Baseline (CCBL)
- Current Conditions Baseline with MICUP (CCBL_MICUP, CCBL+MICUP)

The two scenarios were built from the groundwater modeling conducted through the Groundwater Sustainability Plan (GSP) for the ESJ Subbasin under the Sustainable Groundwater Management Act (SGMA).

This TM includes the following five sections:

- **Introduction –** briefly describes the purpose of this TM and provides a brief overview of the MICUP goals and objectives.
- **Modeling Approach –** describes the groundwater modeling approach and scenario development
- **Model Assumptions –** provides an overview of the key modeling assumptions used in the scenarios.
- **Modeling Analysis and Results –** presents the groundwater modeling results for the two scenarios and evaluation of potential effects of the MICUP project components
- **Summary –** provides a summary of the modeling analysis findings.

San Joaquin County currently relies on groundwater for approximately half of its water supply, with surface water meeting the remaining demands. The 2025 GSP Amendment notes that the ESJ Subbasin is critically overdrafted and additional supplies are needed to achieve sustainability.

The specific goals and objectives identified for MICUP include:

- Develop a supplemental Mokelumne River surface water supply
- Use surface water and groundwater conjunctively to respond to drought and climate change
- Improve groundwater levels in the ESJ Subbasin
- Achieve integrated water supply and environmental benefits in the lower Mokelumne watershed

The MICUP project components are anticipated to improve groundwater levels and storage. The MICUP project components would offset groundwater pumping and increase recharge to help the ESJ Subbasin reach sustainability. The MICUP modeling results and anticipated potential benefits to the ESJ Subbasin are documented in this Technical Memorandum. A more detailed description of the MICUP project components can be found in the MICUP Project Identification Report**.**

II. Modeling Approach

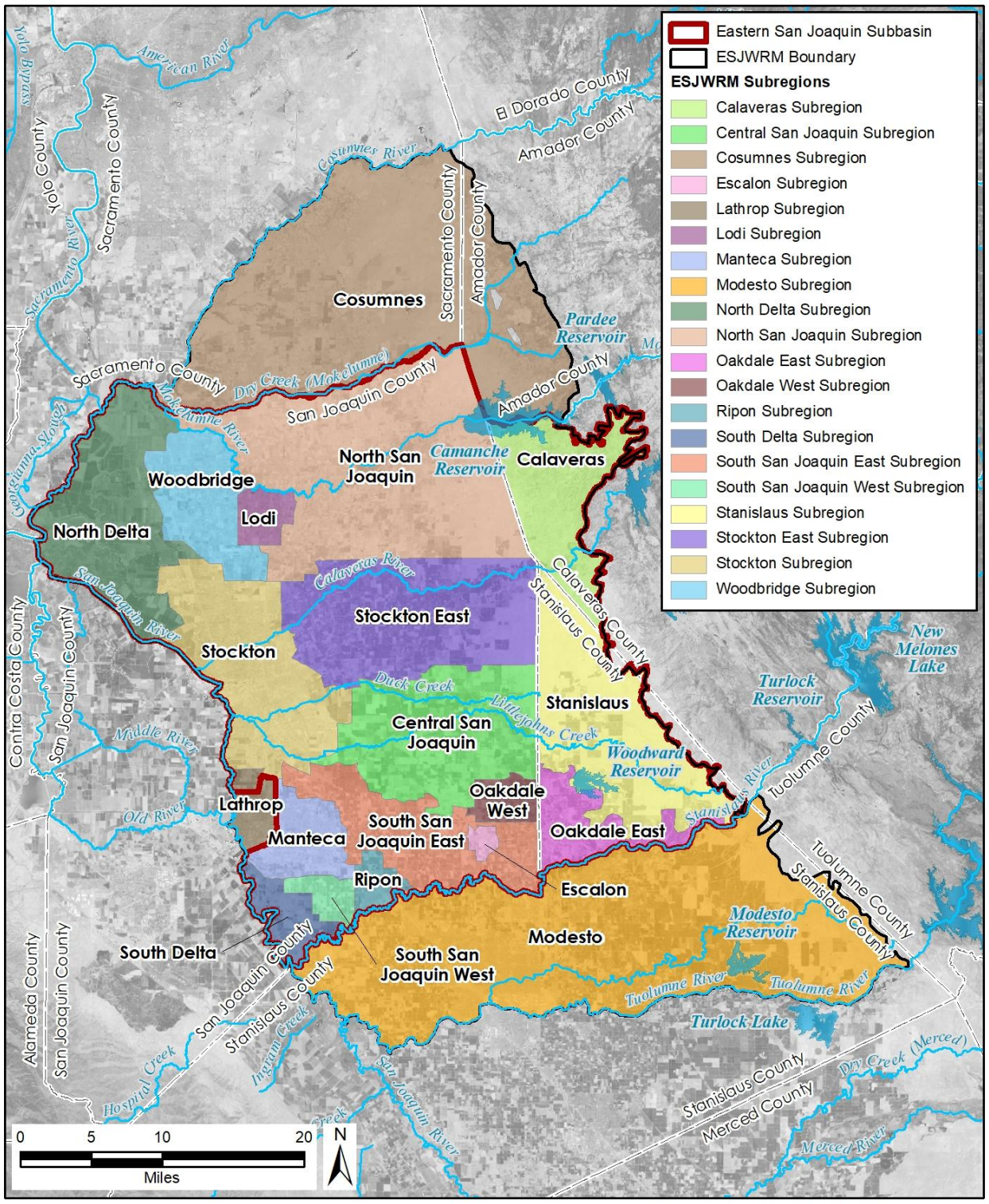
The modeling approach developed to evaluate the MICUP effects on groundwater resources is consistent with the modeling analysis conducted through the ESJ Subbasin GSP. As mentioned above, the two modeling scenarios developed and analyzed in support of the MICUP were built from the latest versions of the ESJ Subbasin GSP model baseline scenarios, as briefly described below.

A. Easter San Joaquin Water Resources Model

The Eastern San Joaquin Water Resources Model (ESJWRM or Model) was used to serve as the modeling platform for evaluating the potential effects of the 17 proposed MICUP project components on the groundwater resources. Figure 1 shows the ESJWRM boundary and the Model subregions. The ESJWRM is an integrated water resources model that simulates the surface water and groundwater conditions in the ESJ Subbasin, and is developed to simulate land and water use, and water demand and water supply conditions under the recent historical, current, and projected future groundwater conditions in the Subbasin. Additionally, the Model was developed to simulate projected future conditions scenario with projects and management actions (PMAs) as part of the GSP process to meet the SGMA regulatory requirements.

The ESJWRM is based on the model platform, Integrated Water-Flow Model (IWFM), maintained by the California Department of Water Resources (DWR). Changes between different versions of IWFM are documented on DWR's IWFM website and the IWFM technical memorandums corresponding to the latest version are available online (Dogrul, 2025). The MICUP scenarios were simulated with the latest IWFM code, IWFM-2025.0.1747 (released in September 2025).

Figure 1. ESJWRM Subregions



1. ESJRWM Purpose

As documented in the 2024 GSP Amendment (ESJGWA, 2024), ESJWRM is a decision-making tool for the ESJ Subbasin and can have various uses, including:

- Developing understanding of Subbasin inflows, outflows, and change in storage under variety of conditions and planning horizons (historical, current, future)
- Understanding of current and historical groundwater storage and depletions of interconnected surface water
- Estimating Subbasin sustainable yield
- Evaluating impact of demand reduction on Subbasin sustainability
- Evaluating impact of climate change on Subbasin sustainability
- Developing or evaluating Sustainable Management Criteria (SMC) for groundwater levels, groundwater storage, and depletions of interconnected surface water
- Evaluating projects and management actions needed to reach sustainability
- Providing information on Subbasin data gaps or focus needs

ESJWRM is planned to be the primary numerical model for assessment of Subbasin sustainability, and as such will be maintained and updated annually for the GSP Annual Report preparation and to continue to analyze implementation and sustainability periods for the Subbasin.

The application of the ESJWRM performed in support of the MICUP is alignment with the Model purpose and directly supports the Model use for assessing the Subbasin sustainability during the implementation of future projects such as the recharge projects proposed under the MICUP.

2. ESJRWM Version 3.0

The Historical ESJWRM Version 3.0 and Projected Conditions Baseline (PCBL) Version 3.0, completed through the 2024 GSP Amendment for the ESJ Subbasin, were used as the basis for the development of the two MICUP scenarios. Table 1 provides a summary of the common key model assumptions used in the development of the two MICUP scenarios, CCBL and CCBL+MICUP. The Historical ESJWRM Version 3.0 was updated and recalibrated for the entire model period of record from water year (WY) 1995 through 2023 (October 1, 1994 through September 30, 2023), as part of the 2024 GSP Amendment. Major changes included the revision of model layers, update of land use data, simulation of local reservoir seepage, and adjustments to surface water delivery data to several Subbasin agricultural agencies based on recent local information.

Projected Conditions Baseline Version 3.0 was developed to estimate future baseline conditions of land use and water supply and demand conditions assuming a 2040 level of development based on the historical hydrology from WYs 1969 - 2023.

Supporting information about the most recent version of the ESJWRM, including the Historical ESJWRM Version 3.0 and PCBL Version 3.0, is documented in the ESJ Subbasin 2024 GSP Amendment (ESJGWA, 2024).

3. Model Layers

The Historical ESJWRM Version 3.0 has undergone significant refinements to better reflect subsurface conditions and improve the accuracy of groundwater dynamics. The model layering was fully updated for the Historical ESJWRM Version 3.0 and the stratigraphy now includes a newly defined shallow alluvium layer, updated Corcoran Clay boundaries, and refined model layers informed by the recent airborne electromagnetic (AEM) surveys.

The ESJWRM has five layers, as described in Table 1, in order from top to bottom. Model Layers 2 and 3 are most relevant for incorporating the MICUP project components involving ASR recharge, as further explained later in this TM.

Table 1. Model Layer Descriptions

Layer	Description
Layer 1	The shallowest alluvium in the model extent, consisting of coarse unconsolidated to semi-consolidated deposits that interact with the ground surface and streams
Layer 2	The remaining top unconfined portion of the aquifer, consisting of older alluvium deposits such as those from the Laguna Formation. The top is defined as the bottom of Layer 1.
Aquitard 2	The Corcoran Clay confining layer separating Layers 2 and 3 in the southwest corner of the model.
Layer 3	The primary pumping layer in ESJWRM, located beneath the confining layer where the Corcoran Clay exists and below Layer 2 in the rest of the model extent. The bottom of Layer 3 generally aligns with the base of the Mehrten Formation.
Layer 4	The confined portion of the aquifers that extends to the base of freshwater.
Layer 5	The saline water, ranging from the base of freshwater to the base of continental deposits, and is currently a non-production zone.

B. Current Conditions Baseline (CCBL) Scenario

The CCBL scenario was built off the Historical ESJWRM Version 3.0 and PCBL Version 3.0, as described earlier, and represents the most recent land use, demand and supply conditions as of WY 2023. The model stratigraphy, layering, and structure for the CCBL are identical to the Historical ESJWRM Version 3.0, which is also the same for the PCBL Version 3.0. The Historical ESJWRM Version 3.0 simulated the WYs 1995 - 2023 period. The current conditions in the GSP are represented as the average of the last five years from 2019 to 2023 period. Based on a review of the annual water budget for the 2019 to 2023 period, it was determined that WY 2023 would be most representative to establish the current conditions in support of the two MICUP scenarios. The WY 2023 water management activities differ from average of the prior water years and reflect the expected future water management activities among the MICUP Partners.

These include:

- Increased surface water diversions to North San Joaquin Water Conversation District (NSJWCD)
- Better representation of stream losses in the Calaveras River
- Increased surface water use in the City of Stockton (CoS, the City)

The CCBL scenario simulates the existing level of development and agricultural demand to a 53-year historical hydrology from WYs 1969 to 2021. This represents the overlapping period between the historical hydrology in the PCBL Version 3.0 and the MICUP water availability analysis.

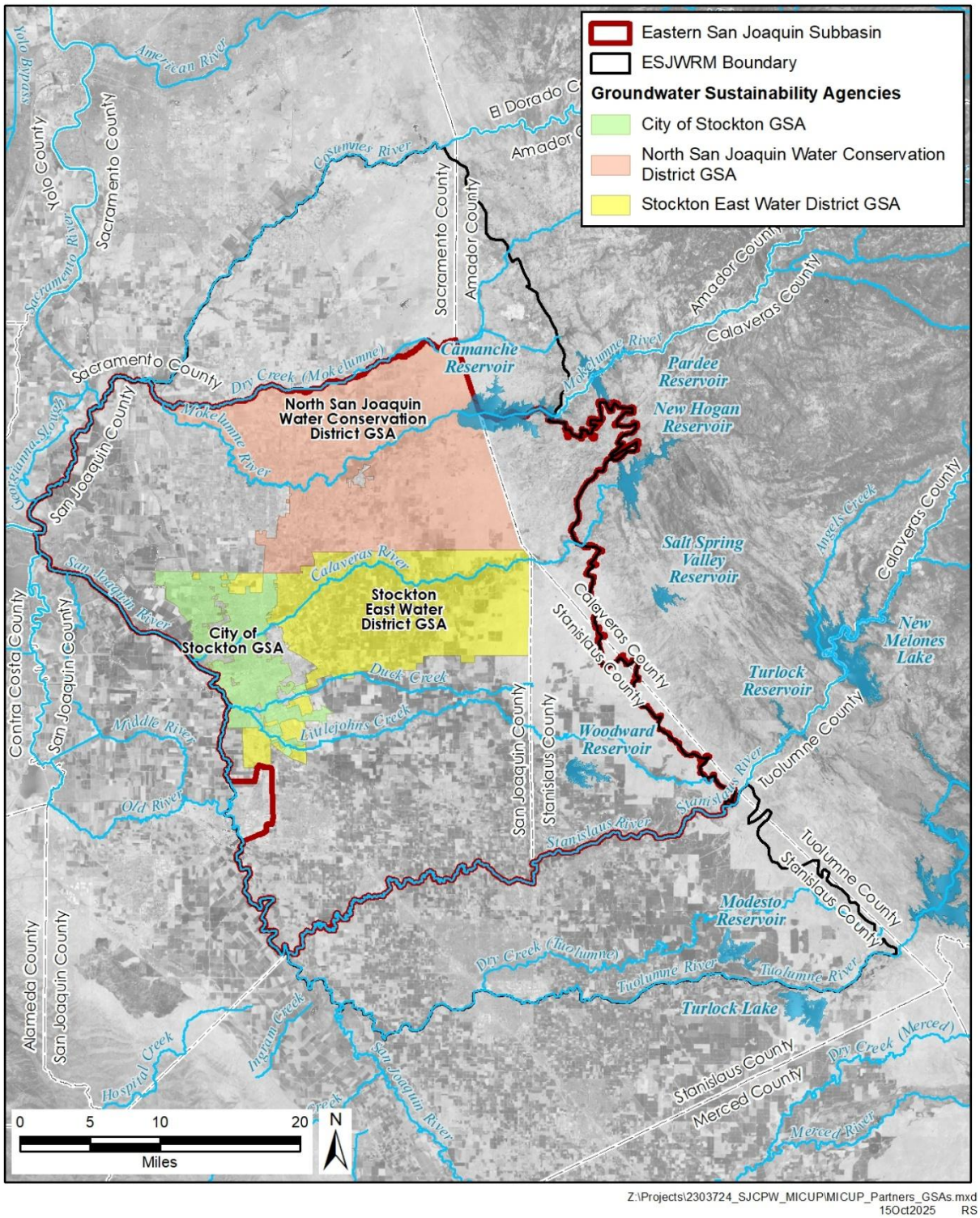
C. MICUP Scenario (CCBL+MICUP)

The CCBL+MICUP represents the 17 proposed MICUP project components incorporated into the CCBL to assess their effects on groundwater resources. Table 2 provides a brief description of the CCBL+MICUP descriptions relative to the CCBL. The 17 MICUP project components were identified by three Groundwater Sustainability Agencies (GSAs) that are the MICUP Partners, including NSJWCD, Stockton East Water District (SEWD), and the City of Stockton. Figure 2 shows the boundaries of the three GSAs participating in MICUP in relation to the Subbasin and Model boundaries. Table 3 lists the 17 MICUP project components within NSJWCD, SEWD, and the City of Stockton.

Table 2. CCBL and CCBL+MICUP Assumptions

Model Feature	Current Conditions Baseline (CCBL)	Current Conditions Baseline with MICUP (CCBL+MICUP)
Hydrologic Conditions	53-year hydrology from WYs 1969 to 2021, based on the PCBL	53-year hydrology from water years 1969 to 2021
Precipitation	53 years of precipitation data for WYs 1969 to 2021, consistent with the records in the PCBL Version 3.0	Same as CCBL
Stream Inflow	53 years of stream inflows for WYs 1969 to 2021, consistent with the records in the PCBL Version 3.0	Same as CCBL
Land Use and Cropping Patterns	Land use and cropping patterns at the end of the Historical ESJWRM Version 3.0, reflecting 2022 land use conditions	Same as CCBL
Agricultural Demand	Agricultural demand based on the current cropping patterns reflecting 2022 land use at the end of the Historical ESJWRM Version 3.0 and historical hydrology for WYs 1969 to 2021	Same as CCBL
Agricultural Surface Water Supplies	Agricultural surface water supplies representing WY 2023 at the end of the Historical ESJWRM Version 3.0	Same as CCBL except additional MICUP surface water deliveries for agricultural in areas of the MICUP in-lieu recharge project components
Agricultural Groundwater Pumping	Agricultural groundwater pumping representing WY 2023 at the end of the Historical ESJWRM Version 3.0	Same as CCBL except reduced groundwater pumping for agriculture due to additional MICUP surface water deliveries in areas of the MICUP in-lieu recharge project components
Urban Demand	Urban demand representing WY 2023 at the end of the Historical ESJWRM Version 3.0	Same as CCBL
Urban Surface Water Supplies	Urban surface water supplies representing WY 2023 at the end of the Historical ESJWRM Version 3.0	Same as CCBL
Urban Groundwater Pumping	Urban groundwater pumping representing WY 2023 at the end of the Historical ESJWRM Version 3.0	Same as CCBL
Municipal Wells	Active municipal wells representing WY 2023 at the end of the Historical ESJWRM Version 3.0	Same as CCBL

Figure 2. MICUP Partners



III. Model Assumptions

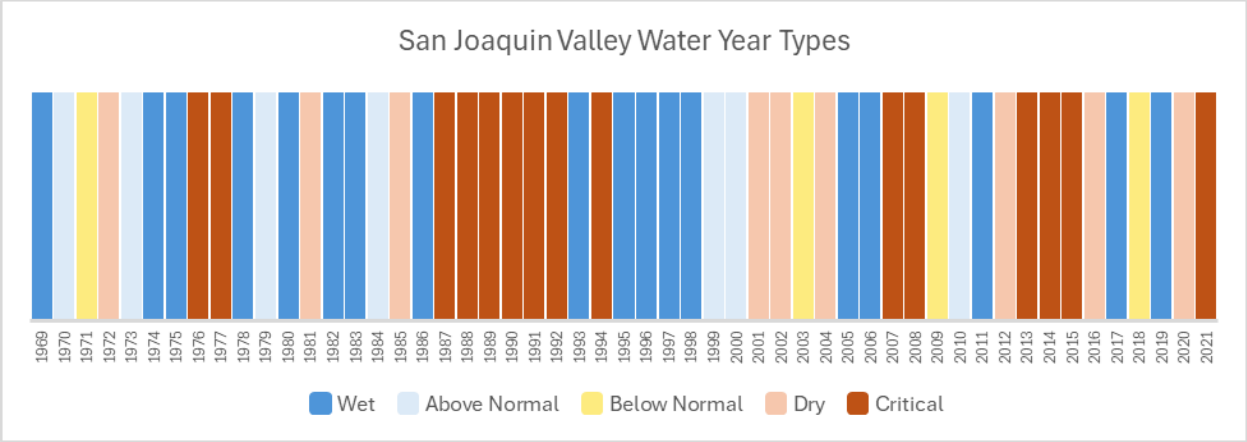
The Current Conditions Baseline reflects the current conditions with respect to the land use, water demand and use in the ESJ Subbasin, consistent with the GSP modeling analysis. This section provides an overview of the key model assumptions related to the hydrology, urban demand, groundwater pumping, and surface water diversions relevant to the MICUP. The hydrologic period and the data for land use, cropping patterns, agricultural demands, urban demand and urban supplies are identical to the GSP modeling and reflect the data at the end of the Historical ESJWRM Version 3.0, as described below.

D. Hydrology

The CCBL and CCBL+MICUP simulate the same hydrology, as presented in Table 2. MICUP is located in within the ESJ Subbasin, so the San Joaquin Valley water year type index was used to determine hydrologic year types. Figure 3 presents the San Joaquin Valley index from the DWR. The 53-years of hydrology includes 18 wet years, 7 above normal, 4 below normal, 9 dry, and 15 critical dry years. Water was diverted for MICUP in 16 out of the 18 wet years.

Additionally, historical records of hydrologic data, including stream flow, precipitation, and evapotranspiration, used in the CCBL and CCBL+MICUP are identical, based on the historical data used in the PCBL Version 3.0.

Figure 3. Historical Water Year Types



E. Land Use and Cropping Patterns

Land use and cropping patterns in the CCBL and CCBL+MICUP are identical, representing the land use conditions at the end of the Historical ESJWRM Version 3.0.

F. Urban Demand

The CCBL and CCBL+MICUP simulate the same urban demand, as presented in Table 2. They both use the representative urban demand as of WY 2023, consistent with urban demand at the end of the Historical ESJWRM Version 3.0.

G. Groundwater Pumping

The CCBL and CCBL+MICUP scenarios simulate the same urban (municipal) groundwater pumping, as presented in Table 2. No changes were made to the spatial distribution of urban pumping from the Historical ESJWRM Version 3.0. Similarly, agricultural demand unchanged between the CCBL and CCBL+MICUP. However, agricultural groundwater pumping under CCBL+MICUP was reduced due to increased surface water diversions in-lieu of pumping under the CCBL.

In addition, the CCBL+MICUP incorporates proposed Aquifer Storage and Recovery (ASR) wells as positive pumping to simulate direct recharge into the aquifer system.

H. Surface Water Diversions

The CCBL+MICUP scenario incorporates additional surface water diversions resulting from the implementation of the 17 MICUP projects components. The MICUP points of diversions can be found in Figure 4. Table 3 lists these 17 MICUP project components with additional surface water diversions along with the types of recharge, project component areas, and the average volume of recharge by project component.

Key modeling assumptions for MICUP include:

- **Additional diversions:** The MICUP project components were simulated as additional diversions in the CCBL+MICUP scenario.
- **Direct recharge**: For the project components involving direct recharge (e.g., Flood-MAR, recharge basins, and dry wells), diversions were modeled as 100 percent recoverable loss to the aquifer system.
- **In-lieu recharge**: Diversions for the in-lieu recharge project components were delivered to meet agricultural demand to offset groundwater pumping.
- **ASR wells**: The project components involving the proposed ASR recharge wells were assumed to receive surface water imports to the model domain; thus, they are not direct diversions. A total of 25 ASR wells were incorporated to directly recharge groundwater - 20 ASR wells within the NSJWCD footprint and five within the SEWD footprint. Each ASR well was assumed to have a well screen of 50 feet, partially recharging into Model Layers 2 and 3.

Figure 4. MICUP Points of Diversion

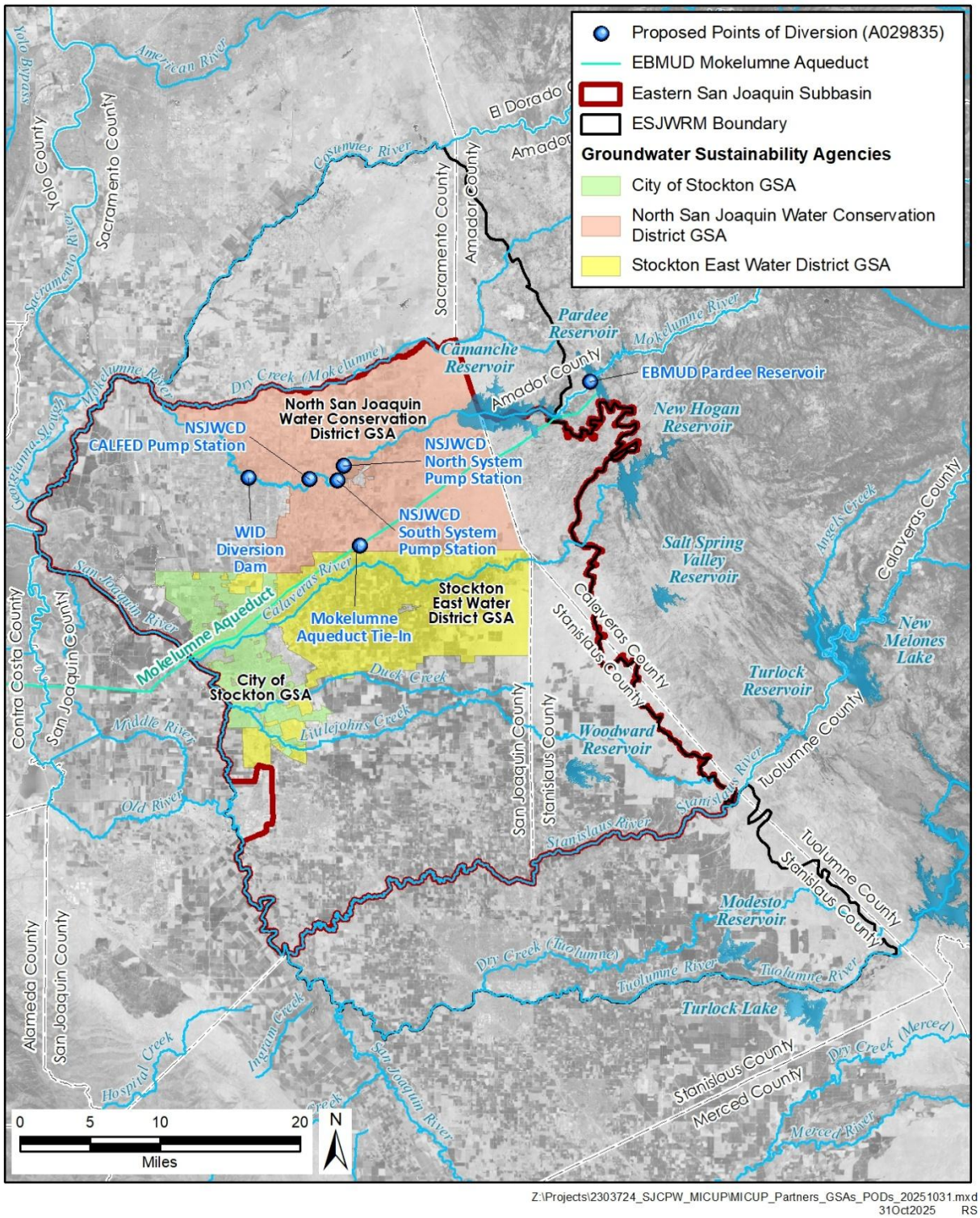


Table 3. MICUP Project Components and Methods

Project Component Number	District	Project Component Name	Recharge Method	Average Annual Surface Water Diversions for Recharge (AFY)
1	NSJWCD	NSJWCD_No1_NS_FM	Flood-MAR	200
2	NSJWCD	NSJWCD_No2_NS_IL	In - Lieu	3,600
3	NSJWCD	NSJWCD_No3_NS_RB	Recharge Basin	9,600
4	NSJWCD	NSJWCD_No4_SS_FM	Flood-MAR	200
5	NSJWCD	NSJWCD_No5_SS_IL	In - Lieu	3,600
6	NSJWCD	NSJWCD_No6_SS_RB	Recharge Basin	9,600
7	NSJWCD	NSJWCD_No7_A_FM	Flood-MAR	1,200
8	NSJWCD	NSJWCD_No8_A_ASR	Wells (ASR)	5,100
9	SEWD	SEWD_No9_B_ASR	Wells (ASR)	200
10	SEWD	SEWD_No10_WL_FM	Flood-MAR	600
11	SEWD	SEWD_No11_WL_IL	In - Lieu	7,900
12	SEWD	SEWD_No12_WL_DW	Wells (Dry Wells)	8,100
13	SEWD	SEWD_No13_MC_RBDW	Recharge Basin	8,700
14	SEWD	SEWD_No14_MC_RB	Recharge Basin	4,800
15	CoS	CoS_No15_DR_RB	Recharge Basin	2,300
16	CoS	CoS_No16_DR_SD	Recharge Basin	500
17	CoS	CoS_No17_DWTP_RBDW	Recharge Basin	2,200
Total				**68,400**

Note: AFY = acre-feet per year; Recharge Capacity includes both the Direct Diversion and Diversion from Storage Windows; Recharge Volume was rounded to nearest 100; NSJWCD = North San Joaquin Water Conservation District; SEWD = Stockton East Water District; CoS = City of Stockton

IV. Modeling Analysis and Results

Modeling results from the CCBL+MICUP were compared to the CCBL to evaluate potential effects of the 17 proposed MICUP project components on groundwater conditions in the ESJ Subbasin. The modeling results include the following components:

- Annual average land and water use budget tables for the CCBL and CCBL+MICUP (Table 4)
- Annual average groundwater budget tables for the CCBL and CCBL+MICUP (Table 5)
- Annual groundwater budget components (i.e., inflows and outflows) over the simulation period for the CCBL and CCBL+MICUP (Figure 5 and Figure 6)
- Comparison of the cumulative change in storage between the CCBL and CCBL+MICUP (Figure 7)
- Groundwater elevation difference contour map at the end of the simulation period, representing the average of Model Layers 2 and 3 (Figure 8)
- Simulated groundwater elevations for Model Layers 2 and 3 for the CCBL and CCBL+MICUP at the GSP Representative Monitoring Site (RMS) Wells (Figure 10 through Figure 15)
- Streamflows at the four representative locations along the Mokelumne River for the CCBL and CCBL+MICUP (Figure 16 through Figure 19)
- Annual change in stream seepage for the Mokelumne River (Figure 20)

Detailed results for land and water use budgets, groundwater budgets, and groundwater hydrographs are included in Appendix A, B, and C, respectively.

A. Land and Water Use Budgets

Table 4 presents the annual average land and water use budgets for the ESJ Subbasin for the CCBL, CCBL+MICUP, and the resulting MICUP benefits calculated as the difference between the two scenarios.

Over the 53-year simulation period, the average annual water demand under the CCBL+MICUP is 1,373 thousand acre-feet per year (TAFY), consisting of approximately 1,246 TAFY of agricultural demand and 127 TAFY of urban demand. This demand is met by an annual average of 553 TAFY of surface water deliveries (approximately 482 TAFY of agricultural and 71 TAFY of urban deliveries) and is supplemented by 832 TAFY groundwater production (783 TAFY of agricultural and 49 TAFY of urban pumping).

Relative to the baseline scenario, CCBL, the inclusion of MICUP demonstrates measurable benefits, shown as reduction in agricultural groundwater pumping and a corresponding increase in surface water deliveries. Agricultural surface water deliveries increase approximately 2 percent, while groundwater pumping decreases by 8.9 TAFY that reflects an approximate 1 percent reduction. These benefits are primarily attributed to the MICUP project components with in-lieu recharge and reflect improved surface water availability and reduced groundwater dependence in the Subbasin.

Total agricultural demand and area, urban demand and area remain effectively unchanged between the two scenarios, as shown in Table 4. The supplementary land and water use budgets for the three MICUP partner GSAs can be found in Appendix A.

Table 4. ESJ Subbasin Land and Water Use Budget

Annual Average WY 1969 to 2021, ESJ Subbasin			
Land and Water Use Budget Component	**CCBL**	**CCBL+MICUP**	**Benefit of MICUP**
Agricultural Area (thousand acres)	397.7	397.7	0.0
Agricultural demand (TAFY)	1246.3	1245.9	-0.5
Agricultural Groundwater Pumping (TAFY)	791.8	782.9	-8.9
Agricultural Surface Water Deliveries (TAFY)	472.6	482.1	9.6
Agricultural Surplus (TAFY)*	18.0	19.1	1.1
Urban Area (thousand acres)	80.7	80.7	0.0
Urban Demand (TAFY)	127.1	127.1	0.0
Urban Groundwater Pumping (TAFY)	49.5	49.5	0.0
Urban Surface Water Deliveries (TAFY)	71.0	70.9	-0.1
Urban Shortage (TAFY)	6.7	6.8	0.1

Note: TAF = thousand acre-feet; TAFY = thousand acre-feet per year; *Number inverted to differentiate surplus from shortage; Values rounded to nearest tenth

B. Groundwater Budget

Table 5 presents the annual average groundwater components for the CCBL, CCBL+MICUP, and MICUP benefits calculated as CCBL+MICUP minus CCBL. Figure 5 and Figure 6 present the Subbasin annual groundwater budget and cumulative change in storage for the CCBL and CCBL+MICUP, respectively[1]. The supplementary groundwater budgets for the three partner GSAs can be found in Appendix B.

Groundwater pumping remains the largest component in the groundwater budget under the CCBL+MICUP, with an annual average of 841 TAFY. However, the modeling results show that the implementation of the 17 proposed MICUP project components would significantly reduce the Subbasin's overdraft. In the absence of MICUP, the CCBL scenario estimates an average annual overdraft of 32 TAFY over the 53-year simulation period. In contrast, with the MICUP in place, this overdraft is reduced to 13 TAFY, reflecting a net gain of 19 TAFY of groundwater in storage, an improvement of nearly 60% compared to the CCBL.

[1] In this representation, the "Change in Storage" uses an inverted sign convention. Positive values indicate a loss of groundwater storage or reduction, and negative values indicate a gain in storage or increase. Consequently, when the cumulative change in storage line (navy) trends downward, the Subbasin is experiencing net depletion and when the line trends upward, the Subbasin storage is recovering.

The improvement to the Subbasin is driven by a combination of increased direct recharge and reduced groundwater pumping through in-lieu recharge. The CCBL+MICUP shows 49 TAFY increase in recharge in the Subbasin, primarily from direct recharge associated with the MICUP project components. Groundwater pumping is reduced by 9 TAFY under the MICUP, attributed to the increase in surface water deliveries from the MICUP project components, consistent with the land and water use budget results presented in Table 4.

Higher simulated groundwater levels under the CCBL+MICUP also result in 24 TAFY reduction in stream seepage into the groundwater system and 16 TAFY decrease in boundary flows.

Figure 7 shows comparison of groundwater storage changes in the ESJ Subbasin for the CCBL+MICUP relative to the CCBL. The CCBL+MICUP shows a consistent increase in groundwater storage throughout the entire 53-year simulation period. At the end of the simulation period, the MICUP project components contribute approximately 1,015 TAF of additional groundwater storage in the Subbasin, which equates to an average annual gain of 19 TAFY, as presented in Table 5.

Overall, the inclusion of MICUP enhances groundwater sustainability in the ESJ Subbasin by increasing recharge, reduced reliance in groundwater pumping, and improving groundwater storage. The CCBL+MICUP scenario demonstrates measurable benefits to groundwater balance, supporting the long-term sustainability of the Subbasin.

Table 5. Annual Average Groundwater Budget

Annual Average WY 1969 to 2021, ESJ Subbasin			
Groundwater Budget Component	**CCBL**	**CCBL+MICUP**	**Benefit of MICUP**
Deep Percolation (TAF)	286	287	1
Other Recharge (TAF)	143	191	49
Flow from Stream (TAF) **	234	210	-24
Boundary Flow (TAF)	158	142	-16
Pumping (TAF)*	850	841	-9
Change in Storage (TAF)*	-32	-13	19

Note: TAF = thousand acre-feet; *Number inverted relative to the original sign; **Net value; Negative = outflow from Groundwater; Positive = inflow to Groundwater; Values rounded to nearest whole number

Figure 5. Eastern San Joaquin Subbasin Groundwater Budget CCBL

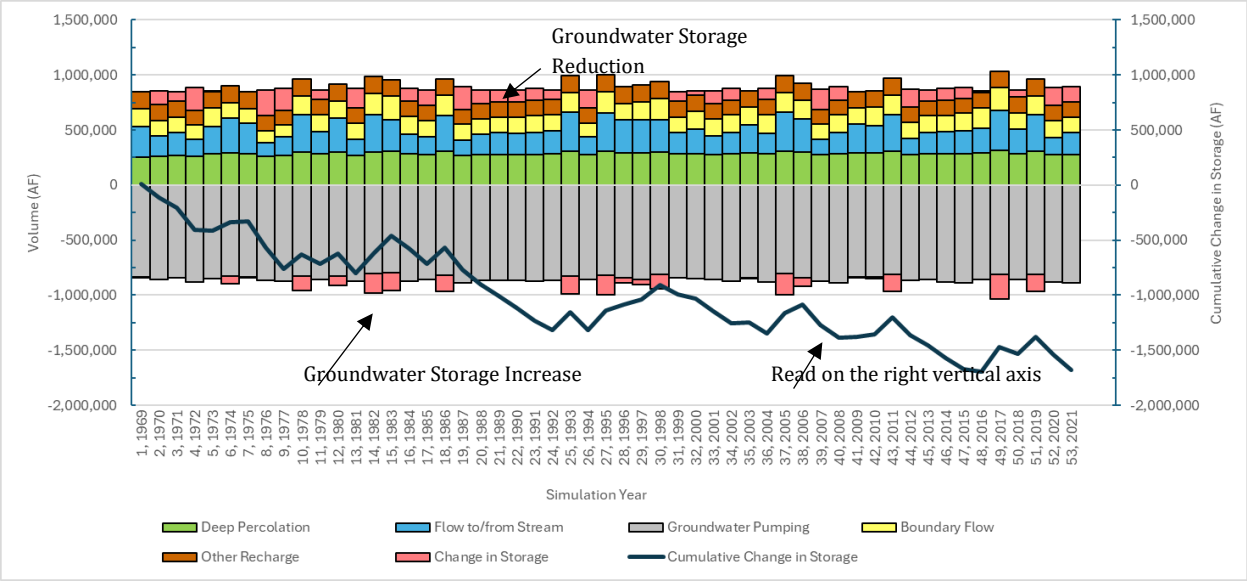


Figure 6. Eastern San Joaquin Subbasin Groundwater Budget CCBL+MICUP

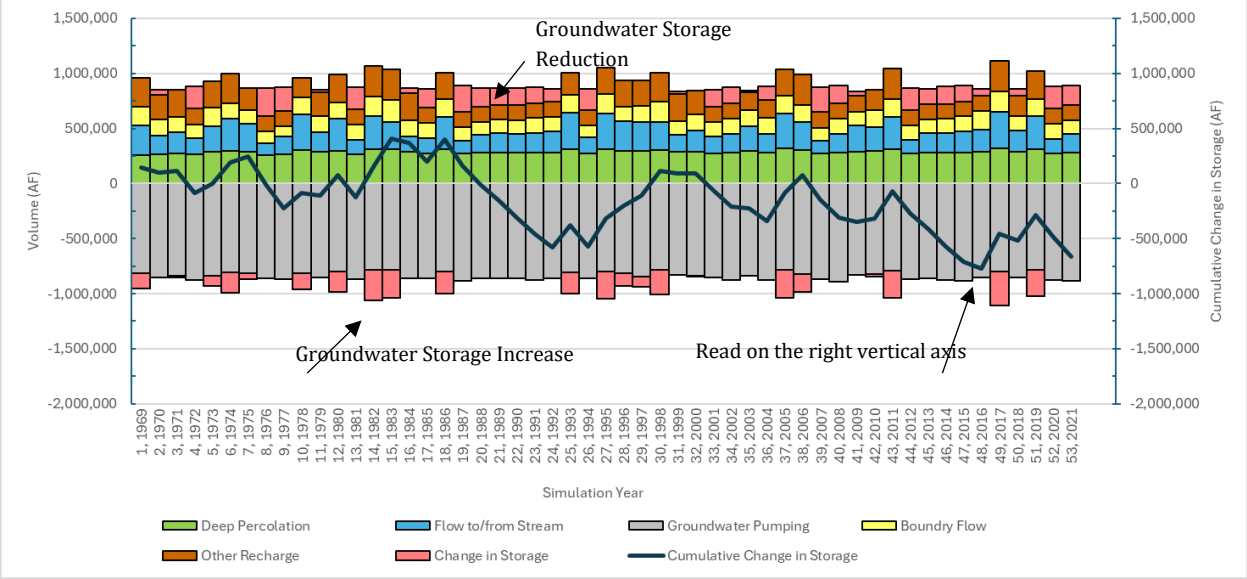
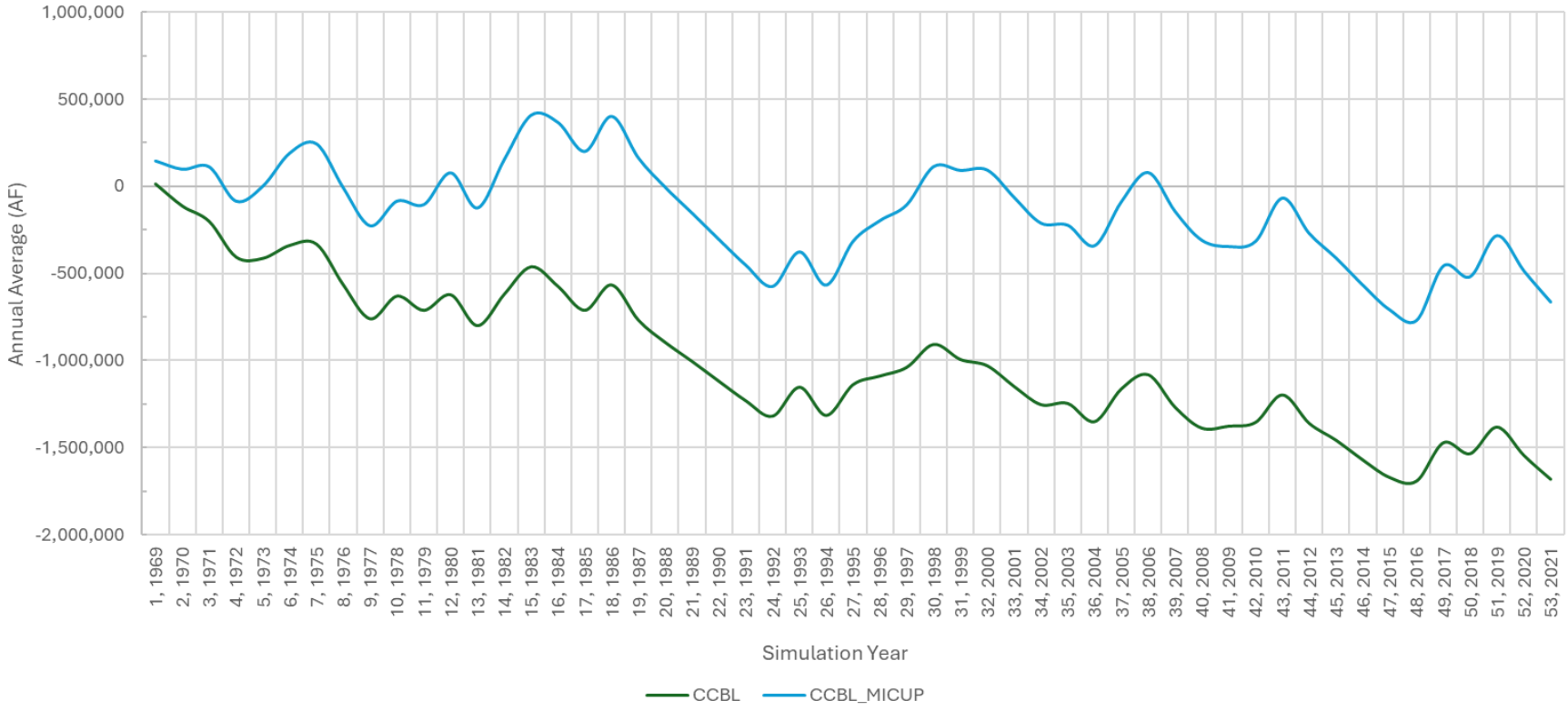


Figure 7. Cumulative Change in Storage in the Eastern San Joaquin Subbasin for CCBL and CCBL+MICUP



C. Groundwater Levels

Model results indicate that MICUP produces measurable improvements in groundwater elevations across the eastern and central portions of the Subbasin, particularly near the Mokelumne River and within the NSJWCD and SEWD GSAs. As shown in Figure 8 groundwater elevation difference contours (representing the difference at the end of the simulation as the average of model Layers 2 and 3) illustrate the spatial distribution of simulated groundwater level changes across the Model domain.

Increases in groundwater elevations are centered around the MICUP project components, where additional surface-water deliveries, increased recharge, and reduced groundwater pumping were simulated. The most significant increases, on the order of 30 to 35 feet, occur between the Mokelumne River corridor and the Camanche Reservoir.

The MICUP area of influence extends radially outward from this core region, with the magnitude of groundwater elevation gains gradually decreasing toward the southern and western portions of the Subbasin. Groundwater response to the MICUP diminishes at the most northern edges of the NSJWCD GSA boundary and within the City of Stockton, with changes of about 10 to 5 feet simulated.

Localized changes in groundwater elevations resulting from MICUP were evaluated based on the simulated groundwater levels at each of the RMS wells in the ESJ Subbasin.

Figure 9 shows the locations of the RMS wells and Table 6 associates the MICUP project components to the nearest RMS wells. Hydrographs from representative RMS wells near the proposed MICUP project components (e.g.,03N07E21L003, 04N07E20H003M, 02N07E29B001, and 02N08E15M002) consistently show higher groundwater elevations under the MICUP scenario (blue) relative to the CCBL scenario (green) throughout the simulation period, as shown in Figure 10 through Figure 13. These improvements are evident in both shallow (Layer 2) and deeper (Layer 3) Model layers, demonstrating that MICUP benefits extend vertically within the aquifer system. At RMS wells farther from the MICUP project footprint (e.g. 01N07E14J002 and NSJWCD-01), simulated groundwater elevation differences between the two scenarios are small, indicating that the MICUP effects diminish with distance from the project footprint, as seen in Figure 14 and Figure 15. The supplementary hydrographs at each of the RMS wells can be found in appendix C.

Overall, the model results demonstrate that MICUP enhances groundwater conditions both locally and across the subbasin, contributing significant benefits to groundwater elevations and storage.

Figure 8. Groundwater Difference Contour Map End of Simulation

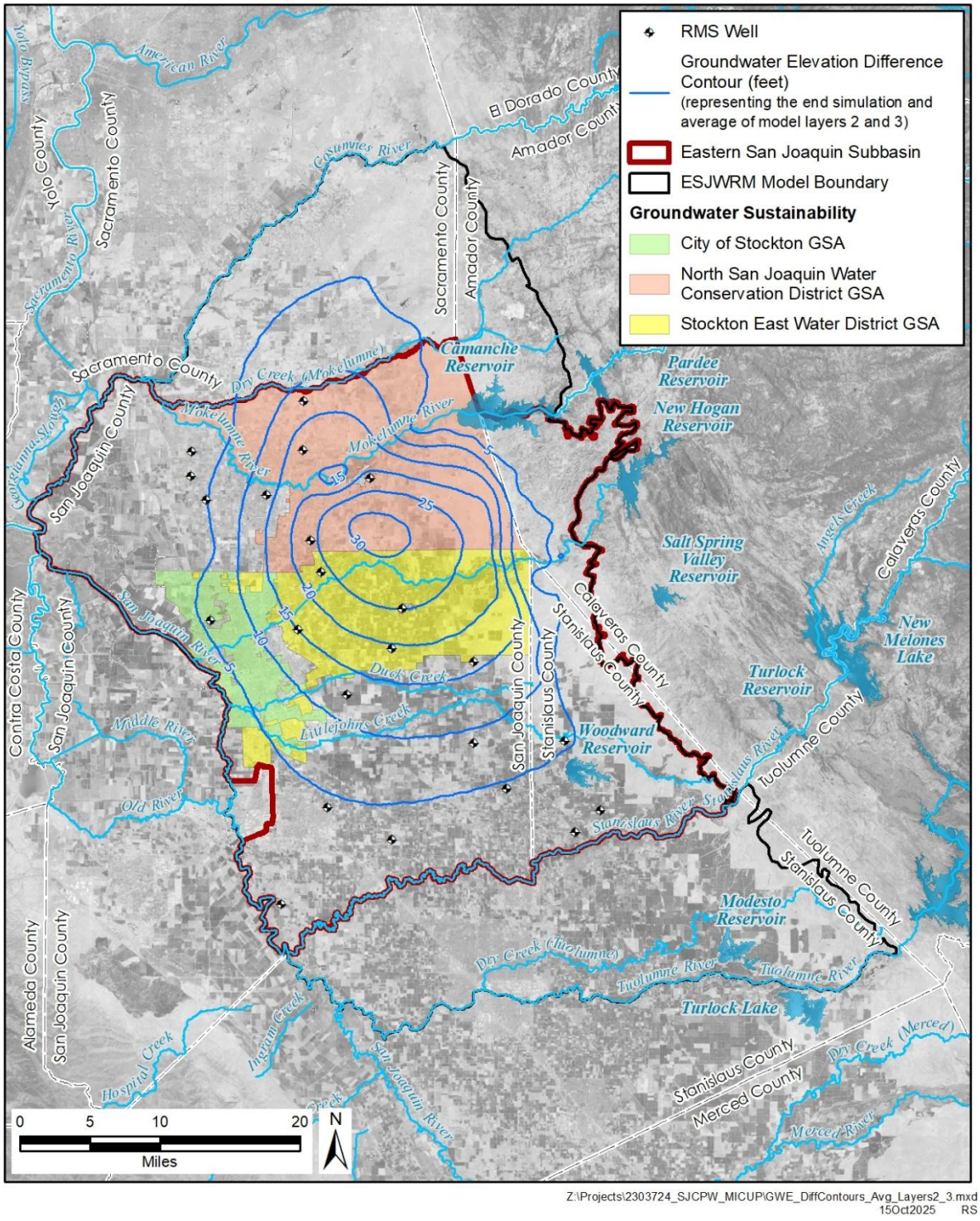


Figure 9. Groundwater Hydrograph and Stream Flow Hydrograph Locations

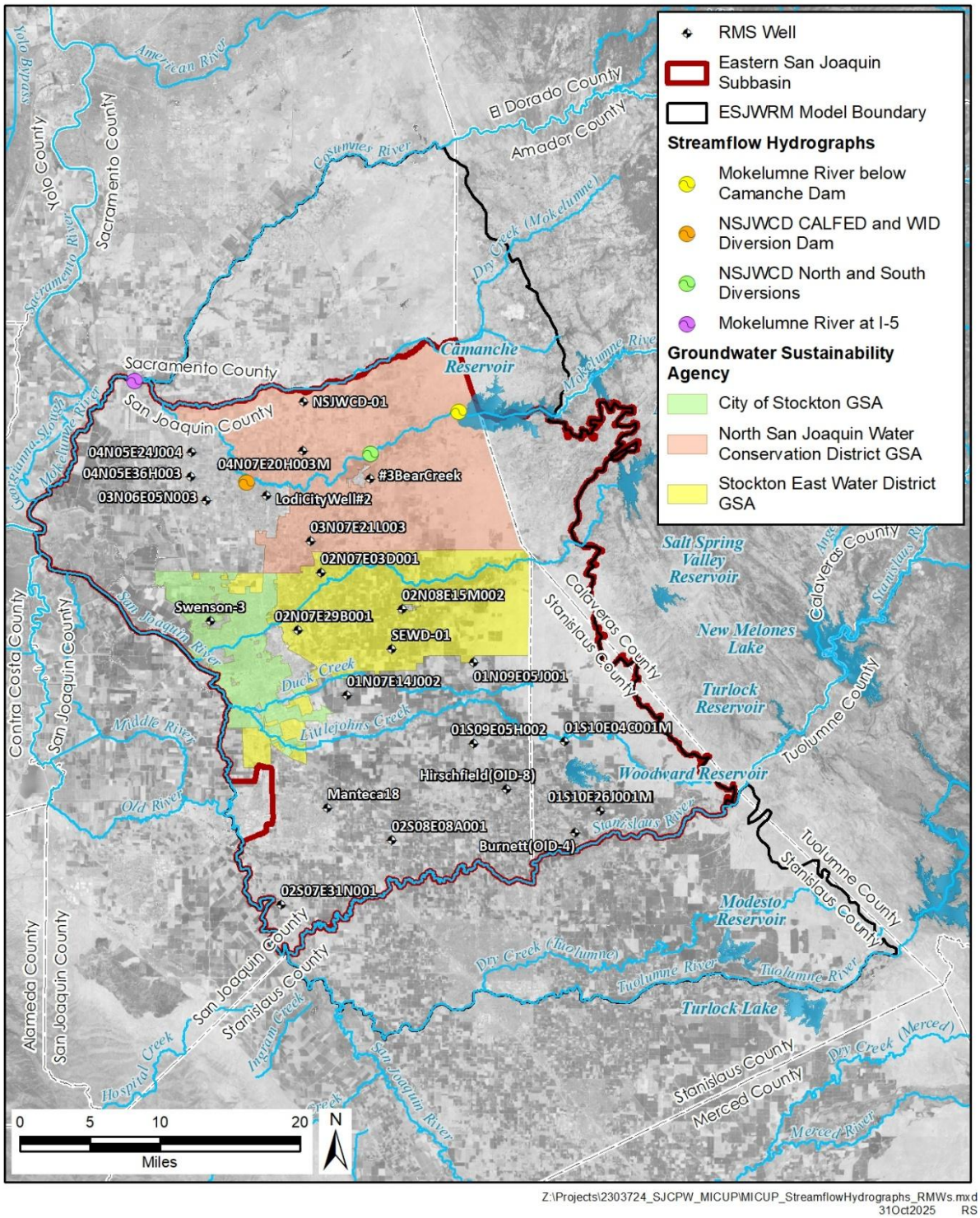


Table 6. MICUP Project Components and RMS Wells

Project Component Name	04N07E20H003M	#3 Bear Creek	Lodi City Well #2	03N06E05N003	03N07E21L003	02N07E03D001	02N08E15M002	Swenson-3	02N07E29B001
NSJWCD_No1_NS_FM	✓		✓						
NSJWCD_No2_NS_IL	✓		✓						
NSJWCD_No3_NS_RB	✓		✓						
NSJWCD_No4_SS_FM		✓			✓				
NSJWCD_No5_SS_IL		✓			✓				
NSJWCD_No6_SS_RB		✓			✓				
NSJWCD_No7_A_FM	✓	✓	✓		✓				
NSJWCD_No8_A_ASR						✓			
SEWD_No9_B_ASR						✓			
SEWD_No10_WL_FM						✓	✓		
SEWD_No11_WL_IL						✓	✓		
SEWD_No12_WL_DW						✓	✓		
SEWD_No13_MC_RBDW					✓	✓			
SEWD_No14_MC_RB					✓	✓			
CoS_No15_DR_RB			✓	✓		✓			
CoS_No16_DR_SD			✓	✓		✓			
CoS_No17_DWTP_RBDW								✓	✓

Note: This list only includes the ESJ Subbasin GSP RMS Wells that were near MICUP Project Components

Figure 10. Mokelumne River Flows below Camanche Dam

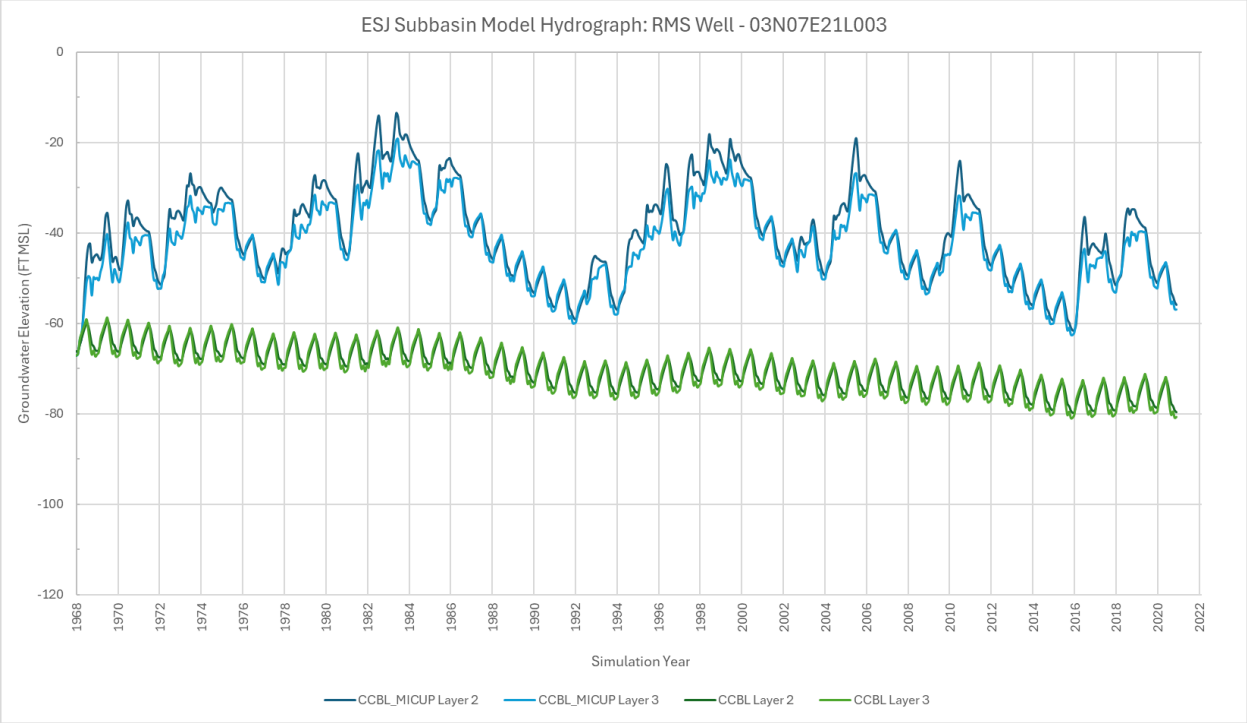


Figure 11. RMS Well Hydrograph Representing the Northern Area

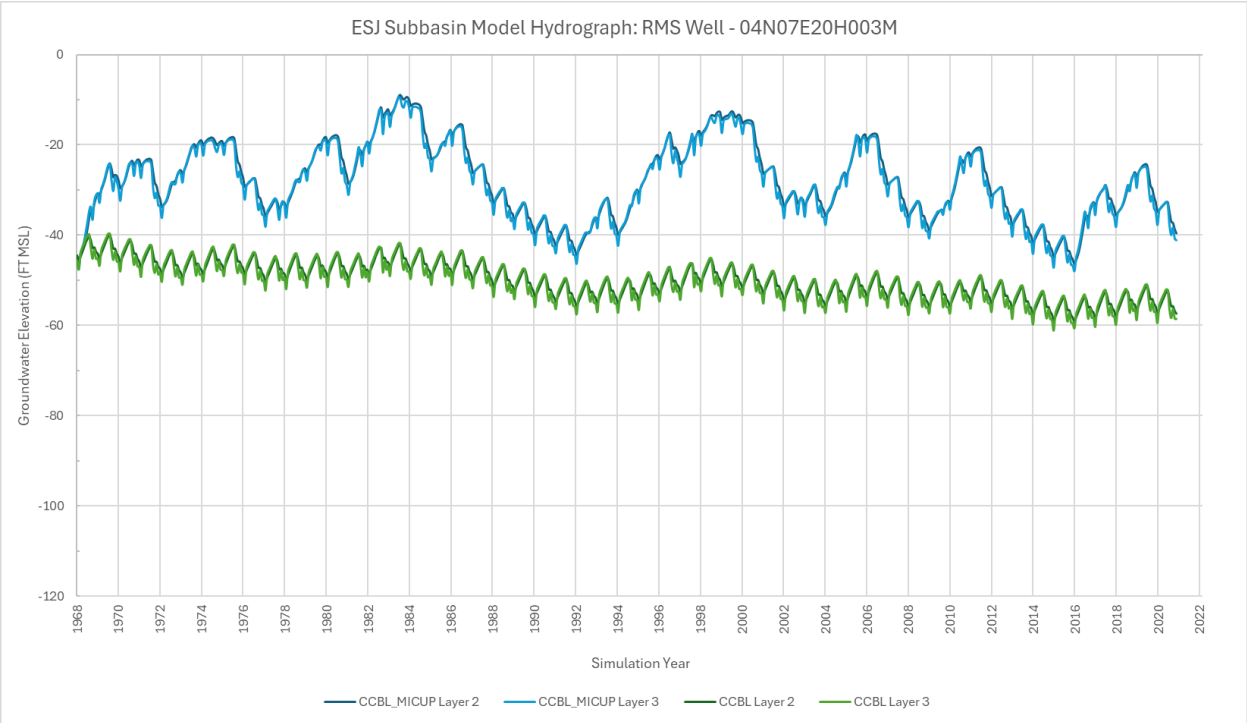


Figure 12. RMS Well Hydrograph Representing the Western Area

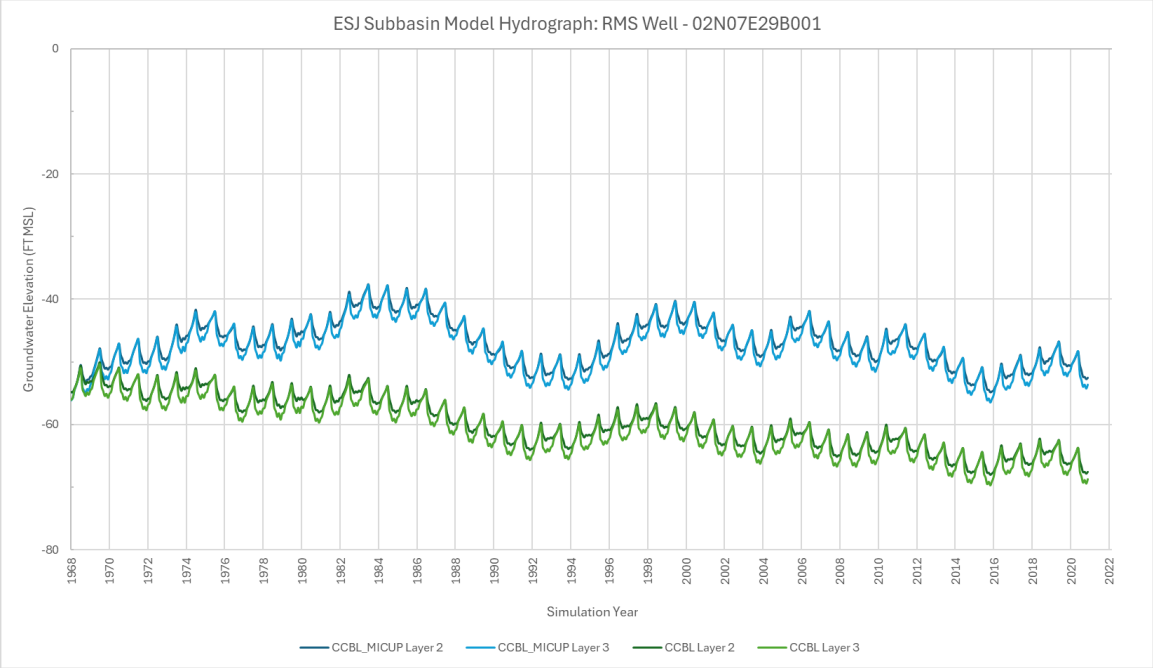


Figure 13. RMS Well Hydrograph Representing the Southern Area

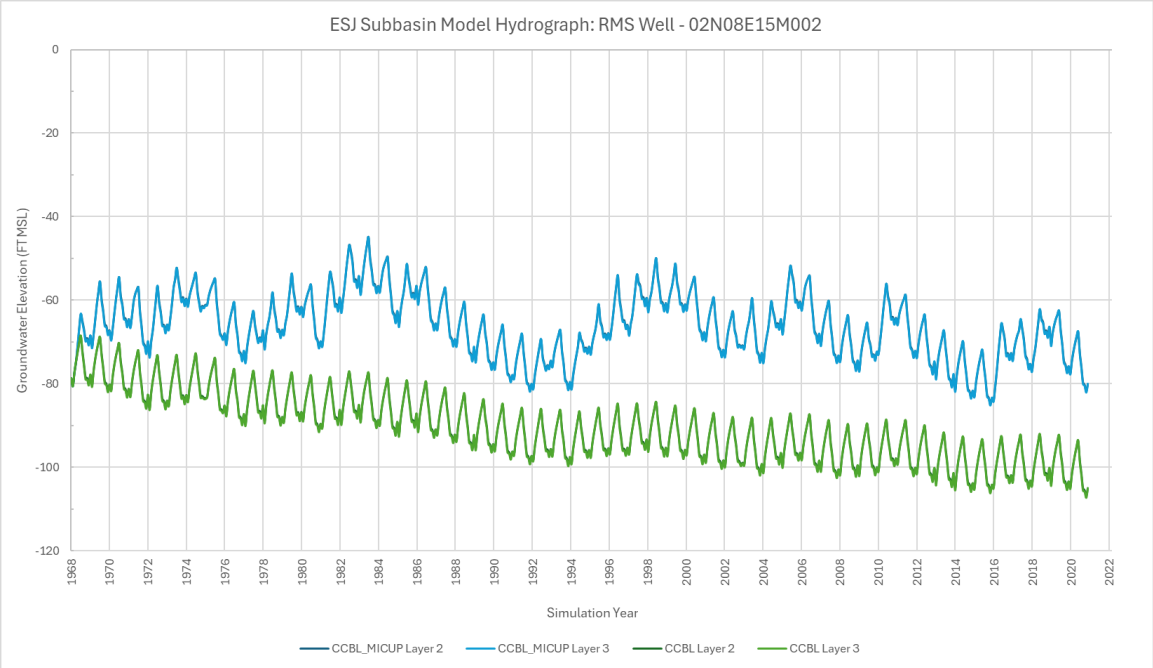


Figure 14. RMS Well Hydrograph Representing the Northern Area of the Subbasin outside of the Primary MICUP Area of Influence (no project component associated with this well)

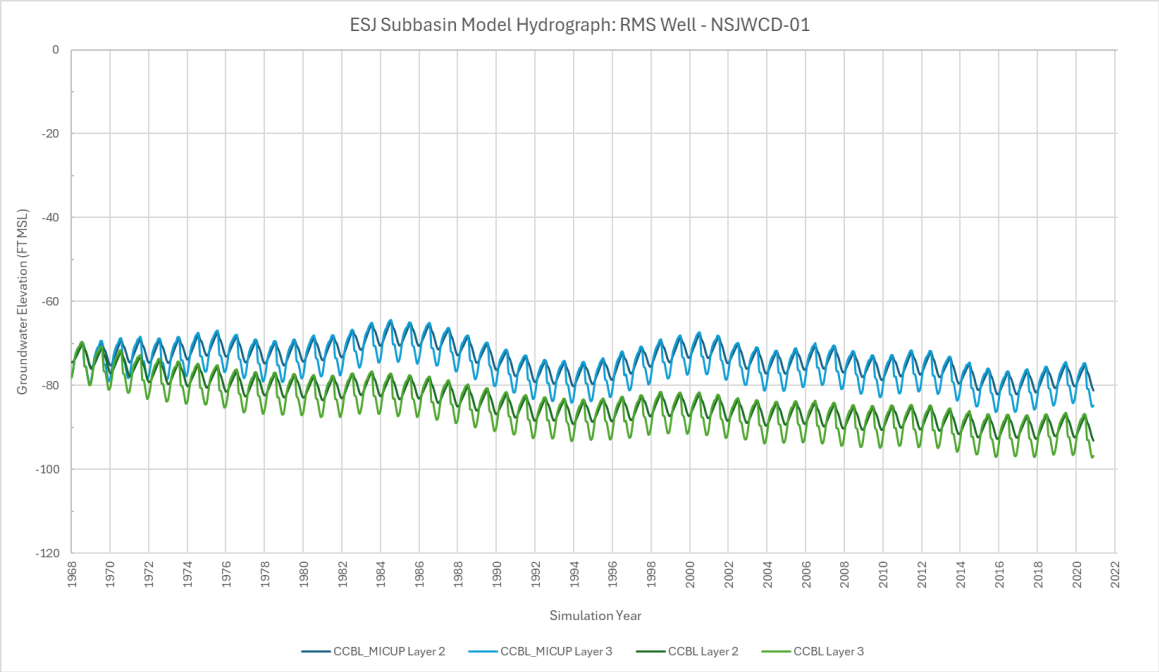
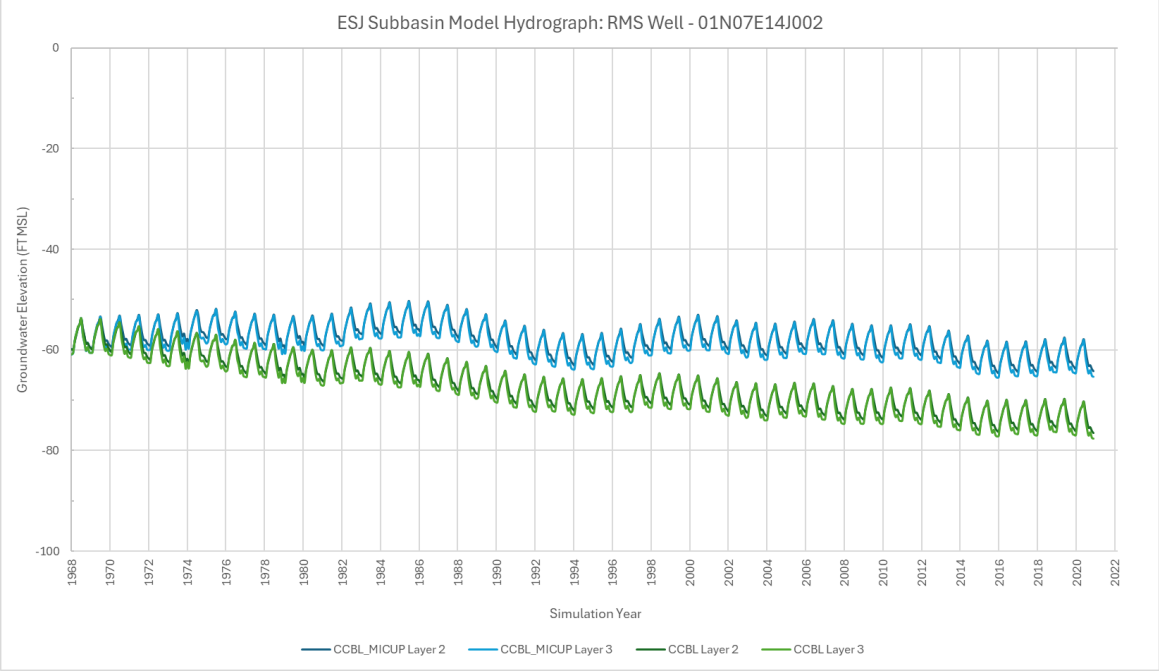


Figure 15. RMS Well Hydrograph Representing the Southern Area of the Subbasin outside of the Primary MICUP Area of Influence (no project component associated with this well)



D. Streamflow

Streamflow was evaluated at four representative locations along the Mokelumne River to assess the effects of the CCBL_MICUP relative to the CCBL. Figure 9 shows the locations of the streamflow hydrographs. Figure 16 through Figure 19 show exceedance charts with the percentage of time that monthly streamflow exceeded.

The model results show similar trends at the upstream and downstream of the MICUP, suggesting no adverse impacts to flow timing or magnitude (Figure 16 and Figure 19). Within the MICUP footprint, small to moderate differences are anticipated during high flow periods (Figure 17 and Figure 18). These variations are expected and attributed to increased surface water diversions under the MICUP during wet periods.

E. Stream Seepage

Figure 20 shows annual stream seepage reduction along the Mokelumne River over the simulation period, based on the difference between the CCBL_MICUP and CCBL. Under the CCBL conditions, the Mokelumne River is generally losing water from the stream to the aquifer system. However, with the implementation of MICUP and increased groundwater levels, stream seepage to the aquifer system is reduced under the CCBL_MICUP, retaining more flow within the Mokelumne River system.

The most substantial reductions in stream seepage occur in the upstream of the Mokelumne river (Reach 3). In comparison, downstream portion (Reaches 4 and 5) show smaller reductions. Therefore, the greatest streamflow benefits are anticipated in the upstream portion of the Mokelumne River.

Figure 16. Mokelumne River Flows below Camanche Dam

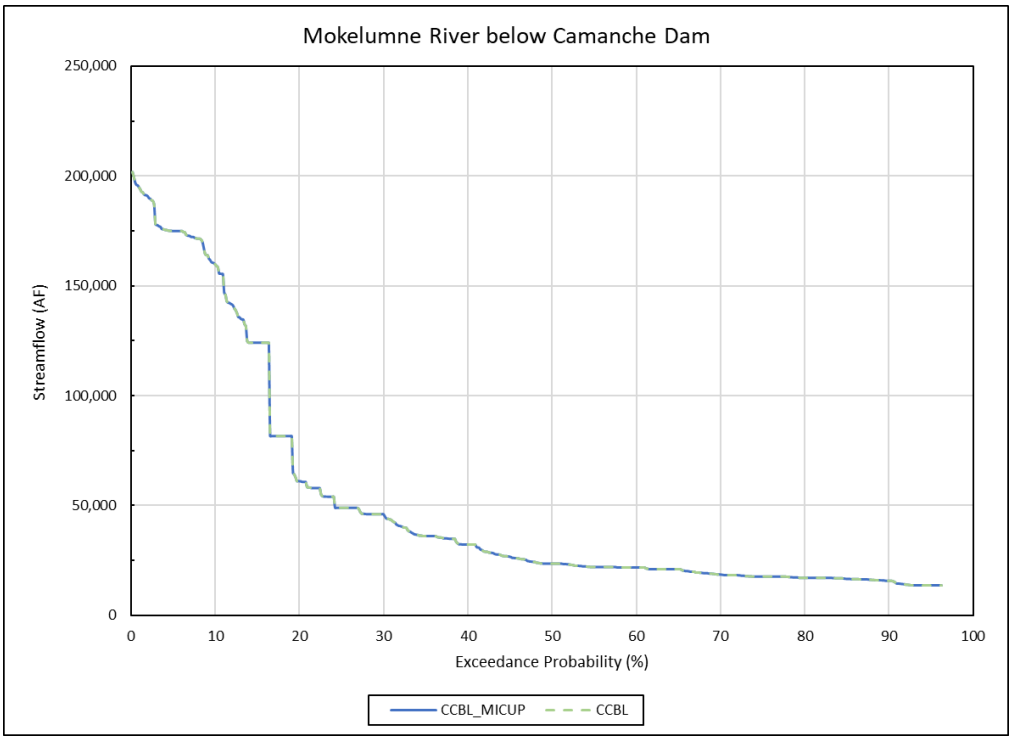


Figure 17. Mokelumne River Flows at NSJWCD North and South Diversions

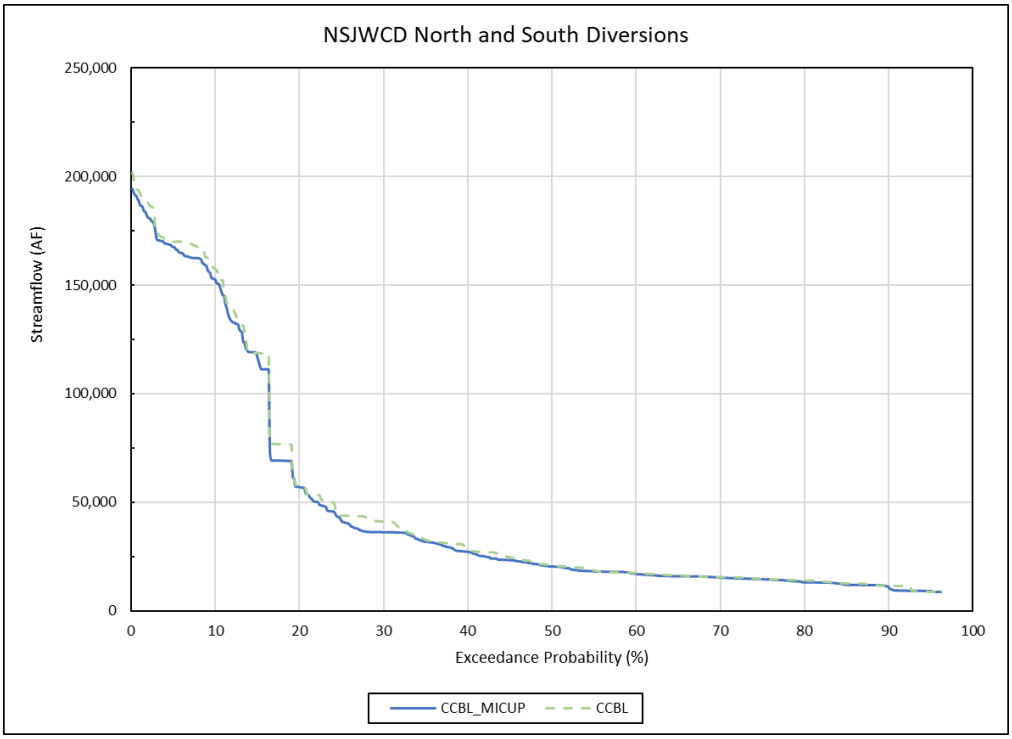


Figure 18. Mokelumne River Flows at NSJWCD CALFED Diversion & WID Diversion Dam

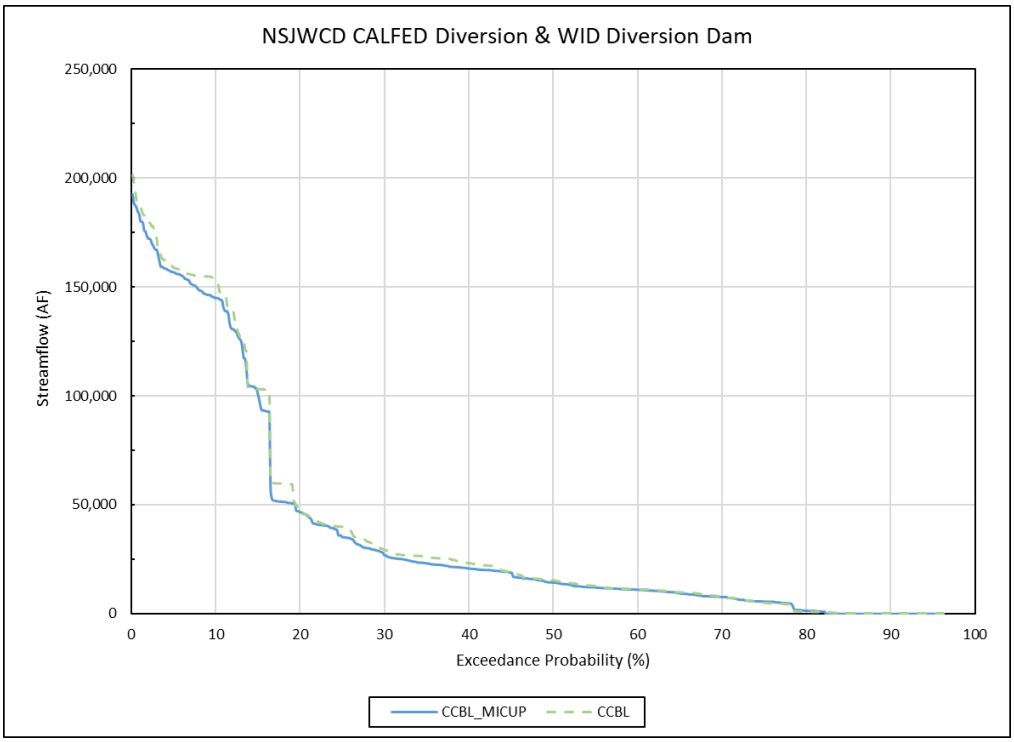


Figure 19. Mokelumne River Flows at I-5

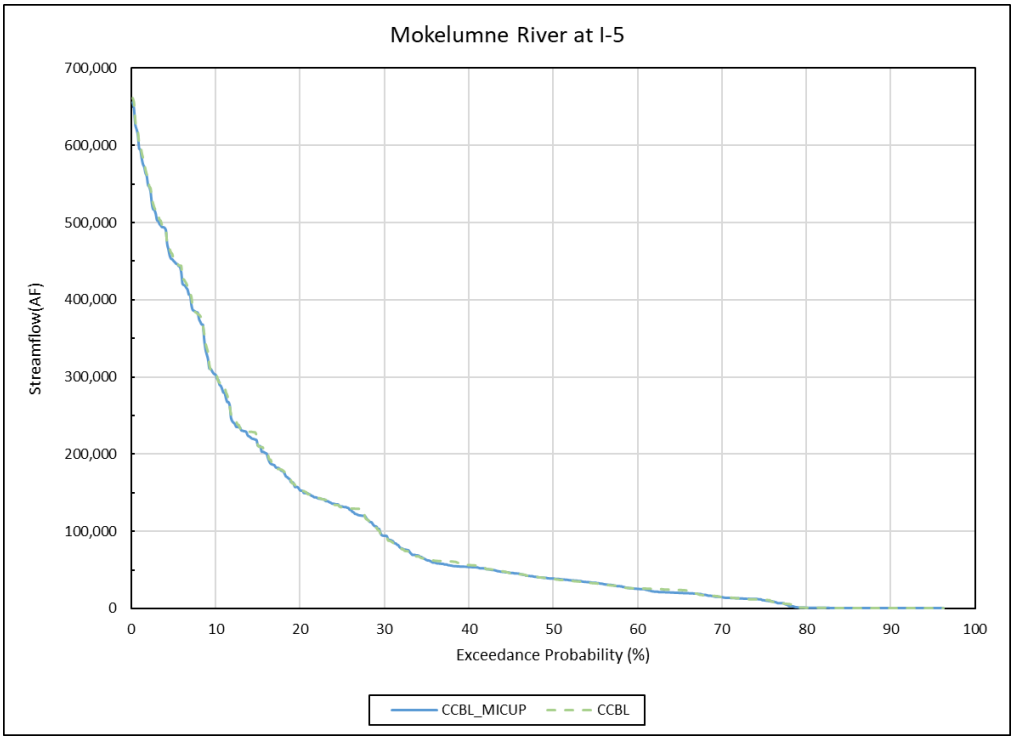
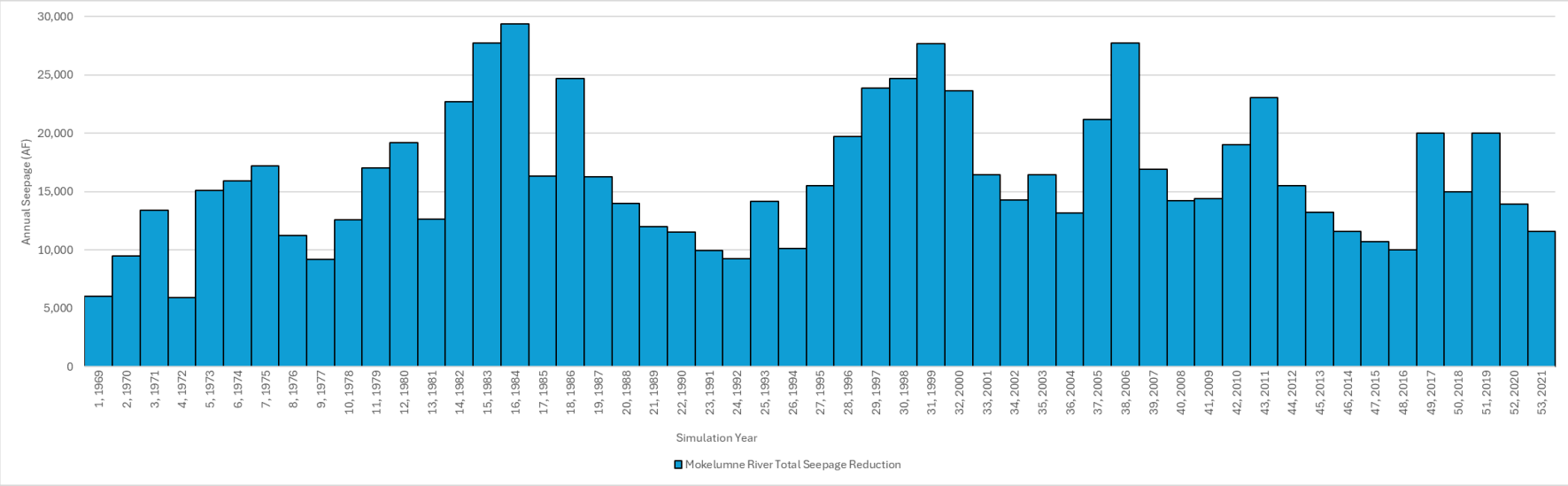


Figure 20. Annual Stream Seepage Reduction for the Mokelumne River



V. Summary

This TM evaluates the groundwater impacts of the MICUP in the ESJ Subbasin using two modeled scenarios: a Current Conditions Baseline (CCBL) and one with MICUP project components (CCBL+MICUP). The modeling results demonstrate that MICUP provides measurable benefits to groundwater sustainability for the ESJ Subbasin by increasing surface water deliveries, reducing groundwater pumping, and enhancing groundwater levels and storage. Additionally, the analysis shows reduced stream seepage, supporting MICUP's environmental and water supply objectives.

Key improvements in the ESJ Subbasin under the MICUP scenario include:

- **Increased surface water deliveries during wet periods**, which reduce reliance on groundwater pumping for agriculture, improve surface water substitution, and promote aquifer recharge. This leads to measurable rises in groundwater elevations, especially near the MICUP footprint (Figure 8).
- **Enhanced recharge,** leading to significant improvements in groundwater levels, as shown by elevation difference contours and RMW well hydrographs. Benefits are most pronounced near the Mokelumne River corridor (Figure 10 through Figure 13) and extend well beyond the MICUP footprint within the ESJ Subbasin (Figure 14, Figure 15, and Appendix C). These benefits are evident in both shallow and deeper aquifer layers (Model Layers 2 and 3).
- **Reduced groundwater overdraft**, with average annual overdraft decreasing from 32 TAF under the CCBL to 13 TAFY under the CCBL+MICUP. This reflects a net gain of approximately 19 TAFY in groundwater storage (Table 5, Figure 7). Over the 53-year simulation period, this translates to a cumulative increase of 1,015 TAF in groundwater storage across the ESJ Subbasin.

Overall, the modeling results consistently show that MICUP provides tangible improvements to groundwater storage, groundwater balance, and interconnected surface water throughout the simulation period and contributes to overall groundwater sustainability.

Appendix A Land and Water Use Budget by MICUP Partners

Table A - 1. Subregion 4 NSJWCD Land and Water Use Budget

Annual Average WY 1969 to 2021, SR4 North San Joaquin			
Land and Water Use Budget Component	**CCBL**	**CCBL+MICUP**	**Benefit of MICUP**
Agricultural Area (thousand acres)	71.3	71.3	0.0
Agricultural demand (TAFY)	-181.4	-180.9	0.5
Agricultural Groundwater Pumping (TAFY)	169.0	162.7	-6.4
Agricultural Surface Water Deliveries (TAFY)	12.4	19.4	7.0
Agricultural Surplus (TAFY)*	0.1	1.2	1.1
Urban Area (thousand acres)	6.8	6.8	0.0
Urban Demand (TAFY)	-4.6	-4.6	0.0
Urban Groundwater Pumping (TAFY)	4.6	4.6	0.0
Urban Surface Water Deliveries (TAFY)	0.0	0.0	0.0
Urban Shortage (TAFY)	0.0	0.0	0.0

Note: TAF = thousand acre-feet; *Number inverted to differentiate surplus from shortage; Values rounded to nearest tenth

Table A - 2. Subregion 6 City of Stockton Land and Water Use Budget

Annual Average WY 1969 to 2021, SR6 Stockton			
Land and Water Use Budget Component	**CCBL**	**CCBL+MICUP**	**Benefit of MICUP**
Agricultural Area (thousand acres)	19.0	19.0	0.0
Agricultural demand (TAFY)	-49.3	-49.3	0.0
Agricultural Groundwater Pumping (TAFY)	36.7	37.0	0.2
Agricultural Surface Water Deliveries (TAFY)	12.8	12.6	-0.2
Agricultural Surplus (TAFY)*	0.3	0.2	0.0
Urban Area (thousand acres)	43.4	43.4	0.0
Urban Demand (TAFY)	-73.2	-73.2	0.0
Urban Groundwater Pumping (TAFY)	16.7	16.7	0.0
Urban Surface Water Deliveries (TAFY)	56.5	56.5	0.0
Urban Shortage (TAFY)	0.0	0.1	0.0

Note: TAF = thousand acre-feet; *Number inverted to differentiate surplus from shortage; Values rounded to nearest tenth

Table A - 3. Subregion 7 SEWD Land and Water Use Budget

Annual Average WY 1969 to 2021, SR7 Stockton East

Land and Water Use Budget Component	CCBL	CCBL+MICUP	Benefit of MICUP
Agricultural Area (thousand acres)	59.1	59.1	0.0
Agricultural demand (TAFY)	-200.7	-200.7	0.1
Agricultural Groundwater Pumping (TAFY)	173.6	170.2	-3.4
Agricultural Surface Water Deliveries (TAFY)	27.2	30.6	3.4
Agricultural Surplus (TAFY)*	0.0	0.1	0.1
Urban Area (thousand acres)	3.5	3.5	0.0
Urban Demand (TAFY)	-3.4	-3.4	0.0
Urban Groundwater Pumping (TAFY)	3.4	3.4	0.0
Urban Surface Water Deliveries (TAFY)	0.0	0.0	0.0
Urban Shortage (TAFY)	0.0	0.0	0.0

Note: TAF = thousand acre-feet; *Number inverted to differentiate surplus from shortage; Values rounded to nearest tenth

Appendix B Groundwater Budget by MICUP Partners

Table B - 1. Subregion 4 NSJWCD Groundwater Budget

Annual Average WY 1969 to 2021, SR4 North San Joaquin			
Groundwater Budget Component	**CCBL**	**CCBL+MICUP**	**Benefit of MICUP**
Deep Percolation (TAF)	26.2	26.8	0.5
Other Recharge (TAF)	3.2	26.7	23.5
Flow to/from Stream (TAF) **	101.9	87.8	-14.1
Boundary Flow (TAF)	35.6	25.7	-9.9
Pumping (TAF)*	173.6	167.2	-6.4
Change in Storage (TAF)*	-6.7	-0.3	6.4

Note: TAF = thousand acre-feet; *Number inverted relative to the original sign; **Net value; Negative = outflow from Groundwater; Positive = inflow to Groundwater; Values rounded to nearest tenth

Table B - 2. Subregion 6 City of Stockton Groundwater Budget

Annual Average WY 1969 to 2021, SR6 Stockton			
Groundwater Budget Component	**CCBL**	**CCBL+MICUP**	**Benefit of MICUP**
Deep Percolation (TAF)	10.3	10.4	0.1
Other Recharge (TAF)	21.8	21.8	0.0
Flow to/from Stream (TAF) **	24.8	20.4	-4.4
Boundary Flow (TAF)	-5.6	0.7	6.4
Pumping (TAF)*	53.4	53.6	0.2
Change in Storage (TAF)*	-2.1	-0.4	1.8

Note: TAF = thousand acre-feet; *Number inverted relative to the original sign; **Net value; Negative = outflow from Groundwater; Positive = inflow to Groundwater; Values rounded to nearest tenth

Table B - 3. Subregion 7 SEWD Groundwater Budget

Annual Average WY 1969 to 2021, SR7 Stockton East

Groundwater Budget Component	CCBL	CCBL+MICUP	Benefit of MICUP
Deep Percolation (TAF)	45.0	45.2	0.2
Other Recharge (TAF)	38.6	60.5	21.9
Flow to/from Stream (TAF) **	15.8	15.4	-0.4
Boundary Flow (TAF)	75.9	55.4	-20.4
Pumping (TAF)*	180.3	176.9	-3.4
Change in Storage (TAF)*	-5.0	-0.3	4.6

Note: TAF = thousand acre-feet; *Number inverted relative to the original sign; **Net value; Negative = outflow from Groundwater; Positive = inflow to Groundwater; Values rounded to nearest tenth

Appendix C Groundwater Hydrographs at GSP Representative Monitoring Wells within ESJ Subbasin

Figure C - 1. RMS Well 04N05E24J004

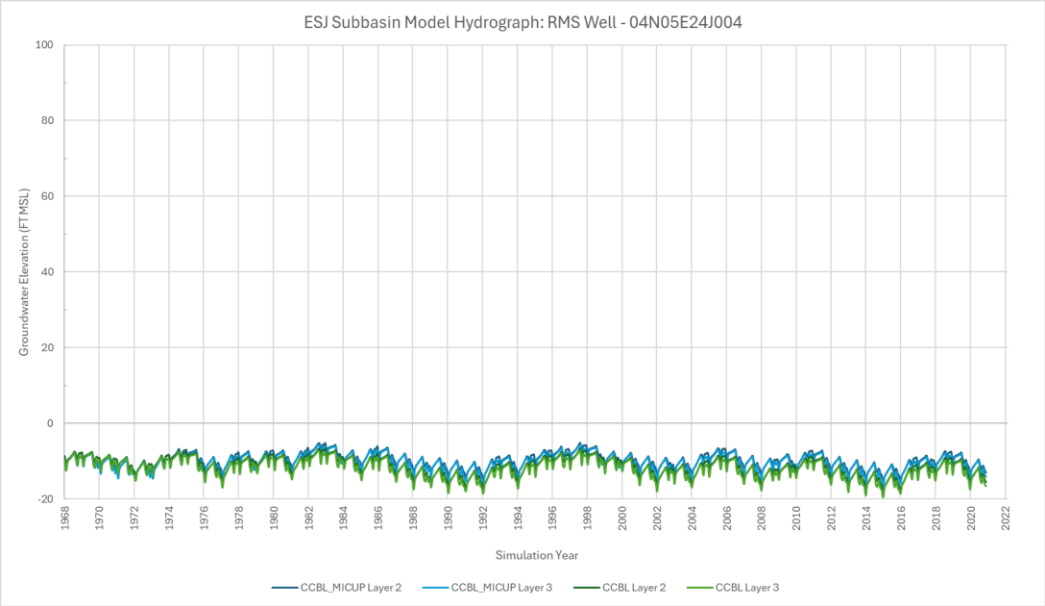


Figure C - 2. RMS Well 04N05E36H003

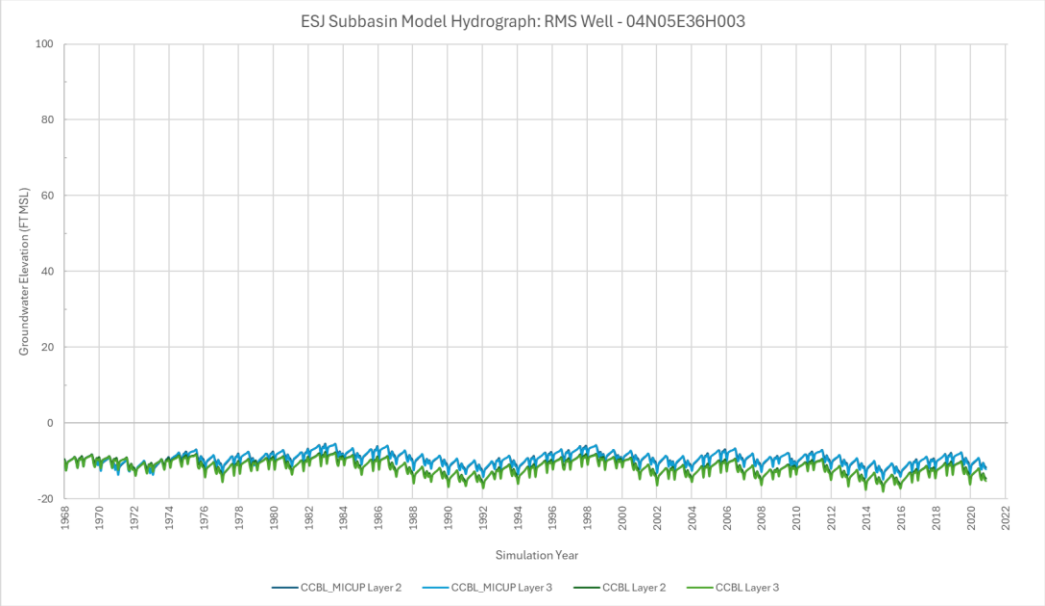


Figure C - 3. RMS Well #3 Bear Creek

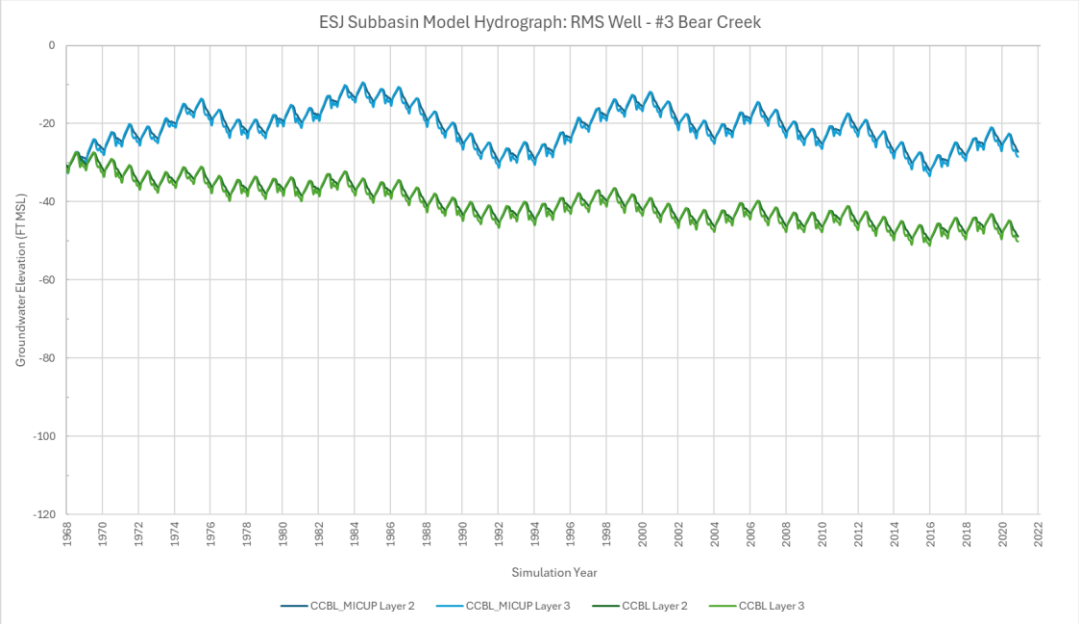


Figure C - 4. RMS Well 03N06E05N003

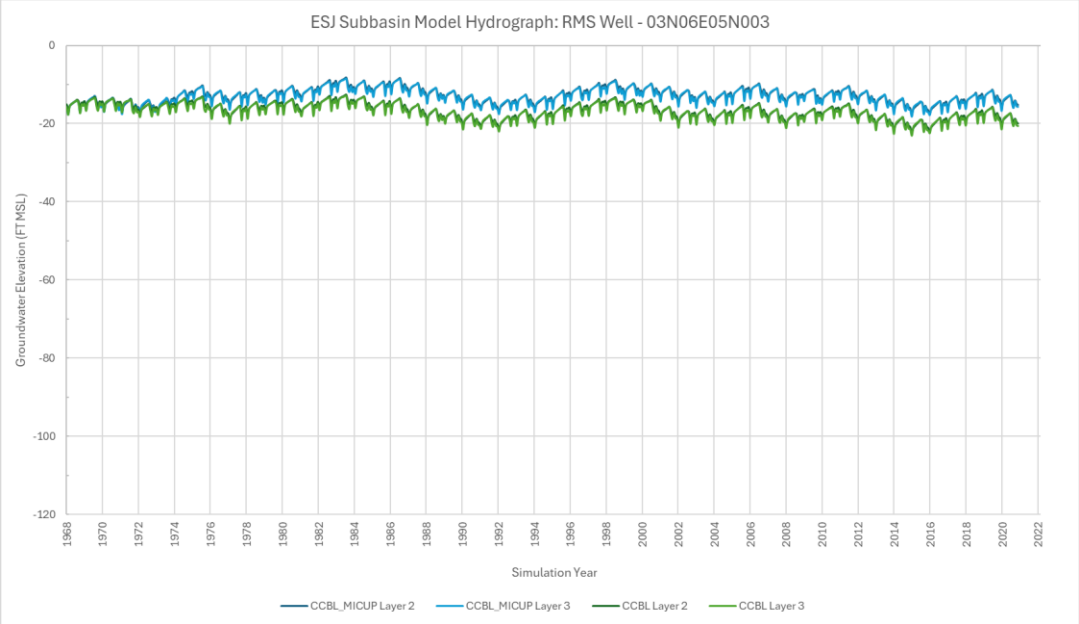


Figure C - 5. RMS Well Lodi City Well #2

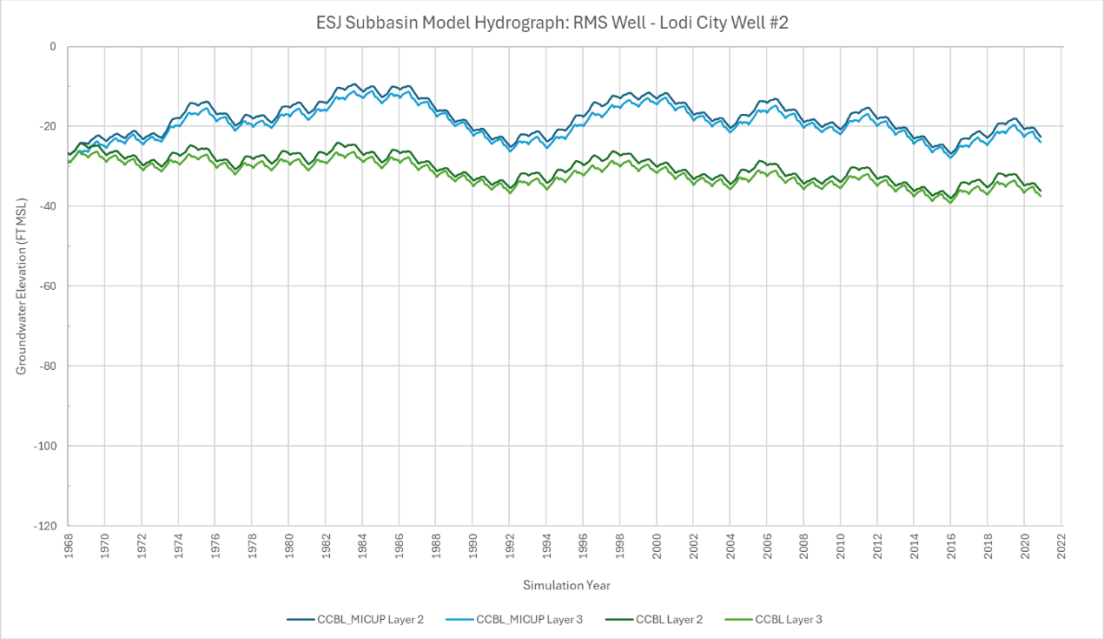


Figure C - 6. RMS Well Swenson-3

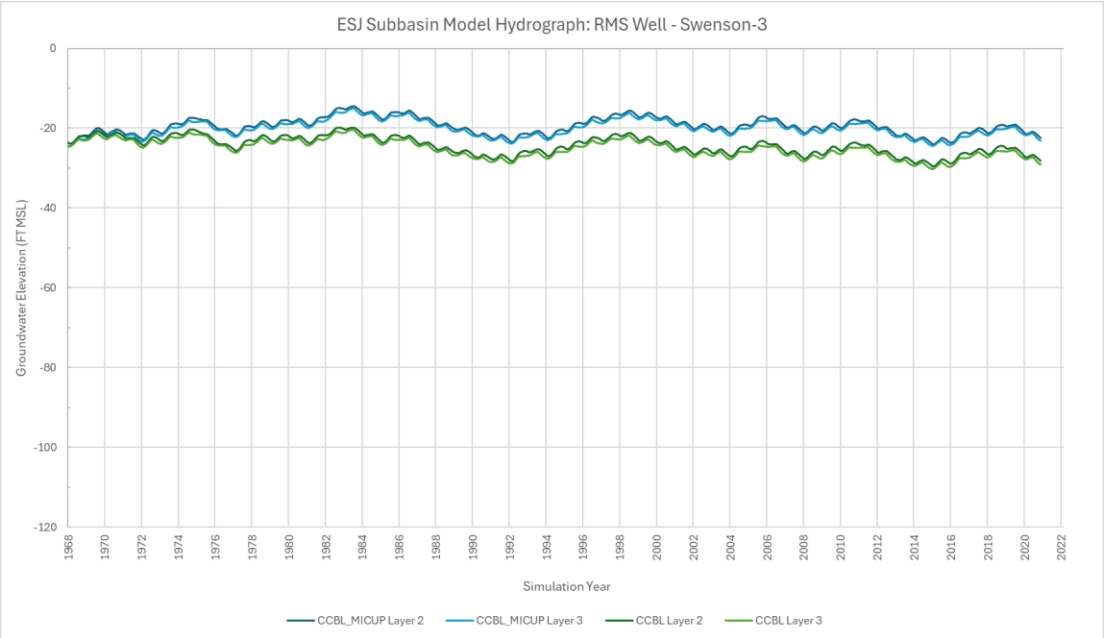


Figure C - 7. RMS Well 02N07E03D001

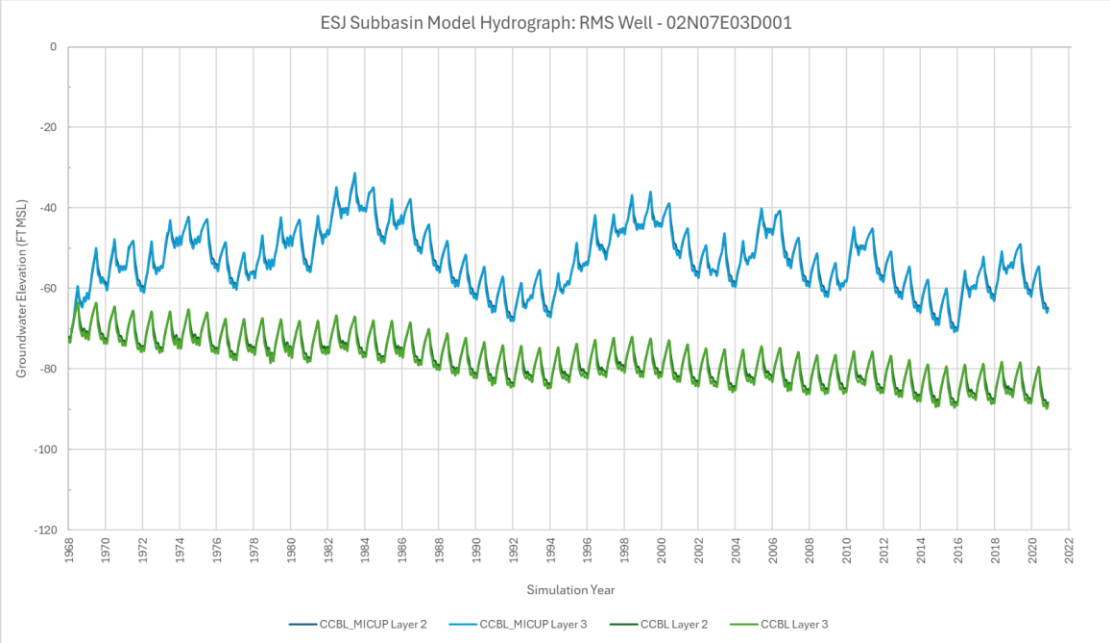


Figure C - 8. RMS Well SEWC-01

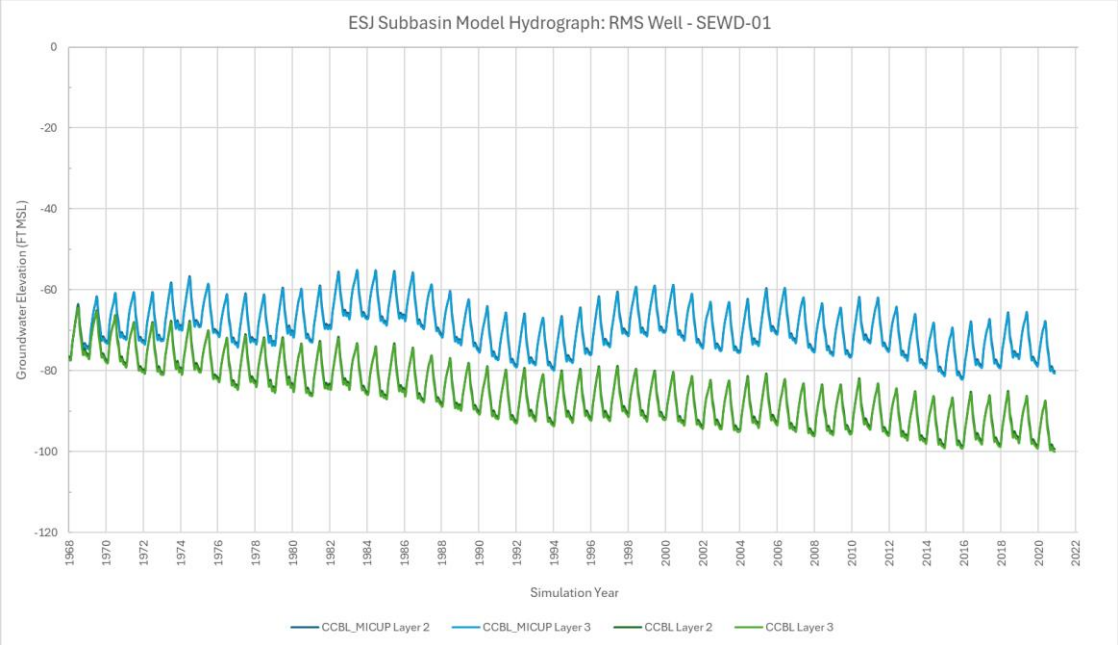


Figure C - 9. RMS Well 01N09E05J001

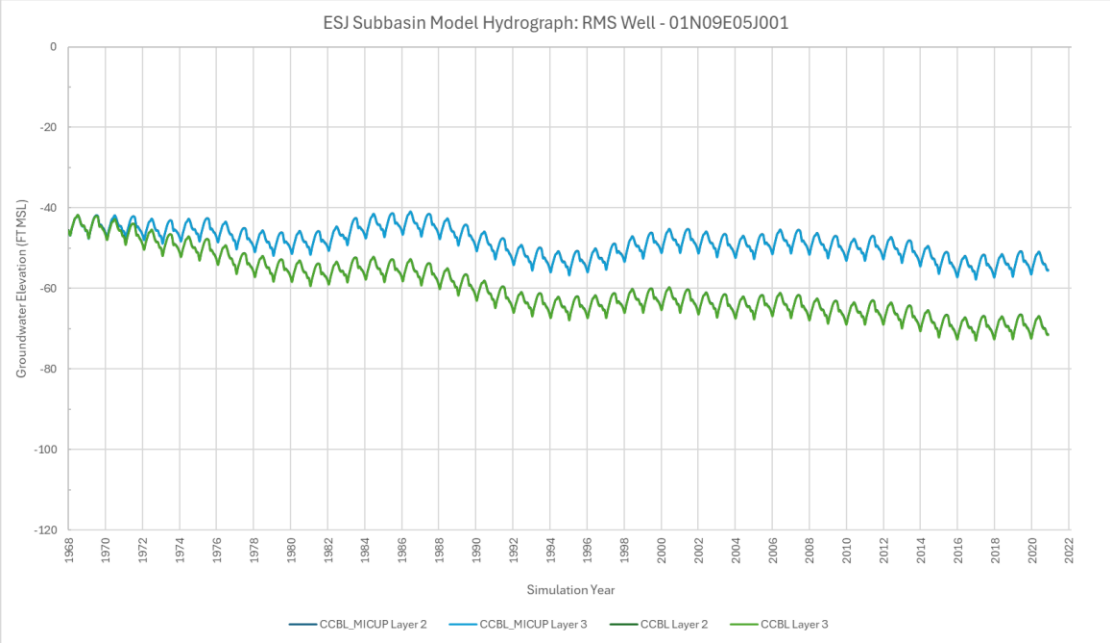


Figure C - 10. RMS Well 01S09E05H002

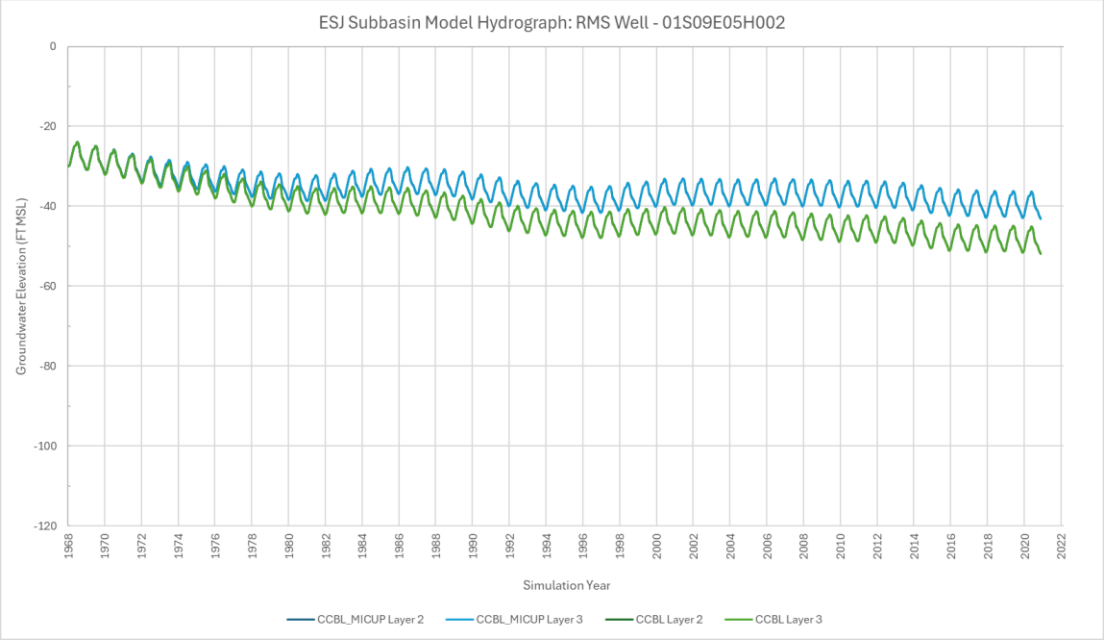


Figure C - 11. RMS Well Manteca 18

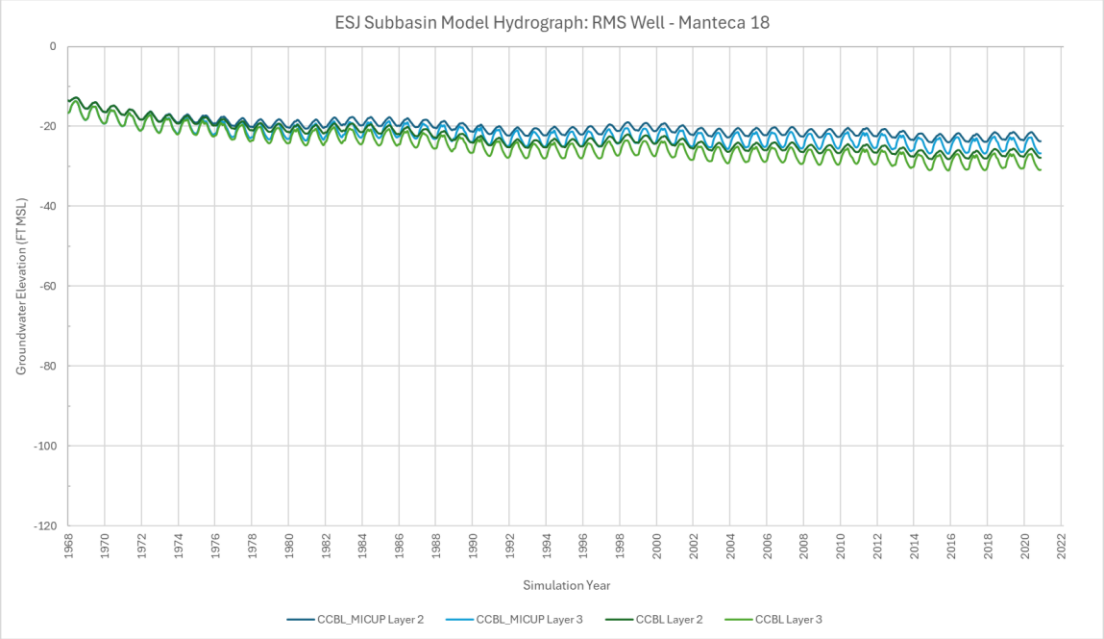


Figure C - 12. RMS Well 01S10E04C001M

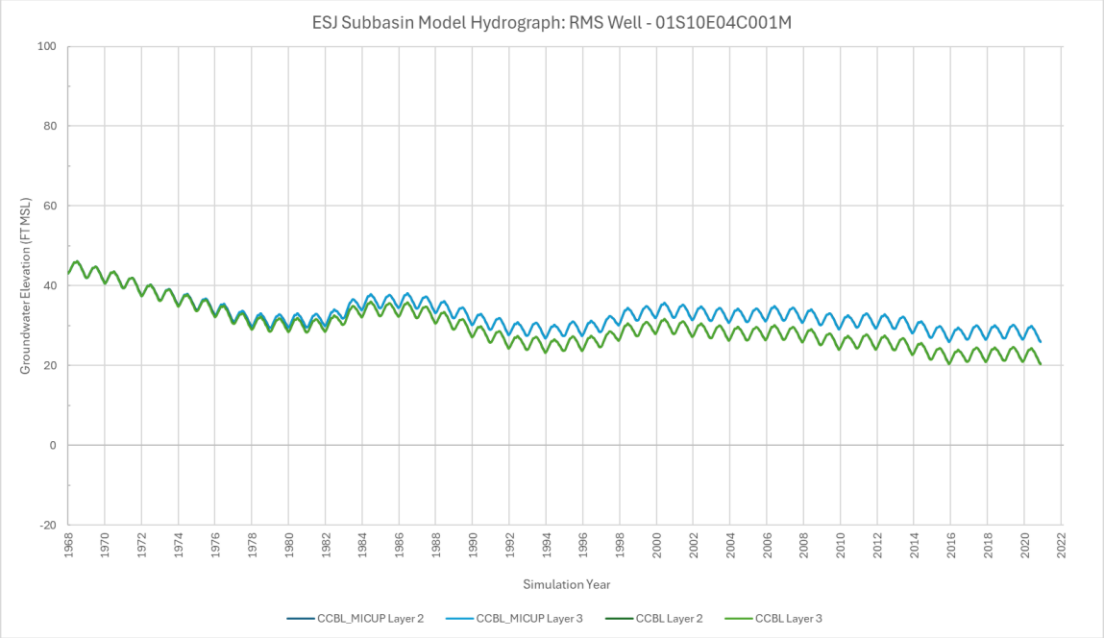


Figure C - 13. RMS Well Hirschfield (OIC-8)

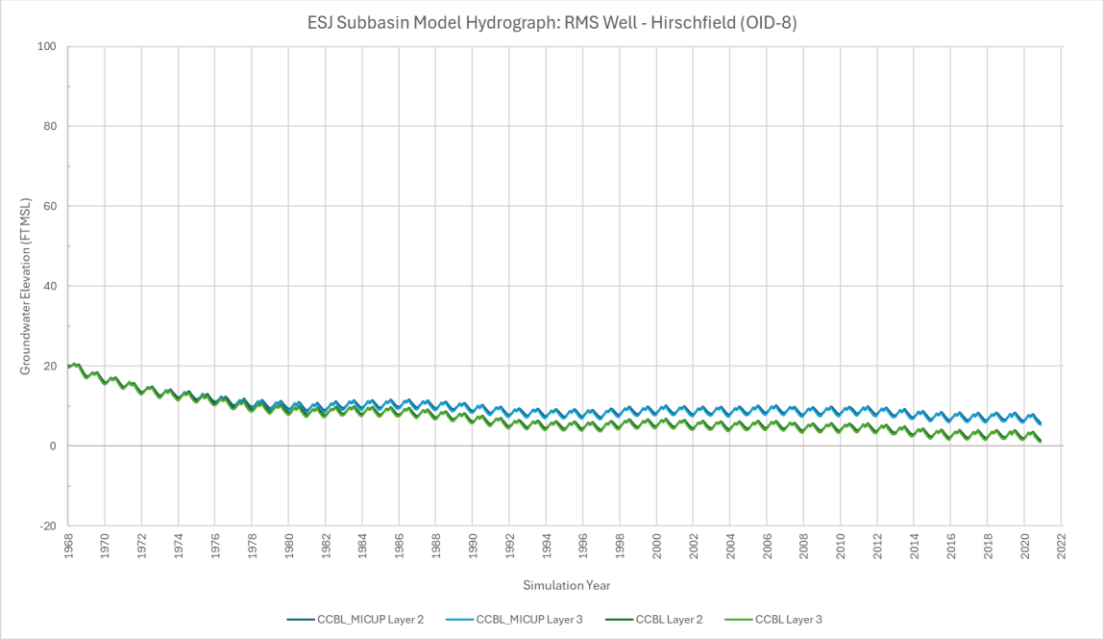


Figure C - 14. RMS Well Frankenheimer (01S10E26J001M)

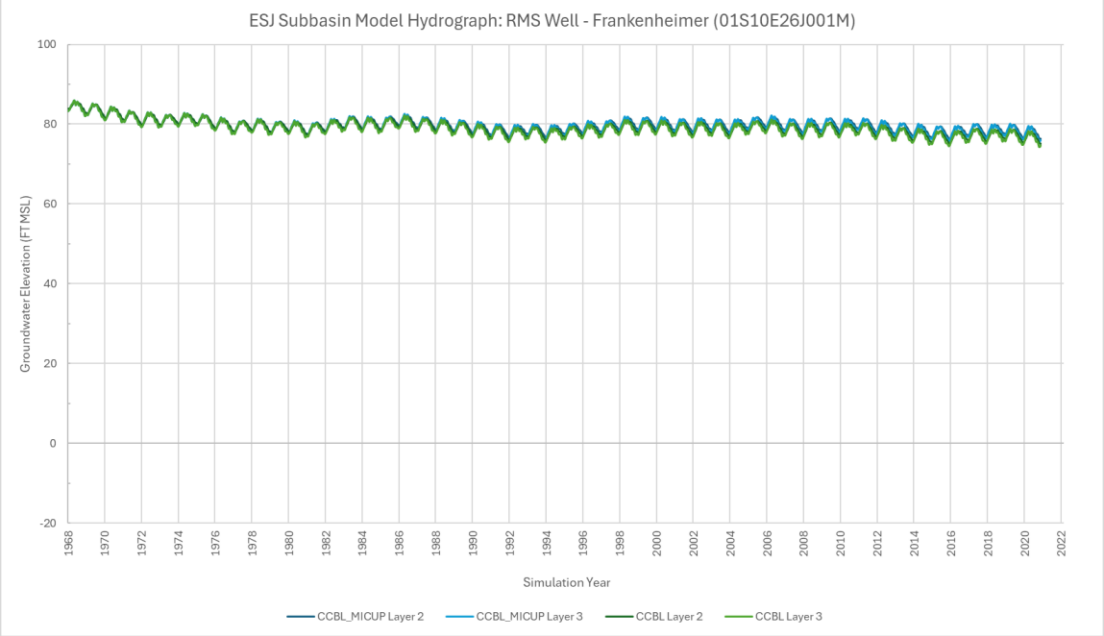


Figure C - 15. RMS Well 02S08E08A001

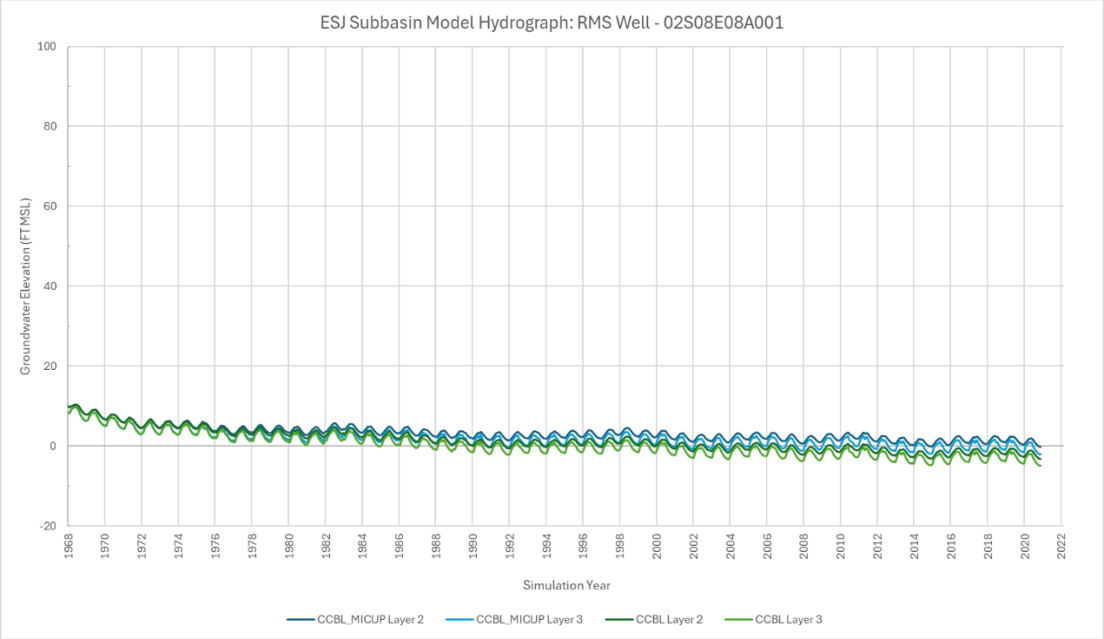


Figure C - 16. RMS Well Burnett (OIC-4)

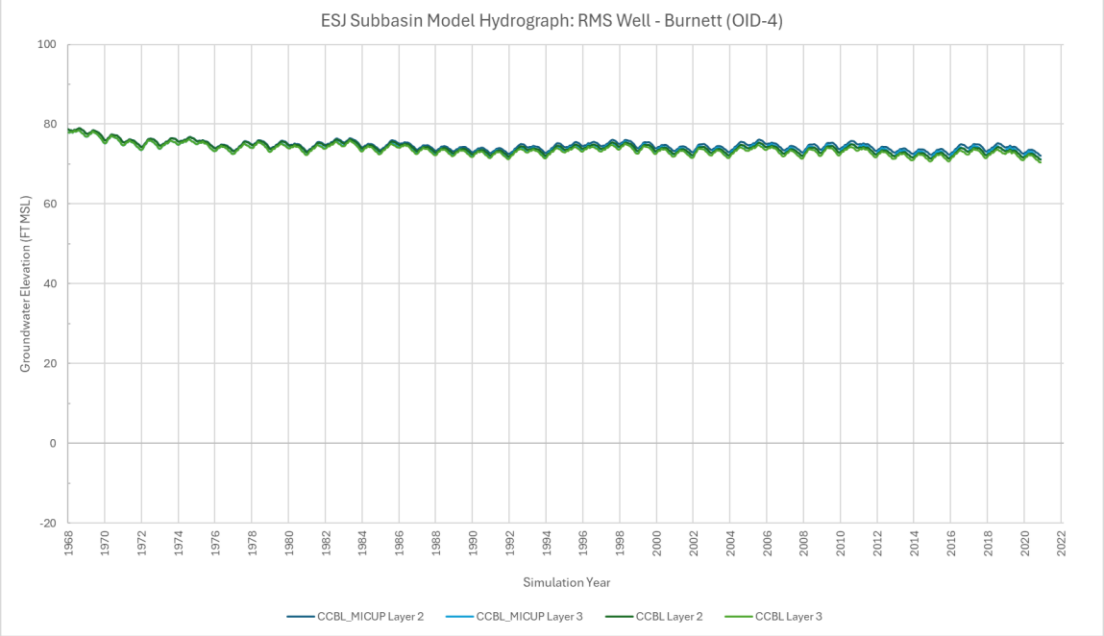
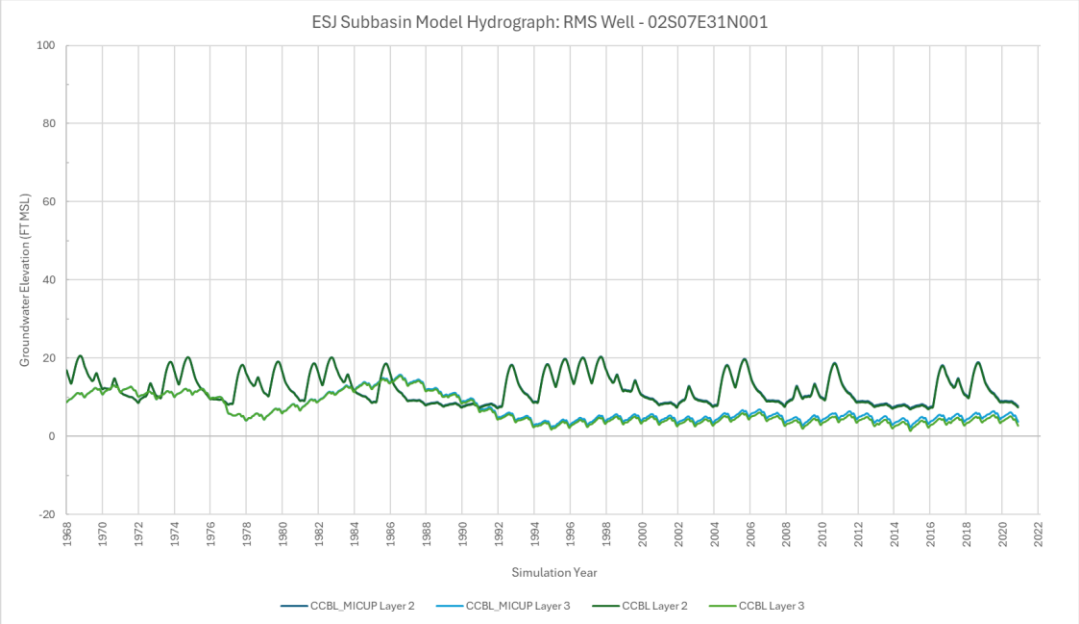


Figure C - 17. RMS Well 02S07E31N001



Appendix I-2

SJPCW-MICUP Delta Modeling

RESOURCE MANAGEMENT ASSOCIATES
WATER RESOURCES ENGINEERING

SJCPW-MICUP Delta Modeling

Technical Memorandum

April 2026

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Introduction

This technical memorandum provides documentation of numerical modeling that was performed using the Delta Simulation Model II (DSM2) to evaluate potential water quality impacts to the Sacramento-San Joaquin River Delta (Delta) from Mokelumne River flow scenarios proposed for the Mokelumne River Integrated Conjunctive Use Program (MICUP).

Methods

The Delta Simulation Model 2 (DSM2) was applied to Baseline and MICUP scenarios over a 53-year simulation period to assess potential impacts.

DSM2 is a one-dimensional mathematical model for dynamic simulation of tidal hydraulics, water quality, and particle tracking in a network of riverine or estuarine channels. The California Department of Water Resources (DWR) has developed a Delta version of the DSM2 model, that they and other agencies have applied for Delta hydrodynamic and water quality studies for over 20 years.

To perform the analysis, the DSM2 Delta Model requires time series of Delta inflows, flow diversions, gate operations, and salinity boundary conditions. For the MICUP study, the Baseline Delta boundary conditions were provided by the CalSim 3 model output from the 2023 State Water Project Delivery Capability Report (DWR, 2024). The MICUP scenario Delta boundary conditions were provided by the same CalSim 3 output, with certain adjustments described below to reflect MICUP operations. CalSim 3 is the modeling platform used to simulate California water operations for water resources planning.

The CalSim 3 water operations model and the DSM2 Delta hydrodynamic and water quality model are commonly linked to perform planning studies to support the California Environmental Quality Act and National Environmental Policy Act documentation related to the State Water Project (SWP) and the Central Valley Project (CVP). Examples include the Environmental Impact Statement for the Long-term operations (LTO) of the federal Central Valley Project and State Water Project (Reclamation, 2023), and the Environmental Impact Report (EIR) for the proposed Delta Conveyance Project (DWR, 2023a).

DSM2 Delta Model for Hydrodynamics and Water Quality

DSM2 is a one-dimensional mathematical model for dynamic simulation of tidal hydraulics, water quality, and particle tracking in a network of riverine or estuarine channels. Versus 2-D and 3-D models, the one-dimensional DSM2 can perform simulations in a reasonable time for a

long-term planning level analysis (e.g., 30 years) that cover a full range of Delta hydrologic and tidal conditions.

DSM2 consists of the modules HYDRO and QUAL. The DSM2-HYDRO simulates one-dimensional tidally driven hydrodynamics of the Delta system including flows, velocities, and water surface elevations, typically at a 15-minute time step. DSM2-HYDRO provides the flow input for DSM2-QUAL. DSM2-QUAL simulates one-dimensional fate and transport of conservative and non-conservative water quality constituents given a flow field simulated by DSM2-HYDRO. An extensive description of the DSM2-HYDRO and DSM2-QUAL programs and model inputs for planning analysis are available in the Appendix 5A, Section C1 of the Delta Conveyance EIR (DWR, 2023a).

The MICUP Delta water quality study utilized the DSM2 v.8.2.2 computational program with the planning studies dataset. The v.8.2.2 comprises the model network geometry, plus the calibrated hydrodynamic and water quality model coefficients. The DSM2 v.8.2.2 and previous versions have been calibrated and validated to historical observed data through various studies to best reproduce Delta flow, stage, and salinity (EC) (DWR, 2021, 2023b).

Figure 2 identifies the hydrodynamic and water quality boundary conditions and locations for the model. For the MICUP analysis, the DSM2 Delta inflows, exports, EC boundary conditions, and gate operations were principally set by the CalSim 3 Delivery Capability Report (DCR) 2023 outputs. For the MICUP scenario, Mokelumne River, Calaveras River and San Joaquin River flows were modified (1) to reflect increases in flows entering the Delta due to reductions in stream seepage associated with the higher groundwater elevations resulting from MICUP operations in the Eastern San Joaquin Subbasin, and (2) reductions in Mokelumne River flows due to MICUP diversions. In sum, out of the 636-month analysis period, the MICUP scenario included reductions in Mokelumne River outflows to the Delta during 243 months, and increases during 390 months; Calaveras River outflows to the Delta increased during 597 months and decreased during 36 months; and San Joaquin River flows increased during 607 months and decreased during 26 months.

The DSM2 model and model resources are available from the DWR, Delta Simulation Model II webpage: https://water.ca.gov/Library/Modeling-and-Analysis/Bay-Delta-Region-models-and-tools/Delta-Simulation-Model-II

Model Limitations

DSM2 is a one-dimensional model with inherent limitations in simulating hydrodynamic and transport processes in a complex estuarine environment such as the Delta (DWR, 2023a). DSM2 assumes that velocity in a channel can be adequately represented by a single average velocity over the channel cross-section, meaning that variations both across the width of the channel

and vertically through the water column are negligible. DSM2 does not conserve momentum at the channel junctions and does not model the secondary currents in a channel. DSM2 also does not explicitly account for dispersion due to flow accelerating through channel bends. It cannot model the vertical salinity stratification in the channels. DSM2 has inherent limitations in simulating the hydrodynamics related to the open water areas. For open waterbodies, DSM2 assumes uniform and instantaneous mixing over the entire open water area. Thus, it does not account for any salinity gradients that may exist within the open waterbodies. Significant uncertainty exists in flow and EC input data related to in-Delta agriculture, which leads to uncertainty in the simulated EC values. Caution needs to be exercised using model output in areas in the Delta where the in-Delta agriculture has a substantial effect on water quality.

The representation of Delta hydrodynamics in CalSim 3 is highly simplified (DWR, 2022). Simulated Delta channel flows represent tidally averaged or freshwater flow, averaged over a monthly timestep. Salinity in the Delta cannot be modeled accurately by the simple mass balance routing and coarse timestep used in CalSim 3. Salinity variation in the western Delta is affected by seawater intrusion. Delta salinity is also influenced by boundary inflows, operation of the Delta Cross Channel Gates, salinity of the San Joaquin River at Vernalis, and export pumping. Agricultural drainage and municipal and industrial wastewater discharges also can affect local salinity conditions. CalSim 3 uses an Artificial Neural Network (ANN) algorithm developed by DWR to translate water quality standards into flow equivalents that are to be met through SWP and CVP simulated operations. The ANN mimics the flow-salinity relationships as simulated in DSM2 and provides a rapid transformation of this information into a form usable by CalSim 3 operations.

The CalSim 3 Delta boundary conditions also have modeling limitations for purposes of this study with respect to Mokelumne River outflows to the Delta. Mokelumne River operations are modeled using MOCASIM. A comparison of MOCASIM model outputs for Mokelumne River outflow to the Delta with CalSim 3 Delta boundary conditions for Mokelumne River flow indicates a wide variation between the datasets, particularly in the late summer to fall months when decisions regarding the timing of releases from storage from Camanche Reservoir vary depending on real time conditions. This variation ranged from -913% percent to 100% percent.

These limitations should be considered when viewing results of the modeling performed for the purpose of CEQA.

Model Configuration

Geometric Extents

The DSM2 one-dimensional model grid, shown in Figure 1, extends from the Martinez tidal boundary to the Sacramento River above the confluence with the American River, and to the San Joaquin River near Vernalis.

Model Boundary Conditions

Figure 2 identifies the Delta inflows and exports employed in the DSM2 model, and the tidal boundary condition at the Martinez location. The "DCD" are Delta agricultural diversions and returns. Water quality boundary conditions are specified for all inflows and the Martinez boundary.

For this study, DSM2 model simulations were performed using downscaled CalSim 3 flows from the draft 2023 DCR existing conditions historical adjusted study, with a planning tide at Martinez.

For the MICUP flow scenario, Calsim 3 boundary condition flows were adjusted to reflect MICUP operations. Mokelumne River flows were adjusted to reflect the net effects of MICUP, including diversions that reduce outflows to the Delta and increased flows resulting from higher groundwater levels in the Eastern San Joaquin Groundwater Subbasin due to groundwater recharge, which reduces stream losses in the Mokelumne River. Calsim 3 boundary condition flows for the Calaveras and San Joaquin River were also adjusted to reflect increased flows that occur from MICUP groundwater recharge reducing stream losses in those streams.

The Martinez boundary EC was calculated based on Net Delta Outflow (NDO) for the Baseline and MICUP cases.

CalSim 3 Delivery Capability Report 2023

The DSM2 Delta Model requires flow and salinity boundary conditions to perform the analysis. The Baseline boundary conditions are provided by CalSim 3 studies supporting the 2023 State Water Project Delivery Capability Report (DWR, 2024). CalSim 3 is the model used to simulate California water operations for water resources planning. Embedded in the CalSim 3 model are numerical relationships for balancing water operations while maintaining Delta water quality and flow conditions to meet Delta standards and regulations.

The Delivery Capability Report (DCR), published on a bi-annual basis, provides information to the water agencies that receive water from the project for planning purposes and to forecast future needs for increased conservation measures, new facilities, or alternative water sources.

The CalSim 3 modeling studies for the DCR 2023 were performed for "Baseline" conditions (2023 LOD) and future 2043 conditions for three "levels of concern".

The Baseline CalSim DCR 2023 results were utilized to provide the required DSM2 boundary conditions for the MICUP scenario. No new CalSim 3 simulations were performed for the MICUP study. The DCR CalSim 3 model encompasses the 100 years of hydrology from 1921-2021. For the DCR 2023 Baseline CalSim model, the 100 years of historical hydrology and hydroclimate data were adjusted to incorporate the effects of the current climate change conditions (DWR, 2023c).

To model existing (Baseline) SWP water delivery capability, CalSim 3 DCR 2023 was configured by DWR to simulate existing regulations (SWRCB D-1641, 2019 BiOps and its associated ITP (2020)), infrastructure and demands using Adjusted Historical Hydrology. Delta water quality conditions inform the CalSim 3 water operations as Delta water quality and flow standards are objectives to be met. Data from the calibrated DSM2 simulations is used to train and validate the ANN embedded in the CalSim model to meet Delta salinity standards (DWR, 2022).

Links to the DCR 2023 reports and CalSim 3 models and data are available from the DWR, Delivery Capability Report and Studies webpage: https://water.ca.gov/Library/Modeling-and-Analysis/Central-Valley-models-and-tools/CalSim-3/DCR

Martinez EC Boundary Condition

The DSM2 downstream salinity (EC) boundary condition is located at Martinez at the western end of Suisun Bay. Salinity varies intertidally, and seasonally with increasing and decreasing outflow from the Delta. DSM2 simulations under historical Delta boundary conditions apply observed EC from Martinez monitoring station. For DSM2 planning study runs, the Delta outflow will vary between simulation scenarios and generally deviate from historical observed Martinez EC. DWR has developed a "G-Model" that combines the 15-minute astronomical tide at Martinez and Net Delta Outflow output by CalSim 3 or other water operation models to develop the required 15-minute EC for the DSM2 simulation (Ateljevich, 2001).

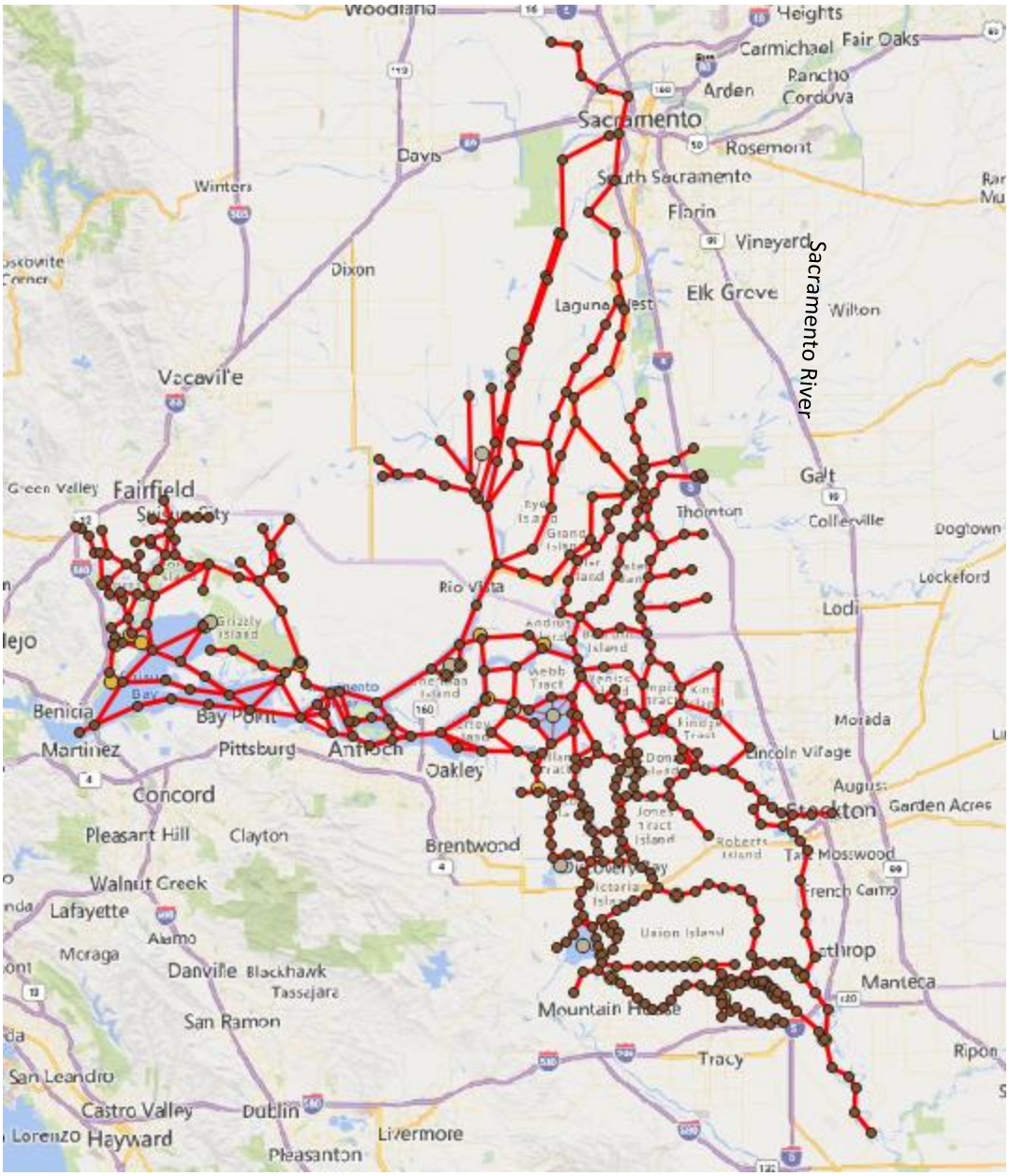


Figure 1 DSM2 model grid

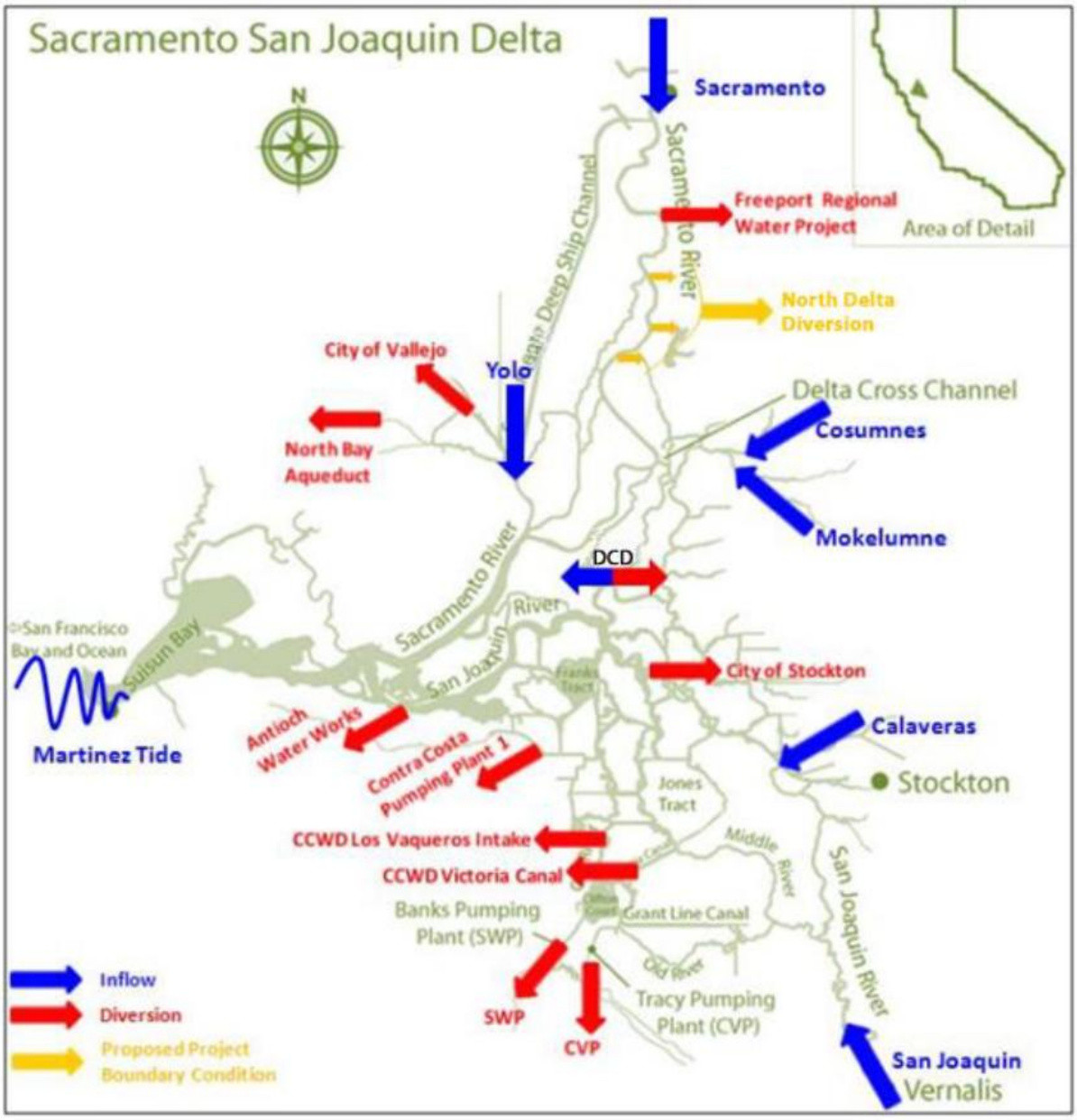


Figure 2 Hydrodynamic and water quality boundary conditions in DSM2[1] (Note: DCD are Delta agricultural diversions and returns.)

[1] from Delta Conveyance Project Final EIR, Appendix 5A-C

Modeling Evaluation Process

DSM2 was applied to Baseline and MICUP simulations to predict the potential water quality impacts of modified Mokelumne River, Calaveras River and San Joaquin River flows in the MICUP scenario, assuming no change in other Delta boundary conditions.

Modeling Scenarios

The following model simulations were performed.

- Baseline Condition
    - Purpose of this run was to simulate the Baseline (historical period adjusted for existing conditions)
- MICUP Scenario
    - Baseline Condition with flow reductions and increases for the Mokelumne River, Calaveras River and San Joaquin River associated with MICUP operations.

Analysis Period

The DSM2 model simulations were performed for November 1, 1921 through September 30, 2021. MICUP flow modifications began on October 1, 1968. The MICUP water quality impacts analysis was performed for the 53-year period extending from October 1, 1968 through September 30, 2021.

Evaluation of Water Quality Changes at Select D-1641 Compliance Stations and CCWD Intake Locations

Introduction

The salinity (EC) transport component of the DSM2 model was utilized to evaluate the potential salinity changes at select D-1641 compliance locations and Contra Costa Water District intake locations listed in Table 1 (see Figure 3 for map). Chloride changes at the water intakes were evaluated, as well as changes to X2.

Table 1 D-1641 Compliance Stations to be used for Project salinity evaluation.

D-1641 Station ID	Location
D22	Sacramento River at Emmaton
D15	San Joaquin River at Jersey Point
D29	San Joaquin River at Prisoner Point
C9	Clifton Court Forebay Intake
DMC1	Delta-Mendota Canal at Tracy Pumping Plant
C5	Contra Costa Rock Slough Intake
	CCWD Old River Intake
	CCWD Victoria Canal Intake

The modeling evaluation criteria were:

1) Examine if the Project has the potential to result in additional days of non-compliance with the D-1641 water quality objectives for EC and chloride for the Table 1 locations.
2) Examine if the Project has the potential to result in additional days of non-compliance with the D-1641 objectives for X2.

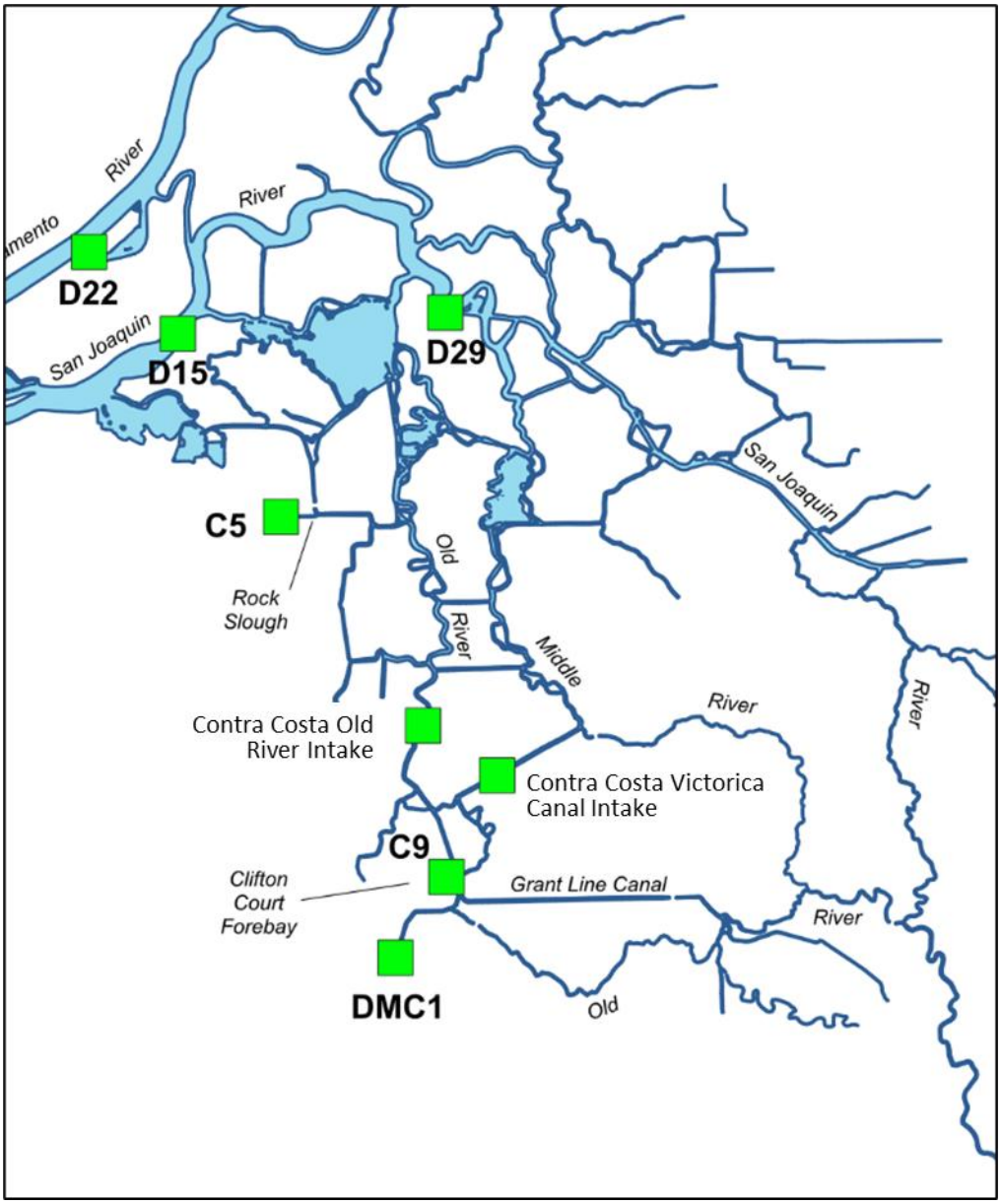


Figure 3 D-1641 compliance locations and Contra Costa water intakes

Evaluation of Potential Non-Compliance at Select D-1641 Stations

D-1641 standards may not be met under Baseline conditions due to some limitations of the CalSim monthly model. When the D-1641 standards are exceeded for the Baseline condition, the project impacts are evaluated by the number of additional days of exceedance versus the Baseline case.

The salinity modeling results were analyzed to evaluate whether the MICUP scenario resulted in any additional days of non-compliance with the D-1641 water quality objectives at Sacramento

River at Emmaton, San Joaquin River at Jersey Point and San Joquin River at Prisoners Point. The salinity (EC) water quality objectives for agriculture, and fish and wildlife are listed in Table 2.

During most years there are no additional violations of standards under the MICUP scenario. Table 3 summarizes the additional days of standards violations in the MICUP model scenario compared to the Baseline scenario.

Results at the water intakes were evaluated relative to the D-1641 chloride objectives listed in

Table 4.

Table 2 D-1641 Station Salinity Water Quality Objects – Fish and Wildlife and Agriculture. Standards are presented in mmho/cm (1 mmho/cm = 1000 µS/cm).

Station	Water Year Type[2]	Number of days standards apply	Fish and Wildlife		Agriculture			
			Value[3]	Time Period	Value[3]	Time Period	Value[3]	Time Period
D22 – Sacramento at Emmaton	Wet	137	Not applicable		0.45	Apr 1 – Aug 15	Not applicable	
	Above Normal	137			0.45	Apr 1 – Jun 30	0.63	Jul 1 – Aug 15
	Below Normal	137			0.45	Apr 1 – Jun 19	1.14	Jun 20 – Aug 15
	Dry	137			0.45	Apr 1 – Jun 14	1.67	Jun 15 – Aug 15
	Critical	137			2.78	Apr 1 – Aug 15	Not applicable	
D15 – San Joaquin at Jersey Point	Wet	137	0.44	Apr 1 – May 31	0.45	Apr 1 – Aug 15	Not applicable	
	Above Normal	137	0.44	Apr 1 – May 31	0.45	Apr 1 – Aug 15	Not applicable	
	Below Normal	137	0.44	Apr 1 – May 31	0.45	Apr 1 – Jun 19	0.74	Jun 20 – Aug 15
	Dry	137	0.44	Apr 1 – May 31	0.45	Apr 1 – Jun 14	1.35	Jun 15 – Aug 15
	Critical	137	Not applicable		2.2	Apr 1 – Aug 15		
D29 – San Joaquin at Prisoners Point	Wet, Above Normal, Below Normal, Dry	61	0.44	Apr 1 – May 31	Not applicable			

[2] Sacramento Valley Water Year Hydrologic Classification

[3] Maximum 14-day running average of mean daily EC (mmho/cm)

Table 3 Summary of additional days of standards violation in the MICUP scenario compared to the Baseline scenario

Standard	Total Days Modeled with Standard in Effect over 53 years	MICUP Scenario Additional Days of Standard Not Met over 53 years	Percent of Days over 53 years
Emmaton	7,261	21	0.3%
Jersey Point	7,261	33	0.5%
Prisoners Point	3,233	0	0.0%
X2	14,325	28	0.2%

Table 4 D-1641 water quality objectives for water intakes.

Compliance Location	Station Number	Criteria Description	Water Year type	Value
CCWD at Rock Slough or Antioch Intake	C5 or D12	Maximum mean daily Chloride of 150 mg/L for required number of days	 Wet Abv Norm. Blw Norm. Dry Critical	# of days*[4] each calendar year ≤ 150 mg/L Cl 240 190 175 165 155
CCWD at Rock Slough -and- West Canal at Clifton Court -and- DMC Canal at Tracy PP -and- Barker Sl -and- Vallejo PP	C5 C9 DMC1 SLBAR3 C19	Maximum mean daily Chloride	All	250 mg/L

Agriculture, Fish and Wildlife Compliance Stations

Compliance for Emmaton (D22), Jersey Point (D15) and Prisoners Point (D29) is determined from the 14-day running average of mean daily EC. The compliance period begins on April 1 and ends August 15 for the Emmaton (D22) and Jersey Point (D15) stations, and ends May 31 for the Prisoners Point (D29) station. Specific details are provided in Table 2.

Sacramento River at Emmaton (D22)

At Emmaton, MICUP flows caused an additional 21 days of standards violations over the 53-year analysis period, equating to 0.3% of the 7,261 days when standards are in effect. These violations are summarized by month and analysis year in Table 5.

[4] # of days must be met in intervals not less than two weeks

Table 5 Number of days of additional standards violations at Emmaton under MICUP scenario, per month of compliance periods over the analysis period

Year	Water year type[5]	**Emmaton - MICUP:** number of days when additional standards violations occur per month of compliance periods over analysis period					
		Apr (30 days)	May (31 days)	Jun (30 days)	Jul (31 days)	Aug (15 days)	All (137 days)
1969	W	0	0	0	0	**2**	**2**
1970	W	0	0	**2**	**2**	0	**4**
1971	W	0	0	0	0	**1**	**1**
1972	BN	0	0	0	0	0	0
1973	AN	0	0	0	0	0	0
1974	W	0	0	0	0	0	0
1975	W	0	0	0	0	**1**	**1**
1976	C	0	0	0	0	0	0
1977	C	0	0	0	0	0	0
1978	AN	0	0	0	0	0	0
1979	BN	0	0	0	0	0	0
1980	W	0	0	0	0	**2**	**2**
1981	D	0	0	0	0	0	0
1982	W	0	0	0	0	0	0
1983	W	0	0	0	0	0	0
1984	W	0	0	0	0	**3**	**3**
1985	D	0	0	0	0	0	0
1986	W	0	0	0	0	**3**	**3**
1987	D	0	0	0	0	0	0
1988	C	0	0	0	0	0	0
1989	BN	0	0	0	0	0	0
1990	C	0	0	0	0	0	0
1991	C	0	0	0	0	0	0
1992	C	0	0	0	0	0	0
1993	AN	0	0	0	0	0	0
1994	C	0	0	0	0	0	0
1995	W	0	0	0	0	0	0
1996	W	0	0	0	0	**1**	**1**
1997	W	0	0	0	0	0	0
1998	W	0	0	0	0	0	0
1999	W	0	0	0	0	**1**	**1**
2000	AN	0	0	0	0	0	0
2001	D	0	0	0	0	0	0
2002	D	0	0	0	0	0	0
2003	AN	0	0	0	0	0	0

Year	Water year type[5]	**Emmaton - MICUP:** number of days when additional standards violations occur per month of compliance periods over analysis period					
		Apr (30 days)	May (31 days)	Jun (30 days)	Jul (31 days)	Aug (15 days)	All (137 days)
2004	BN	0	0	0	0	0	0
2005	BN	0	0	0	0	0	0
2006	W	0	0	0	0	0	0
2007	D	0	0	0	0	0	0
2008	C	0	0	0	0	0	0
2009	D	0	0	0	0	0	0
2010	BN	0	0	0	0	0	0
2011	W	0	0	0	0	0	0
2012	BN	0	0	0	0	0	0
2013	D	0	0	0	0	0	0
2014	C	0	0	0	0	0	0
2015	C	0	0	0	0	0	0
2016	BN	0	0	0	0	0	0
2017	W	0	0	0	0	**2**	**2**
2018	BN	0	0	0	0	0	0
2019	W	0	0	0	0	**1**	**1**
2020	D	0	0	0	0	0	0
2021	C	0	0	0	0	0	0
all		0	0	**2**	**2**	**17**	**21**

San Joaquin River at Jersey Point (D15)

At Jersey Point, there were an additional 33 days of standards violations over the 53-year analysis period, equating to 0.5% of the 7,261 days when standards are in effect, with the MICUP scenario. These violations are summarized by month and analysis year in Table 6.

[5] CalSim water year type, which varies by month. If water year type varies over the compliance period in any year, the water year type at the time the compliance standard exceeded is reported.

Table 6 Number of days when additional standards violations occur at Jersy Point with MICUP scenario, per month of compliance periods over the analysis period

Year	Water year type[5]	**Jersey Point - MICUP:** number of days when additional standards violations occur per month of compliance periods over analysis period					
		Apr (30 days)	May (31 days)	Jun (30 days)	Jul (31 days)	Aug (15 days)	All (137 days)
1969	W	0	0	0	0	0	0
1970	W	0	0	0	0	**1**	**1**
1971	W	0	0	0	0	**2**	**2**
1972	BN	0	0	0	0	0	0
1973	AN	0	0	0	**6**	0	**6**
1974	W	0	0	0	0	0	0
1975	W	0	0	0	0	**2**	**2**
1976	C	0	0	0	0	0	0
1977	C	0	0	0	0	0	0
1978	AN	0	0	0	0	**2**	**2**
1979	BN	0	0	0	**1**	0	**1**
1980	W	0	0	0	0	**2**	**2**
1981	D	0	0	0	0	0	0
1982	W	0	0	0	0	0	0
1983	W	0	0	0	0	0	0
1984	W	0	0	0	**3**	0	**3**
1985	D	0	0	0	0	0	0
1986	W	0	0	0	0	0	0
1987	D	0	0	0	0	0	0
1988	C	0	0	0	0	0	0
1989	BN	0	0	0	0	0	0
1990	C	0	0	0	0	0	0
1991	C	0	0	0	0	0	0
1992	C	0	0	0	0	0	0
1993	AN	0	0	0	0	**2**	**2**
1994	C	0	0	0	0	0	0
1995	W	0	0	0	0	0	0
1996	W	0	0	0	**4**	0	**4**
1997	W	0	0	0	0	0	0
1998	W	0	0	0	0	0	0
1999	W	0	0	0	0	**3**	**3**
2000	AN	0	0	0	0	0	0
2001	D	0	0	0	0	0	0
2002	D	0	0	0	0	0	0
2003	AN	0	0	0	**2**	0	**2**

Year	Water year type[5]	**Jersey Point - MICUP:** number of days when additional standards violations occur per month of compliance periods over analysis period					
		Apr (30 days)	May (31 days)	Jun (30 days)	Jul (31 days)	Aug (15 days)	All (137 days)
2004	BN	0	0	0	0	0	0
2005	BN	0	0	0	0	**1**	**1**
2006	W	0	0	0	0	0	0
2007	D	0	0	0	0	0	0
2008	C	0	0	0	0	0	0
2009	D	0	0	0	0	0	0
2010	BN	0	0	0	0	**2**	**2**
2011	W	0	0	0	0	0	0
2012	BN	0	0	0	0	0	0
2013	D	0	0	0	0	0	0
2014	C	0	0	0	0	0	0
2015	C	0	0	0	0	0	0
2016	BN	0	0	0	0	0	0
2017	W	0	0	0	0	0	0
2018	BN	0	0	0	0	0	0
2019	W	0	0	0	0	0	0
2020	D	0	0	0	0	0	0
2021	C	0	0	0	0	0	0
all		0	0	0	**16**	**17**	**33**

San Joaquin River at Prisoners Point (D29)

MICUP operations did not result in any additional standards violations at Prisoners Point.

X2

X2 standards for January through October are summarized in Table 7. During January through August there is no variation in the standard with water year type, however, the fall X2 standard (September – October) applies only during wet and above normal water years.

X2 is the most downstream location (lowest value) of either the maximum daily average or the 14-day running average of the 2.64 mmhos/cm isohaline.

Daily and fourteen-day average X2 values were calculated from the Baseline and MICUP model results. The minimums of the two values were used to determine if standards violations occurred. Any standards violations in the Baseline case are likely due to model limitations, and therefore, only additional days of violation are reported for the MICUP model scenario. The MICUP model scenario results in 28 additional days of X2 standards violation over the 53-year analysis period, equating to 0.2% of the 14,325 days when standards are in effect.

The numbers of days of additional X2 standards violations are listed in Table 8 for each month and year of the compliance periods throughout the analysis period.

Table 7 X2 standards

Period	#days	Wet	Above normal	Below normal	Dry	Critical
		X2 position (km)				
01Jan – 31Jan	31	81	81	81	81	81
01Feb – 31May	120-121	75	75	75	75	75
01Jun – 31Aug	92	81	81	81	81	81
01Sep – 31 Oct	61	80	80	--	--	--

Table 8 Number of days when additional X2 standards violations occur under MICUP scenarios, per month of compliance periods over the analysis period

Year	Water year type[5]	**X2 - MICUP:** Number of days when additional standards violations occur per month of compliance periods over the analysis period										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Compliance period
1968	BN	--	--	--	--	--	--	--	--	--	0	0
1969	W	0	0	0	0	0	0	0	0	**1**	0	**1**
1970	W	0	0	0	0	0	0	0	0	**1**	0	**1**
1971	W	0	0	0	0	0	0	0	0	**1**	0	**1**
1972	BN	0	0	0	0	0	0	0	0	0	0	0
1973	AN	0	0	0	0	0	0	0	**2**	**1**	0	**3**
1974	W	0	0	0	0	0	0	0	0	0	0	0
1975	W	0	0	0	0	0	0	0	0	**4**	0	**4**
1976	C	0	0	0	0	0	0	0	0	0	0	0
1977	C	0	0	0	0	0	0	0	0	0	0	0
1978	AN	0	0	0	0	0	0	0	0	0	0	0
1979	BN	0	0	0	0	0	**2**	0	0	0	0	**2**
1980	W	0	0	0	0	0	0	0	0	0	0	0
1981	D	0	0	0	0	0	0	0	0	0	0	0
1982	W	0	0	0	0	0	0	0	0	0	0	0
1983	W	0	0	0	0	0	0	0	0	0	0	0
1984	W	0	0	0	0	0	0	0	**3**	**1**	0	**4**
1985	D	0	0	0	0	0	0	0	0	0	0	0
1986	W	0	0	0	0	0	0	0	0	**1**	0	**1**
1987	D	0	0	0	0	0	0	0	0	0	0	0
1988	C	0	0	0	0	0	0	0	0	0	0	0
1989	BN	0	0	0	0	0	0	0	0	0	0	0
1990	C	0	0	0	0	0	0	0	0	0	0	0

Year	Water year type[5]	**X2 - MICUP:** Number of days when additional standards violations occur per month of compliance periods over the analysis period										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Compliance period
1991	C	0	0	0	0	0	0	0	0	0	0	0
1992	C	0	0	0	0	0	0	0	0	0	0	0
1993	AN	0	0	0	0	0	0	0	**2**	0	0	**2**
1994	C	0	0	0	0	0	0	0	0	0	0	0
1995	W	0	0	0	0	0	0	0	0	0	0	0
1996	W	0	0	0	0	0	0	0	**3**	**1**	0	**4**
1997	W	0	0	0	0	0	0	0	0	**2**	0	**2**
1998	W	0	0	0	0	0	0	0	0	0	0	0
1999	W	0	0	0	0	0	0	0	0	**1**	0	**1**
2000	AN	0	0	0	0	0	0	0	0	**1**	0	**1**
2001	D	0	0	0	0	0	0	0	0	0	0	0
2002	D	0	0	0	0	0	0	0	0	0	0	0
2003	AN	0	0	0	0	0	0	0	0	0	0	0
2004	BN	0	0	0	0	0	0	0	0	0	0	0
2005	BN	0	0	0	0	0	0	0	**1**	0	0	**1**
2006	W	0	0	0	0	0	0	0	0	0	0	0
2007	D	0	0	0	0	0	0	0	0	0	0	0
2008	C	0	0	0	0	0	0	0	0	0	0	0
2009	D	0	0	0	0	0	0	0	0	0	0	0
2010	BN	0	0	0	0	0	0	0	0	0	0	0
2011	W	0	0	0	0	0	0	0	0	0	0	0
2012	BN	0	0	0	0	0	0	0	0	0	0	0
2013	D	0	0	0	0	0	0	0	0	0	0	0
2014	C	0	0	0	0	0	0	0	0	0	0	0
2015	C	0	0	0	0	0	0	0	0	0	0	0
2016	BN	0	0	0	0	0	0	0	0	0	0	0
2017	W	0	0	0	0	0	0	0	0	0	0	0

Year	Water year type[5]	**X2 - MICUP:** Number of days when additional standards violations occur per month of compliance periods over the analysis period										
		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Compliance period
2018	BN	0	0	0	0	0	0	0	0	0	0	0
2019	W	0	0	0	0	0	0	0	0	0	0	0
2020	D	0	0	0	0	0	0	0	0	0	0	0
2021	C	0	0	0	0	0	0	0	0	0	0	0
all		0	0	0	0	0	**2**	0	**11**	**15**	0	**28**

Water Intakes

D-1641 water quality objectives at the water intakes are based on chloride, which can be estimated from the modeled EC results.

Chloride (mg/L) was estimated from modeled EC (µS/cm) as the maximum value from the following equations (USBR, 2010).

Cl = 0.285(EC) - 50

Cl = 0.15(EC) - 12

Chloride criteria, based on the maximum mean daily chloride value, are summarized in

Table 4.

There are no maximum mean daily 250 mg/L chloride standard violations at West Canal at Clifton Court, DMC Canal at Tracy PP, Barker Slough, or Vallejo Pumping Plant under Baseline or MICUP conditions. At CCWD at Rock Slough, there was one additional day of chloride standard violation during December of a below normal water year in the modeled MICUP scenario. These results are summarized in Table 9 by month and water year type.

The 150 mg/L Chloride standards need to be met at Rock Slough or Antioch. At Rock Slough, there were no additional chloride standards violations in the MICUP modeled scenario. The only year when standards are not met at either location is 1976. The additional flows contributed to the Delta under the MICUP scenario reduce the number of days of non-compliance by two during this year (however it is assumed that standards violations in the Baseline simulation are due to model limitations).

Table 9 Additional days of chloride standards violations at C5 - Contra Costa Intake at Rock Slough by month and water year type

water year type	**Contra Costa Rock Slough Intake – MICUP :** additional days of chloride standards violations												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	all
wet	0	0	0	0	0	0	0	0	0	0	0	0	0
above normal	0	0	0	0	0	0	0	0	0	0	0	0	0
below normal	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**
dry	0	0	0	0	0	0	0	0	0	0	0	0	0
critical	0	0	0	0	0	0	0	0	0	0	0	0	0
all	0	0	0	0	0	0	0	0	0	0	0	**1**	**1**

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Appendix I-3

MICUP Modeling Framework Methods, Assumptions, and Results



GEI Consultants



MICUP Modeling Under Planning-Level Assumptions: Methods and Results for Estimating Lower Mokelumne River Flows
San Joaquin County, California

Submitted to:
San Joaquin County
1810 Hazelton Avenue
Stockton, CA 95205

Submitted by:
GEI Consultants, Inc.
11010 White Rock Road, Suite 200
Rancho Cordova, CA 95670
916.631.4500

May 18, 2026
Project No. 2302724



Michael J. Cornelius, P.G.
Principal Geologist

Ryan Jolley
Senior Environmental Project Director

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Acronyms and Abbreviations

AF	Acre-feet
ASR	aquifer storage and recovery
CEQA	California Environmental Quality Act
cfs	cubic feet per second
CoS, The City	City of Stockton
DD Window	Direct Diversion Window
Dotan	Dotan Consultants, LLC
DSM2	Delta Simulation Model II
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
ESJWRM	Eastern San Joaquin Water Resource Model
fish flows	instream fish flow requirements
GW	Groundwater
H99	Highway 99
HRL	Healthy Rivers and Landscapes
I5	Interstate 5
JSA	Joint Settlement Agreement
LOD	Level of Demand
LM	Lower Mokelumne River
MICUP	Mokelumne River Conjunctive Use Program
MOCASIM	Mokelumne-Calaveras Rivers Simulation Model
NSJWCD	North San Joaquin Water Conservation District
PG&E	Pacific Gas & Electric Company
Project Distribution Tool	MICUP Project Component Water Distribution Tool
RB	Recharge Basin
RBS	Regulated Base Supply
RFS Window	Rediversion from Storage Window
SEWD	Stockton East Water District
TAF	thousand acre-feet
VA	Voluntary Agreements
WAA	Water Availability Analysis
WAAT	Water Availability Analysis Tool
WAD	Water Available for Diversion
WDD	Woodbridge Diversion Dam
WID	Woodbridge Irrigation District
WL	West Linden

MICUP Modeling Under Planning-Level Assumptions

This report presents the integrated modeling framework developed for the Mokelumne River Integrated Conjunctive Use Program (MICUP) to support environmental review under the California Environmental Quality Act (CEQA). The analysis evaluates hydrologic conditions under Baseline and Project scenarios using a consistent set of planning-level assumptions to characterize potential changes in water availability, groundwater recharge, and downstream flows.

E.S.1. Modeling Approach

The modeling framework integrates hydrologic simulation, water availability analysis, project-level allocation, and system response modeling into a single workflow. Hydrologic conditions are simulated and used to estimate water available for diversion, which is then allocated across MICUP project components. The resulting project component–level timeseries is used to evaluate groundwater recharge and associated changes in streamflow and Delta inflow.

E.S.2. Groundwater Flow Interaction

Recharge associated with MICUP increases groundwater elevations adjacent to the Mokelumne River. This reduces the hydraulic gradient between the stream and aquifer, resulting in decreased seepage losses from the river. These changes represent a key interaction between groundwater recharge and surface water flow conditions.

E.S.3. Results Summary

Modeling results indicate that MICUP diversions reduce surface water flows relative to Baseline conditions. When combined with reductions in seepage losses associated with groundwater recharge, the net effect on flows varies by hydrologic condition and location within the system. Results are presented at key locations along the Lower Mokelumne River and for inflow to the Delta.

E.S.4. Use and Limitations

The modeling approach is intended to provide a consistent analytical framework for evaluating potential system responses under planning-level assumptions. The results do not represent actual operational conditions, which would vary based on real-time hydrology, infrastructure constraints, regulatory requirements, and operational decision-making.

1. Introduction & Purpose

MICUP involves the diversion and rediversion of water from the Mokelumne River system for groundwater recharge and related beneficial uses. To support evaluation of potential environmental effects under CEQA, a modeling framework was developed to simulate hydrologic conditions, water availability, project operations, and resulting changes in groundwater and surface water systems.

This report consolidates and expands upon prior technical memoranda and supporting analyses prepared for the MICUP Environmental Impact Report (EIR). Specifically, it integrates:

- the modeling approach used to simulate hydrologic conditions and determine water available for diversion (WAD),
- the methodology used to distribute WAD across MICUP project components, and
- the evaluation of groundwater and Lower Mokelumne River flow responses associated with MICUP operations.

The modeling framework applies a sequential process to evaluate Baseline and Project conditions, as described in Section 2. Hydrologic simulation results are used to estimate WAD and evaluate subsequent groundwater and surface water responses.

The modeling approach is based on planning-level assumptions intended to provide a consistent framework for comparison of Baseline and Project conditions.

2. Modeling Framework Overview

The MICUP modeling framework consists of a sequence of linked analytical tools used to simulate hydrologic conditions, estimate WAD, distribute available water across project components, and evaluate resulting changes in groundwater and surface water systems. These components collectively represent the full modeling approach used to evaluate MICUP under Baseline and Project Conditions.

2.1. Hydrologic Simulation and Water Availability

Hydrologic conditions in the Mokelumne River system are simulated using the MOCASIM, which represents streamflows, reservoir operations, diversions, and regulatory requirements based on historical hydrology and system operations. The model incorporates key system components including Pardee Reservoir, Camanche Reservoir, the Mokelumne Aqueduct, and major diversion points throughout the watershed.

Output from MOCASIM is processed using the WAAT, which accounts for water rights, operational constraints, and diversion limitations to estimate WAD for MICUP. This process results in a monthly timeseries of WAD representing available supply under modeled hydrologic conditions.

2.2. Project Component Distribution

Following determination of WAD, available water is distributed across the 17 MICUP project components using the Project Component Tool. The tool applies capacity-based allocation assumptions, diversion window constraints, and system-specific prioritization rules to distribute WAD between project components receiving water from the Mokelumne River and those receiving water through the Mokelumne Aqueduct.

The distribution approach maintains separation between diversion sources and applies monthly capacity-based ratios to allocate water proportionally across available project components. The resulting output is a project component–level timeseries of water deliveries that reflects planning-level operational assumptions.

2.3. Groundwater and Surface Water Response

The project component–level timeseries generated by the Project Distribution Tool is used as input to groundwater modeling to simulate recharge and resulting changes in groundwater elevations. Recharge associated with MICUP project components increases groundwater levels in areas adjacent to the Mokelumne River.

Increased groundwater elevations reduce the hydraulic gradient between the stream and aquifer, resulting in decreased stream seepage losses relative to Baseline conditions. These changes represent an important interaction between groundwater recharge and surface water flow conditions.

Flow modeling incorporates both MICUP diversions and changes in seepage to evaluate resulting conditions in the Lower Mokelumne River and downstream to the Delta.

2.4. Integration of Modeling Components

The modeling components described above are connected through a sequential workflow in which hydrologic simulation informs water availability, water availability informs project-level allocation, and project-level allocation informs groundwater and surface water response analyses.

This integrated framework allows for evaluation of both direct effects of MICUP diversions and indirect effects associated with groundwater recharge, including reductions in seepage losses and corresponding changes in downstream flows.

3. Hydrologic Modeling & WAD

3.1. Introduction

This section describes the analytical foundation for MICUP modeling relevant to the EIR prepared pursuant to the CEQA. Modeling compares Baseline hydrologic conditions of the Mokelumne River system to Project conditions under MICUP.

The hydrologic modeling described in this section provides the basis for estimating WAD, which is subsequently distributed across MICUP project components and used to evaluate groundwater recharge and downstream flow responses.

To simulate MICUP conditions, a multi-step process was applied. Hydrologic conditions were first simulated to represent Baseline and Project scenarios. WAD was then identified and compiled as a monthly timeseries. This timeseries serves as the primary input to the Project Distribution Tool described in Section 4 and to subsequent groundwater and flow modeling analyses described in later sections.

3.2. Modeling Framework

The following two-step process was used to define Baseline and Project conditions and to estimate WAD:

1. MOCASIM – used to simulate streamflows, reservoir behavior, and system conditions in the Mokelumne River system.
2. WAAT – used as a post-processing tool to apply water rights, modeled constraints, and diversion limitations to estimate WAD available for MICUP.

Together, these tools generate a continuous monthly timeseries of WAD representing water available for diversion under modeled hydrologic conditions.

3.3. MOCASIM

MOCASIM is a basin-specific hydrologic and operations model developed to simulate the complex flow system of the Mokelumne and Calaveras rivers. The model represents both unimpaired and regulated stream flows by incorporating historical hydrology, stream gage records, reservoir storage and release patterns, major diversions, and senior water rights.

These generally include:

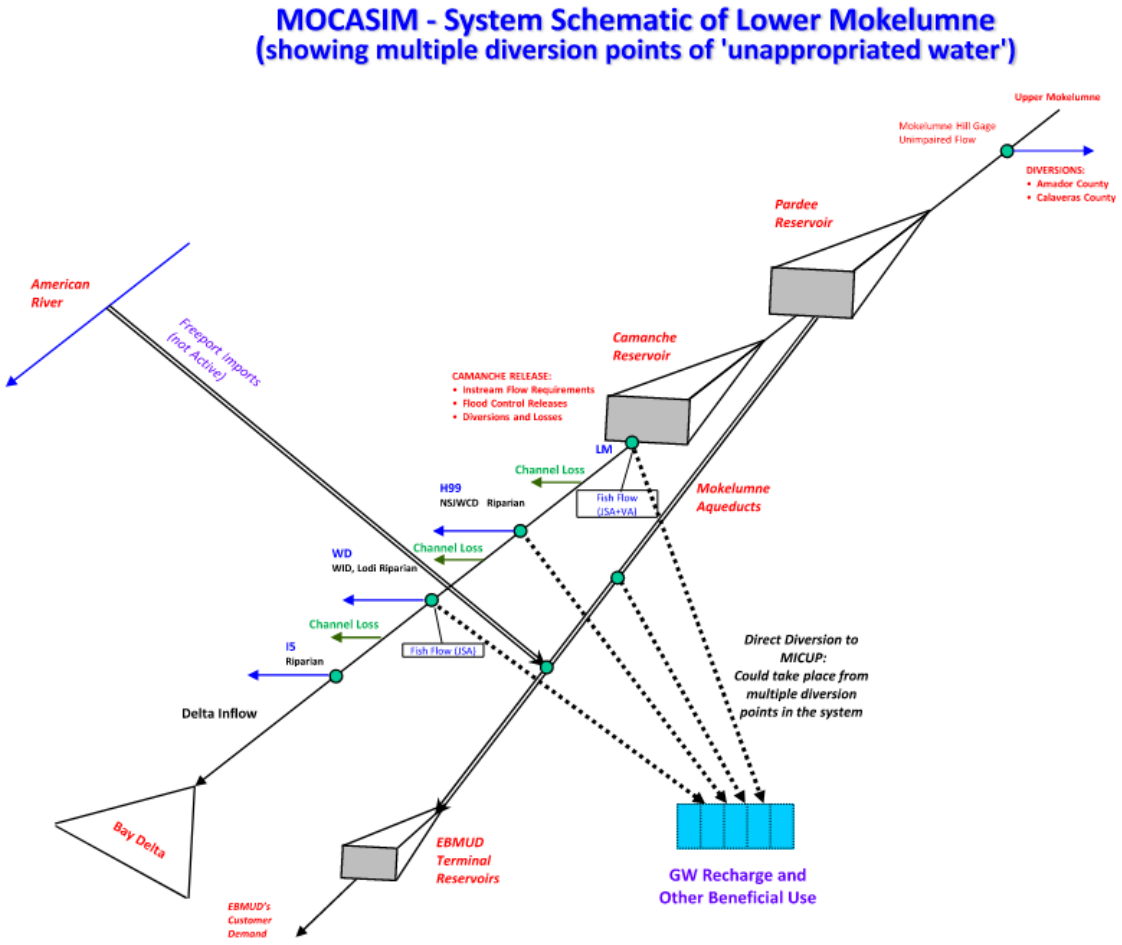
- **Upstream Diversions (Amador and Calaveras Counties):** Portions of the Mokelumne flow are diverted upstream before reaching Pardee Reservoir, reducing inflows to the lower system.
- **Pardee Reservoir and Mokelumne Aqueduct:** Pardee stores inflows and conveys water through the Mokelumne Aqueduct. These facilities support East Bay Municipal Utility District (EBMUD) demands and provide a source of supply for MICUP diversions.
- **Camanche Reservoir Releases:** Downstream of Pardee, Camanche Reservoir regulates flood control, instream flow requirements, and operational diversions. These releases sustain flows in the Lower Mokelumne which support riparian diversions, fish flows, groundwater recharge, and other beneficial uses, and provide water that can be allocated to MICUP diversions.
- **Mokelumne Outflows:** After passing through the Lower Mokelumne system, Mokelumne outflows continue into the Delta system.

In addition to water supply operations, MOCASIM accounts for environmental requirements and regulatory obligations, including instream fish flow requirements (fish flows) under the 1998 Joint Settlement Agreement[1] (JSA) and draft Healthy Rivers and Landscapes Program (HRL, previously called Voluntary Agreement or VA) under development for the Mokelumne River. This ensures that simulated flows reflect both physical hydrology and management commitments relevant to the Mokelumne River system.

The model was developed by **Dotan Consultants, LLC (Dotan)**[2], in coordination with **EBMUD**[3], to ensure accurate representation of reservoir operations on the Mokelumne River at Pardee and Camanche Reservoirs, which are operated by EBMUD. By integrating system-specific operations with observed and historical hydrology, MOCASIM produces a reliable timeseries of flows and reservoir conditions that form the hydrologic foundation for subsequent allocation and availability analyses carried out through the WAAT. Figure 1 on the next page, provides helpful context for where diversions and releases occur.

[1] The **1998 Joint Settlement Agreement (JSA)** is a joint agreement between EBMUD, the California Department of Fish and Game (now California Department of Fish and Wildlife – CDFW), and the U.S. Fish and Wildlife Service (USFWS).
[2] **Dotan Consultants, LLC (Dotan)** provides water resources and environmental consulting, including hydrologic analysis, water quality modeling, water supply studies, and hydropower licensing.
[3] **East Bay Municipal Utility District** (**EBMUD)** provides water supply and wastewater services to the eastern San Francisco Bay Area, including operation of the Mokelumne River Project and related water supply facilities.

Figure 1. MOCASIM



3.4. WAAT

WAAT is a post-processing tool that translates the timeseries of flows and reservoir conditions output from MOCASIM and applies it to a post-processing routine which allocates Mokelumne flows and reservoir releases to the various needs and users based on a set of operational and contractual assumptions. Through this post-processing routine, WAAT incorporates the different operational criteria, limitations, and assumptions which are applicable to each of MICUP's two operational windows:

- **Direct Diversion (DD) Window**: December 1 through June 30 of each water year, limited to no more than 110,000 AF per water year.
- **Rediversion from Storage (RFS) Window**: July 1 – October 31 of each calendar year, limited to no more than 48,000 AF per calendar year.

WAAT's application to the output from MOCASIM results in an output which identifies WAD on a monthly timeseries spanning January 1953 through December 2021. Assumptions applied in the modeling framework are described in detail in Section 3.5.

3.5. Detailed Modeling Assumptions

MOCASIM and WAAT rely on a set of assumptions to simulate hydrologic conditions, system behavior, and water demands under Baseline and Project scenarios. These assumptions reflect historical operations, existing water rights, and modeled constraints applied consistently across the analysis period.

These assumptions are applied uniformly across the modeling framework to support comparison of Baseline and Project conditions.

3.5.1. Modeling Period

The hydrologic modeling conducted using MOCASIM and WAAT spans Water Years 1954 through 2021, representing the full period of available historical hydrology used to characterize Baseline and Project conditions and to estimate WAD.

Groundwater and Delta modeling analyses were conducted over a shorter period, Water Years 1969 through 2021. This period reflects the availability of input data and model development constraints for the groundwater and Delta models and represents a subset of the full hydrologic record used for WAD estimation.

As a result, project component–level timeseries generated from the full hydrologic record were applied to the groundwater and Delta models over the period of overlapping analysis (1969–2021).

3.5.2. Systems Operations Assumptions

The Upper Mokelumne Watershed includes a system of reservoirs and hydropower generation facilities which are operated by Pacific Gas & Electric Company (PG&E). MOCASIM assumes PG&E operations remain consistent with historic practices as reflected in the development of the model.

EBMUD operates the Pardee and Camanche Dams and Reservoirs on the Lower Mokelumne River. MOCASIM and WAAT assume that EBMUD operates the reservoirs to meet water rights and water supply needs for itself and downstream users, and to meet required fish flow and regulatory requirements. Further, the models assume that EBMUD operates the reservoirs to maximize carryover storage while maintaining flood control capacity.

To maintain flood control capacity, EBMUD is required to bring reservoir levels down to a maximum level of fill by November 5th of each year. Releases for MICUP would end by October 31st of each year. MOCASIM and WAAT assume that excess stored water is released following a standardized flood control curve from May through October, generally providing an even distribution of releases to achieve compliance by October 31st.

Reservoir behavior is represented using standardized assumptions applied consistently across the modeling period and does not reflect real-time operational decision-making.

3.5.3. Water Demands & Diversions

Assumptions regarding the water rights and demands which exist under Baseline Conditions reflect the current, 2025 level of demand including both upstream and lower Mokelumne needs and diversions into the Mokelumne Reservoir for EBMUD (2025 Level of Demand or 2025 LOD). More specifically, the 2025 LOD assumes the following:

Upstream Mokelumne Needs:		
Amador County[4]	8,984 AF	
Calaveras County	4,214 AF	
Mokelumne Aqueduct Needs:		
EBMUD	207,226 AF	
Lower Mokelumne Needs:		
NSJWCD[5]	20,000 AF	
WID (RBS)[6]	*60,000 AF*	*(wet years)*
	39,000 AF	*(dry years)*
Riparian and Senior Rights	20,618 AF	(wet years)
	16,068 AF	(dry years)
City of Lodi	3,600 AF	

In certain years, WID has historically diverted some amount of water beyond its RBS. To account for this, the WAAT assumes that WID will divert an additional 26,334 AF above its RBS when there are flows at WID's diversion points in the Lower Mokelumne River which exceed the requirements to meet downstream needs and fish flows. This amount above RBS is a conservative assumption based on WID's diversions in 2017, which was WID's highest reported diversion above RBS in recent years.

In addition to those demand assumptions, the 2025 LOD also assumes the following limitations regarding diversion capacity by cubic feet per section (cfs):

EBMUD	503 cfs
NSJWCD	98 cfs
WID	414 cfs

Additionally, the Baseline Conditions assumptions include regulatory fish flow requirements pursuant to the JSA and HRL, as seen in Table 1 and Table 2. The JSA assumptions include two compliance points on the Mokelumne River, the first is a minimum release from Camanche Reservoir which varies between 325 cfs and 100 cfs depending on the year type and month. The second is a minimum expected flow below Woodbridge Diversion Dam, which varies between 300 cfs and 15 cfs depending on the year type

[4] **Amador County's** demand includes Jackson Valley Irrigation District
[5] **NSJWCD** refers to **North San Joaquin Water Conservation District**, who diverts water under water right Permit 10477 (A012842).
[6] **WID** refers to **Woodbridge Irrigation District**. WID's wet and dry year demand assumptions are based on its **Regulated Base Supply (RBS)**.

and month. The HRL proposal[7] requires seasonal "pulse flows" in October and March-May, which total either 10,000 AF, 20,000 AF, or 45,000 AF depending on the year type. MOCASIM and WAAT assume sufficient releases will be required to meet JSA requirements at both compliance points and provide HRL pulse flows. The HRL compliance point is technically at Camanche Dam, but MOCASIM and WAAT take a conservative approach and require compliance with the pulse flows further downstream at Woodbridge Diversion Dam. This requires the model to release more water than required to account for seepage losses in the river.

[7] EBMUD is currently operating the Mokelumne River System pursuant to the HRL; however, the agreement has not been formally adopted as part of the Bay Delta Water Quality Control Plan update. For the purposes of simulating water needs, MOCASIM and WAAT assume continued implementation of the HRL.

Table 1. Joint Settlement Agreement Fish Flow Requirements (cubic-feet-per-second)

Year Type	Requirements	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual (TAF)
Normal	Minimum Camanche Release	325	325	325	325	325	325	325	325	325	100	100	100	194
Below Normal		250	250	250	250	250	250	250	250	250	100	100	100	154
Dry		220	220	220	220	220	220	220	220	100	100	100	100	130
Critical		115	130	130	130	130	130	130	100	100	100	100	100	80
Normal	Expected Flow below Woodbridge Diversion Dam	100	100	100	100	100	100	150	300	300	25	25	25	86
Below Normal		100	100	100	100	100	100	150	200	200	20	20	20	73
Dry		80	80	80	80	80	80	150	150	20	20	20	20	52
Critical		45	75	75	75	75	75	75	15	15	15	15	15	34

Table 2. MOCASIM Fish Flow Requirements Below Woodbridge Diversion Dam – Joint Settlement Agreement Plus EBMUD Proposed Healthy Rivers and Landscape Flows (acre-feet)

JSA Water Year Type	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Critically Dry	2,767	4,463	4,612	4,612	4,165	4,612	4,463	922	893	922	922	893	34,245
Dry	7,440	4,760	4,919	4,919	4,443	6,395	12,317	11,867	1,190	1,230	1,230	1,190	61,900
Below Normal	11,314	5,950	6,149	6,149	5,554	9,531	15,352	17,278	11,901	1,230	1,230	1,190	92,826
Normal	11,929	5,950	6,149	6,149	5,554	9,531	28,383	34,802	17,851	1,537	1,537	1,488	130,860

3.5.4. MICUP Planning-Level Operations Assumptions

To simulate hydrologic conditions under MICUP operations, MOCASIM and WAAT were applied to the same baseline condition described above, with the inclusion of additional assumptions to identify MICUP WAD. The MICUP operation assumptions are different for two windows.

DD Window:

The DD window extends from December - June and MICUP diversions are limited to no more than 110,000 AF during the time period. MICUP WAD is limited to excess water in the Mokelumne River system as modeled in the baseline condition runs, after accounting for all existing 2025 LOD needs and fish flow conditions.[8] MICUP diversion capacity is limited to 375 cfs during this period. During the DD window, MICUP diversions are assumed to be junior to all existing water rights and flow needs.

RFS Window:

The RFS window extends from July 1 to October 31. During this period, MICUP diversions are limited to no more than 48,000 AF total, 12,000 AF per month, and 375 cfs.

Under actual operations, MICUP WAD is determined by EBMUD when, according to their discretion, there is water that has been diverted to storage which is in excess to EBMUD's current needs, after factoring in other obligations including Lower Mokelumne needs, fish flow/regulatory requirements, and flood control curve releases. When such excess water is available, EBMUD will notify MICUP and the water which has been diverted to storage by EBMUD will become MICUP WAD, which MICUP can then redivert to its project components. However, in order to model project operations, MOCASIM and WAAT operate with perfect foresight and identify WAD when the models predict EBMUD has stored water in Pardee and Camanche Reservoirs that EBMUD would need to release prior to November 5th to stay within the flood control curve.

During the DD window, the models assume MICUP diversions occur after other existing diversions and flow requirements are met. During the RFS window, the models also assume MICUP diversions occur after other historical diversions and flow requirements are accounted for in order to analyze the potential impact of increased diversions attributable to MICUP operations for the draft environmental impact report only. The relative priority of direct diversions during the RFS season and MICUP diversions of stored water could differ during actual operations. However, the resolution of this priority issue does not change the total amount of water removed from the system.

[8] The availability of WAD during the DD window is further supported by the WAA prepared to support pending Water Right Application No. 29853, which analyzes the WAD during the DD window at the 2050 LOD and Max Case LOD.

3.6. Use of MOCASIM and WAD Results

The results of the MOCASIM-WAAT two-step process represent WAD to MICUP after accounting for senior water rights, environmental flow requirements, reservoir operations, and major diversions under the CEQA Baseline Case. MOCASIM produced the underlying timeseries of available flows, which were then processed through the WAAT, which allocated the available water among system users and produced the resulting timeseries of unallocated flows available to MICUP under the study assumptions.

The outputs were compiled into a single-column monthly timeseries spanning Water Year 1954 through Water Year 2021, providing a continuous 68-year record of Mokelumne River flows and WAD. This standardized dataset of WAD was then used in the Project Distribution Tool, ensuring that allocations to MICUP project components were derived from a consistent and transparent hydrologic basis.

The resulting project component–level timeseries was subsequently used as input to groundwater and Delta modeling analyses to evaluate recharge effects and changes in downstream flow conditions. These analyses were conducted over Water Years 1969 through 2021 as a monthly timeseries, reflecting the period of overlapping data availability for the groundwater and Delta models.

This workflow is summarized in Figure 2 below. These results from the WAAT form the direct input to the MICUP distribution process and provide the foundational input for subsequent groundwater and Delta modeling analyses. The resulting WAD timeseries provides the basis for allocation to MICUP project components, as described in Section 4.

Figure 2. Workflow from MOCASIM and WAAT to WAD Results and MICUP Allocations



4. Project Component Distribution

4.1. Introduction

This section describes the methodology used to allocate WAD across MICUP project components. WAD, as described in Section 3, represents the quantity of water available under modeled Baseline and Project conditions and serves as the input to the distribution process.

MICUP involves the diversion and rediversion of WAD from the Mokelumne River system to 17 separate MICUP project components. The MICUP Project Component Water Distribution Tool (Project Distribution Tool) provides a framework for modeling the distribution of WAD between the 17 MICUP project components under planning-level assumptions to support the analysis of MICUP planning-level operations across the timeseries from water year 1954 to 2021. The resulting timeseries is used as the input for the Eastern San Joaquin Water Resources Model (ESJWRM) and then the resulting reduction in seepage is then applied to the inputs for the Delta Simulation Model II (DSM2) to assess changes and impacts from MICUP for the purposes of environmental review pursuant to CEQA.

4.2. Distribution Tool Inputs & Assumptions

To translate WAD into project component-level supplies, GEI developed the Project Distribution Tool), an Excel-based tool created for transparency, reproducibility, and ease of future edits. The tool distributes water to the 17 MICUP project components across both diversion windows, while enforcing the operational and physical constraints established for the systems and maintaining diversion window-specific distribution assumptions.

The Project Distribution Tool reflects planning-level assumptions only and may differ from actual operations. Planning assumptions are used to compare alternatives on a consistent basis and rely on generalized operating rules, historical hydrology, and simplified decision logic. In practice, operations respond to real-time hydrologic and facility conditions, regulatory requirements, environmental constraints, maintenance outages, and operator discretion.

The Project Distribution Tool's input is the timeseries of WAD provided by the two-step modeling process conducted through the MOCASIM and WAAT. The project team converted MOCASIM/WAAT tabular data into a single-column monthly timeseries using Excel's TOCOL function, and filtered to the target study period (Water Years 1954–2021). This data was also converted from cfs to acre-feet (AF) per month during this time. This timeseries of WAD includes separately modeled supplies available for diversion through the Mokelumne River and the Mokelumne Aqueduct. As a result, the Project Distribution Tool also maintains separation between the project components which divert from the Mokelumne River (River Group) and those that receive diversions through the Mokelumne Aqueduct (Aqueduct Group).

4.2.1. Project Components

MICUP consists of 17 separate project components which divert WAD as part of the project's operations. The project components divert either directly from the Mokelumne River or from the Mokelumne Aqueduct. The 17 project components are operated by the following three MICUP partners:

- North San Joaquin Water Conservation District (NSJWCD)
- Stockton East Water District (SEWD)
- City of Stockton (CoS)

Each project component ID, its diversion source, and monthly capacity in cubic feet per second (CFS) are identified in Table 3, below.

Table 3. Project Component Capacities (CFS)

MICUP Project Components Monthly Capacity (CFS)

	Project Component ID	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Diversion
1	NSJWCD_No1_NS_FM	1.5		3.0	3.0	3.0	1.5							River
2	NSJWCD_No2_NS_IL	11.2					1.2	9.3	23.6	31.6	33.2	30.6	24.0	River
3	NSJWCD_No3_NS_RB	52.3		62.0	62.0	62.0	62.3	55.7	41.0	34.4	31.8	34.4	41.0	River
4	NSJWCD_No4_SS_FM	1.5		3.0	3.0	3.0	1.5							River
5	NSJWCD_No5_SS_IL	11.2					1.2	9.3	23.6	31.6	33.2	30.6	24.0	River
6	NSJWCD_No6_SS_RB	52.3		62.0	62.0	62.0	62.3	55.7	41.0	34.4	31.8	34.4	41.0	River
7	NSJWCD_No7_A_FM			24.0	24.0	24.0								River
8	NSJWCD_No8_A_ASR	20.0		20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	20.0	Aqueduct
9	SEWD_No9_B_ASR	0.7		0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	Aqueduct
10	SEWD_No10_WL_FM			10.0	10.0	10.0								Aqueduct
11	SEWD_No11_WL_IL	9.6						12.4	45.7	58.5	61.4	55.1	43.2	Aqueduct
12	SEWD_No12_WL_DW	55.4		55.0	55.0	55.0	65.0	52.6	19.3	6.5	3.6	9.9	21.8	Aqueduct
13	SEWD_No13_MC_RBDW	53.6		53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	53.6	Aqueduct
14	SEWD_No14_MC_RB	46.4		46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	46.4	Aqueduct
15	CoS_No15_DR_RB	17.7		17.7	17.7	8.8	17.7	17.7	17.7	17.7	17.7	17.7	17.7	River
16	CoS_No17_DR_SD	4.0							8.0	8.0	8.0	8.0	8.0	River
17	CoS_No19_DWTP_RBDW						30.0	31.0	30.0	29.0	7.0	13.0	6.0	River
Totals		**337.3**		**357.3**	**357.3**	**348.5**	**363.3**	**364.3**	**370.3**	**372.1**	**348.3**	**354.3**	**347.3**	
Diversion Period		RFS		DD	DD	DD	DD	DD	DD	DD	RFS	RFS	RFS	

As detailed in Table 3, Project Components 1-7 and 15 -17 are included in the River Group and Project Components 8 -14 are the Aqueduct Group. Additionally, the monthly capacity for each project component varies by month, with some components not available in all months.

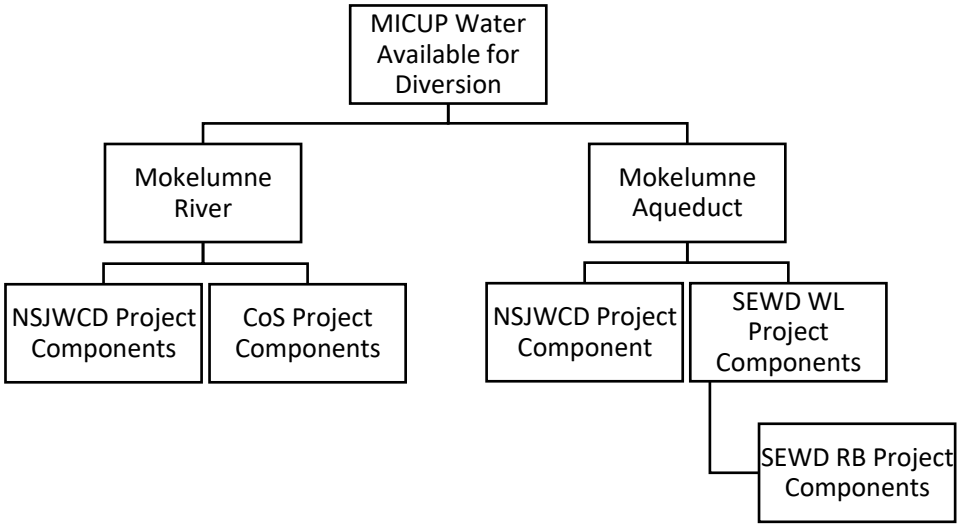
SEWD's Project Component 12 is further divided into two sub-components to represent the two different well types, dry wells and aquifer storage and recovery (ASR) wells, included within that project component. The water distributed to Project Component 12 is fractionally split 142/146 to dry wells and 4/146 to ASR wells[9].

4.2.2. WAD Distribution Assumptions

The Project Distribution Tool includes capacity-based distribution assumptions to minimize the potential for overdistribution of available water. In some months, the WAD exceeds the available diversion capacity for the project components, resulting in months where not all the available MICUP supply is distributed. The tool includes assumptions for the excess WAD. For months where the available diversion capacity exceeds the WAD, the tool uses assumptions to guide the distribution of WAD between all 17 project components.

An overview of the distribution assumptions is provided in Figure 3 below.

Figure 3. Water Allocation between River and Aqueduct



In more detail, the distribution tool utilizes the following assumptions to guide the distribution of WAD between the project components:

[9] This distinction is made in the Distribution Tool because the output processed is used in the groundwater model which requires sufficient detail regarding the method of recharge used by each project component to model groundwater impacts from project operations.

1. **Capacity-Based Allocation:**
    a. The Project Distribution Tool assumes that WAD is evenly distributed, 50% each, between the project components that receive diversions directly from the River Group and those that receive diversions through the Aqueduct Group, as seen in Figure 3.
    b. The 50% share of total WAD for each month is kept strictly separated between the River Group and the Aqueduct Group and is then further distributed between the project components proportionally to total project component capacity within each group according to each component's distribution ratio.

2. **Distribution Ratios:**
    a. Separate distribution ratios were calculated for each group, river and aqueduct, on a monthly basis based on the project components with available capacity in that particular month, subject to diversion window-specific prioritization assumptions.
    b. Capacities for each project component were specified in cfs on a monthly basis.
    c. Capacity distribution ratios[10] were calculated by dividing the capacity of each project component by the total available capacity of all project components within the same diversion group.

3. **Diversion Window-Specific Prioritization:**
    a. <u>DD Window (December – June)</u>
        i. Each month's 50% share of WAD distributed to the Mokelumne Aqueduct is first distributed between only Project Components 8-12, according to the distribution ratio calculated based only on those five components.
        ii. If the WAD during a Direct Diversion month exceeds the capacity of Project Components 8-12, the remaining WAD is distributed first to Component 13 and then to Component 14.
        iii. This assumption prioritizes SEWD and NSJWCD well-based recharge components (Components 8 - 12) over the SEWD recharge basins (Components 13 - 14)
    b. <u>RFS Window (July – October)</u>
        i. The share of WAD distributed to the Mokelumne River is first distributed between only Project Components 1- 7, according to the distribution ratio calculated based only on those seven components.
        ii. If the WAD during a Rediversion from Storage month exceeds the capacity of Project Components 1-7, the remaining WAD is distributed equally between Components 15 - 17.
        iii. This assumption prioritizes NSJWCD's project components (Components 1-7) over CoS's project components (Components 15-17).

[10] **Distribution ratio** calculation example: Project 1 has a December capacity of 3 CFS and receives water from the Mokelumne River. All projects for the Mokelumne River in December total 172 CFS. The ratio for Project 1 in December would be 3/172 = 0.017. So, Project 1 would receive 1.7% of any WAD distributed to the River Group in that month.

4. **Insufficient Capacity:**
    a. If there is insufficient capacity in either the Mokelumne Aqueduct itself or the Aqueduct Group components to divert the entire 50% share of WAD in a particular month, the WAD in excess of available capacity is redistributed to the project components in the River Group, if they have capacity.
    b. If WAD in a particular month exceeds the capacity of all project components, the Distribution Tool redistributes the excess WAD to the Mokelumne River flows.

These distribution assumptions standardize an equitable distribution of WAD between the project components when the WAD does not utilize 100% of all project components' capacities. However, these are planning-level assumptions to support CEQA analysis and may not necessarily reflect actual future operations.

4.3. Methodology for Diversion Window Specific Application

Utilizing the assumptions described above, the Project Distribution Tool applied a structured methodology to model the distribution of WAD between the 17 project components. The tool is applied separately to each distribution window following a consistent application process which incorporates the diversion priority assumptions unique to each diversion window.

4.3.1. Separate Application by Diversion Window

The DD and RFS periods are processed separately in order to maintain the unique distribution priority assumption, described above. The two MICUP diversion windows are:

- Direct Diversion (DD) window, December – June, and
- Rediversion from Storage (RFS) window, July – October.[11]

Because the Distribution Tool is applied separately, a set of adjustable parameters is available to modify inputs specific to each diversion window without requiring the tool to be updated or reapplied to both windows. The Diversion Tool's adjustable parameters are:

- WAD Input: adjusted to reflect the WAD determined according to the MOCASIM/WAAT modeling process. Updated by inserting a new WAD timeseries into the source sheet.
- Mokelumne Aqueduct Conveyance Capacity: adjusted to reflect operational limits; the lowest reasonable value is utilized in order to maintain a conservative approach to modeling the available capacity for diversions by Aqueduct Group components. Updated by inserting a new Mokelumne Aqueduct Capacity timeseries into the source sheet. This also was determined according to the MOCASIM/WAAT modeling process.
- Project Component Capacities: specified in cfs by month for each project component. Updated by entering in new capacities in the source sheet.

[11] Consistent with MOCASIM and WAAT, the Project Distribution Tool limits the RFS window to July - October. The actual RFS window is July 1 – November 5. However, because MOCASIM/WAAT operate on a monthly timestep and the RFS window only includes 5 days in November, the RFS window is constrained to July 1 - October 31 in order to allow simplified modeling and analysis pursuant to CEQA and avoid anomalous results from the inclusion of the five additional days in November.

4.3.2. Project Distribution Tool Application Process

The Project Distribution Tool is applied to each diversion window by processing the adjustable parameters according to the applicable assumptions as follows:

4.3.2.1. DD Window, December – June

For each DD month, the Distribution Tool performs the following steps:

1. Identify total WAD from MOCASIM-WAAT data for that month.
2. Determine share of WAD distributed to Mokelumne Aqueduct, which is equal to either 50% of WAD or the Aqueduct's available conveyance capacity for that month, whichever is less, and distribute the remainder share of WAD to the Mokelumne River.
3. Determine distribution ratio for only the priority project components in the Aqueduct Group with available capacity in that month (SEWD and NSJWCD's Project Components 8 - 12).
4. Distribute Mokelumne Aqueduct share of WAD between only the priority project components in the Aqueduct Group, according to the distribution ratios and not to exceed the available capacity of each component for that month.
5. If there is remaining WAD in excess of the total available capacity of the priority project components in the Aqueduct Group, distribute remaining WAD it to SEWD Project Component 13 up to that component's available capacity for that month.
6. If there is remaining WAD in excess of Project Component 13's available capacity for that month, distribute the remaining WAD to SEWD Project Component 14.
7. If there is remaining WAD in excess of Project Component 14's available capacity for that month, add the remaining Mokelumne Aqueduct share of WAD to the share of WAD assigned to the Mokelumne River.
8. Determine distribution ratio for each project component in the River Group with available capacity in that month.
9. Distribute Mokelumne River share of WAD between all River Group components, according to the distribution ratios and up to the maximum capacity of each priority component for that month.
10. If there is any remaining WAD, add the remaining WAD to the Mokelumne River flows.

4.3.2.2. RFS Window, July – October

For each RFS month, the Distribution Tool performs the following steps:

1. Identify total WAD from MOCASIM-WAAT data for that month.
2. Determine share of WAD distributed to Mokelumne Aqueduct which is equal to either 50% of WAD or the Aqueduct's available conveyance capacity for that month, whichever is less, and distribute the remainder share of WAD to the Mokelumne River.
3. Determine distribution ratio for each project component in the Aqueduct Group with available capacity in that month.
4. Distribute Mokelumne Aqueduct share of WAD between all Aqueduct Group components according to the distribution ratio not to exceed the maximum capacity of each component for that month.
5. If there is remaining WAD in excess of the available capacity of all Aqueduct Group components for that month, add the remaining Mokelumne Aqueduct share of WAD to the share of WAD assigned to the Mokelumne River.
6. Determine distribution ratios between priority River Group components only (NSJWCD's Project Components 1 - 7).
7. Distribute Mokelumne River share of WAD between priority River Group components only, according to the distribution ratios and up to the maximum capacity of each priority component for that month.
8. If there is any remaining WAD, determine the distribution rations between the secondary River Group components (CoS's Project Components 15 - 17).
9. If there is any remaining WAD, distribute remaining WAD between secondary River Group components according to the distribution ratios and up to the maximum capacity of each priority component for that month.
10. If there is any remaining WAD, add the remaining WAD to the Mokelumne River flows.

4.3.3. Consolidation of Outputs

The application of the Distribution Tool to the timeseries produced by the MOCASIM-WAAT modeling process translates basin-scale water availability and flow data into actionable component-level distributions. The component-level distributions allow the MICUP project to be analyzed for its effectiveness at distributing WAD to the project components. An example of this analysis for the DD window is provided in Tables 4 and 5:

Table 4. Direct Diversion Window Summary (December - June)

	Total WAD	MICUP Diversion Capacity	% Difference
Total Years	68	68	
68 Year Average (AF)	43,956	43,367	1.34%
Average excluding 0 Years (AF)	74,725	73,723	1.34%
Maximum (AF)	110,000	109,196	0.73%
Minimum (AF)	0	0	0%

Table 5. Direct Diversion Window Comparison (December - June)

Acre-Feet (AF)	WAA	MICUP		
	# of Years WAD Available	Average Diversions during DD Window	% of Total WAD Diverted by MICUP	# of Years Direct Diversions Taken
110,000	11	108,242	98%	0
100,000 109,999	6	104,504	99%	17
90,000 – 99,999	3	92,052	99%	2
80,000 – 89,999	5	81,711	99%	5
70,000 – 79,999	1	77,541	98%	2
60,000 – 69,999	1	59,456	99%	0
50,000 – 59,999	0	0	-	1
40,000 – 49,999	4	43,561	99%	3
30,000 – 39,999	0	0	-	1
20,000 – 29,999	4	26,344	100%	4
10,000 – 19,999	0	0	-	0
1 – 9,999	5	5,983	100%	5
0	28	0	-	28

Each application of the Distribution Tool produces 18 monthly timeseries outputs (one for each of the 17 project components, with Project Component 12 split into separate Dry Well and ASR subcomponents) covering Water Years 1954 – 2021. Because the tool is separately applied to each diversion window, the two sets of 18 monthly timeseries outputs are later combined into a single unified timeseries which includes both the DD and RFS windows. An example of a portion of the resulting Timeseries output is provided in Table 6 below.

Table 6. Example Portion of Timeseries Output in AF

	1	2	3	4	5	6	7	8
Month Year	NSJWCD_No1_NS_FM	NSJWCD_No2_NS_IL	NSJWCD_No3_NS_RB	NSJWCD_No4_SS_FM	NSJWCD_No5_SS_IL	NSJWCD_No6_SS_RB	NSJWCD_No7_A_FM	NSJWCD_No8_A_ASR
Oct-57	9	69	324	9	69	324	-	188
Nov-57	-	-	-	-	-	-	-	-
Dec-57	-	-	-	-	-	-	-	-
Jan-58	-	-	-	-	-	-	-	882
Feb-58	167	-	3,442	167	-	3,442	1,333	1,110
Mar-58	92	74	3,830	92	74	3,830	-	1,229
Apr-58	-	552	3,314	-	552	3,314	-	1,190
May-58	-	1,449	2,517	-	1,449	2,517	-	1,229
Jun-58	-	1,878	2,043	-	1,878	2,043	-	1,190
Jul-58	-	2,040	1,955	-	2,040	1,955	-	1,229
Aug-58	-	1,884	2,112	-	1,884	2,112	-	1,229
Sep-58	-	976	1,664	-	976	1,664	-	1,190

4.4. Use of Diversion Tool Results

The Project Distribution Tools demonstrate that nearly all water identified as available to MICUP by the Water Availability Analysis (WAA) was successfully distributed to project components under planning assumptions. Over the 68-year study period, MICUP diversions closely track the available supply, with long-term averages differing by less than 1% from the WAA results. Maximum and minimum annual values are also nearly identical, confirming the conservative nature of the tool logic. Table 1 summarizes overall diversions across the full December – June period, while Table 2 provides a comparison of available versus distributed amounts. These results highlight that the tools distribute between 98% and 100% of available water in most years.

The resulting timeseries output of the Project Distribution Tool represent the WAD, as determined through the MOCASIM-WAAT two-step modeling process, which can actually be diverted by the MICUP project components, based on planning-level assumptions and methodology. The Distribution Tool's output and the WAAT's output is then used as inputs for the ESJWRM and the DSM2, respectively, which are utilized to analyze MICUP's impacts to the groundwater basin and the Delta pursuant to CEQA, as seen in Figure 4 below. The project component–level timeseries generated through this process serve as input to groundwater and downstream flow modeling analyses described in Section 5.

Figure 4. Workflow of MICUP Modeling and Processing Tools



5. Groundwater and Surface Water Response

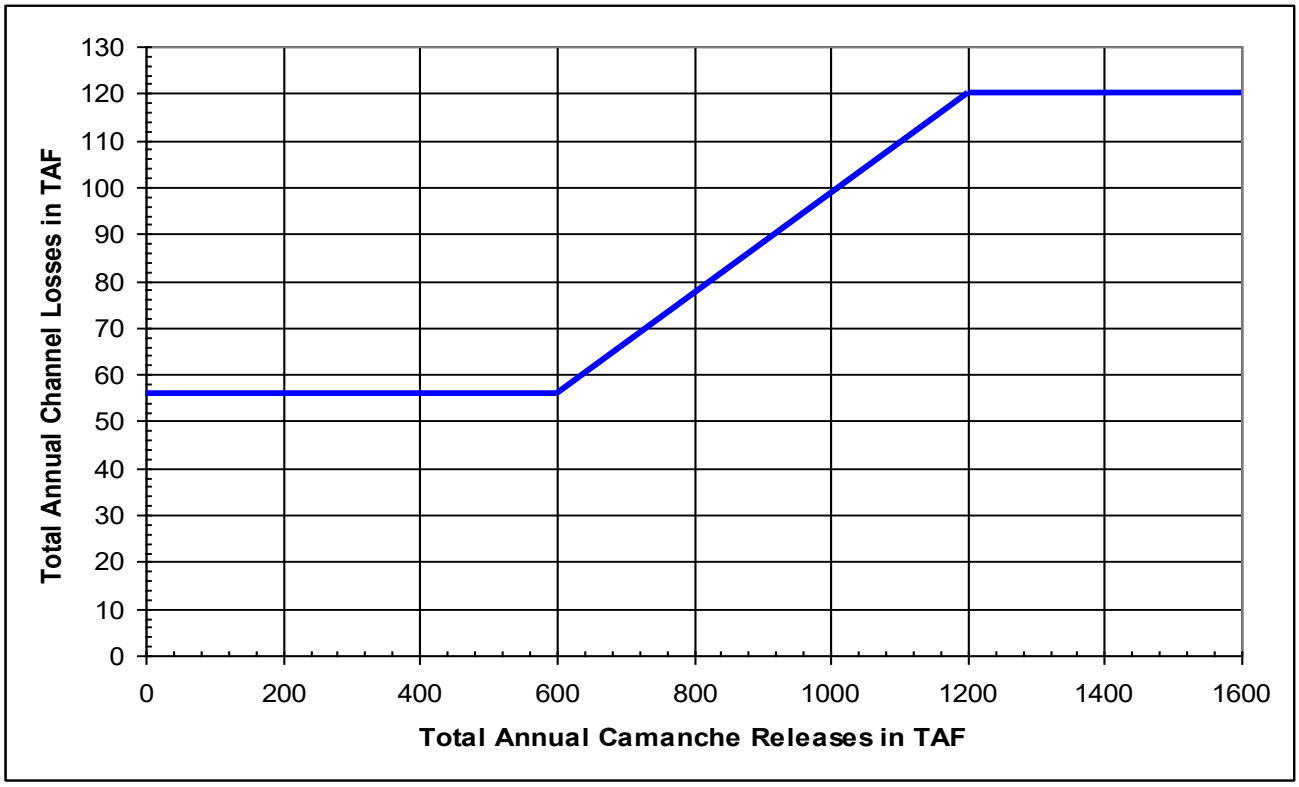
5.1. Introduction

This section describes the evaluation of groundwater and surface water system responses associated with MICUP. Project component–level timeseries generated by the Project Distribution Tool (Section 4) are used as input to groundwater and Delta modeling analyses to evaluate recharge effects, changes in seepage losses, and resulting impacts to flows in the Lower Mokelumne River and Delta.

5.2. Groundwater and Seepage Response

Channel losses to the groundwater basin occur in the lower Mokelumne River. EBMUD, under water rights agreements with other water users on the river, is obligated to release sufficient water to ensure that entitlements are delivered to the users at their points of diversion. Channel losses deplete the amount of water in the river, thus requiring EBMUD to increase the releases from Camanche Dam to compensate for the losses. MOCASIM incorporates the same methodology used in the original EBMUDSIM for modeling channel losses. Channel losses in the model depend on the total annual release from Camanche Dam as illustrated in **Figure 5**.

Figure 5. Lower Mokelumne River Channel Losses



Under the MICUP Scenario, elevated groundwater levels would diminish these losses by reducing the driving head difference between the stream and aquifer. Groundwater modelling indicates that implementation of MICUP results in increased groundwater elevations adjacent to affected stream reaches. The higher groundwater levels reduce the hydraulic gradient between the stream stage and the adjacent aquifer. Because stream-to-aquifer seepage is driven by this hydraulic gradient (i.e., the difference between stream stage and groundwater elevation), a reduction in gradient results in decreased stream seepage losses from the streams relative to baseline conditions. A decrease in stream seepage means that more surface water is remaining in the stream with MICUP compared to baseline conditions. **Table 7** shows the estimated reduction in seepage and corresponding increase in Mokelumne River flow from the MICUP groundwater model throughout the 53-year modeling period.

Under the MICUP Scenario, Mokelumne River outflow to the Delta was first estimated in MOCASIM using the same approach as the Baseline Condition, meaning that channel losses were not adjusted in the WAAT for the reduced total annual release from Camanche Dam when MICUP diversions occur. This approach provides a conservative, high end estimate of channel losses (and resulting flow reductions) at Woodbridge Diversion Dam (WDD) and for Mokelumne River outflow to the Delta under MICUP. Mokelumne River outflow to the Delta was then adjusted to account for increases in flow from reductions in seepage estimated for the Mokelumne River from MICUP. The modeling assumes that reduce seepage begins the first month of the modeling period in 1969. It was not possible to adjust flows for increases from reduced seepage at WDD because flow increases from seepage reductions were estimated on a reach basis. Therefore, lower levels estimated at WDD for MICUP are lower than would be expected.

Table 7. Estimated Reduction in Seepage/Increase in Mokelumne River Flow from the MICUP Groundwater Model throughout the 53-Year Modeling Period (acre-feet)

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Jan-69	1,155
Feb-69	926
Mar-69	439
Apr-69	509
May-69	603
Jun-69	100
Jul-69	907
Aug-69	740
Sep-69	540
Oct-69	448
Nov-69	355
Dec-69	1,113
Jan-70	1,687
Feb-70	1,450
Mar-70	497
Apr-70	571
May-70	610
Jun-70	560
Jul-70	1,370
Aug-70	655
Sep-70	165
Oct-70	442
Nov-70	463
Dec-70	1,806
Jan-71	1,577
Feb-71	1,594
Mar-71	594
Apr-71	605
May-71	1,445
Jun-71	622
Jul-71	1,495
Aug-71	907
Sep-71	653
Oct-71	635
Nov-71	566
Dec-71	693
Jan-72	680
Feb-72	676
Mar-72	644
Apr-72	618
May-72	574
Jun-72	20
Jul-72	530
Aug-72	502
Sep-72	476
Oct-72	665
Nov-72	556
Dec-72	547
Jan-73	1,890
Feb-73	1,508
Mar-73	965
Apr-73	459
May-73	1,458
Jun-73	1,269
Jul-73	1,288
Aug-73	928
Sep-73	861
Oct-73	731
Nov-73	708
Dec-73	2,180
Jan-74	1,884
Feb-74	977
Mar-74	1,675
Apr-74	1,180
May-74	1,869
Jun-74	1,324
Jul-74	1,693
Aug-74	1,547
Sep-74	1,318
Oct-74	1,179
Nov-74	1,075
Dec-74	1,180
Jan-75	1,310
Feb-75	1,408
Mar-75	1,521
Apr-75	1,460
May-75	1,950
Jun-75	1,643
Jul-75	1,642
Aug-75	1,583
Sep-75	1,355
Oct-75	1,203
Nov-75	1,104
Dec-75	1,197
Jan-76	1,198
Feb-76	1,186
Mar-76	1,176
Apr-76	1,109
May-76	988
Jun-76	54
Jul-76	763
Aug-76	728
Sep-76	686
Oct-76	1,246
Nov-76	962
Dec-76	941
Jan-77	934
Feb-77	928
Mar-77	928
Apr-77	846
May-77	850
Jun-77	44
Jul-77	575
Aug-77	557
Sep-77	529

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Oct-77	1,157
Nov-77	856
Dec-77	857
Jan-78	938
Feb-78	982
Mar-78	1,075
Apr-78	1,075
May-78	1,125
Jun-78	1,048
Jul-78	1,389
Aug-78	1,218
Sep-78	762
Oct-78	909
Nov-78	882
Dec-78	915
Jan-79	923
Feb-79	2,127
Mar-79	1,289
Apr-79	765
May-79	1,745
Jun-79	1,525
Jul-79	1,367
Aug-79	1,026
Sep-79	1,155
Oct-79	1,045
Nov-79	969
Dec-79	1,090
Jan-80	2,391
Feb-80	2,285
Mar-80	1,549
Apr-80	1,578
May-80	2,160
Jun-80	1,856
Jul-80	1,867
Aug-80	1,798
Sep-80	1,569
Oct-80	1,382
Nov-80	1,281

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Dec-80	1,370
Jan-81	1,381
Feb-81	1,357
Mar-81	1,349
Apr-81	1,246
May-81	1,163
Jun-81	35
Jul-81	859
Aug-81	815
Sep-81	762
Oct-81	1,498
Nov-81	1,127
Dec-81	2,464
Jan-82	2,188
Feb-82	2,344
Mar-82	1,816
Apr-82	2,165
May-82	1,583
Jun-82	1,671
Jul-82	2,177
Aug-82	1,896
Sep-82	1,662
Oct-82	1,512
Nov-82	1,419
Dec-82	2,897
Jan-83	2,701
Feb-83	2,903
Mar-83	2,400
Apr-83	2,709
May-83	2,125
Jun-83	2,153
Jul-83	2,625
Aug-83	2,289
Sep-83	2,026
Oct-83	1,861
Nov-83	1,777
Dec-83	3,223
Jan-84	2,981

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Feb-84	2,937
Mar-84	1,796
Apr-84	2,124
May-84	2,747
Jun-84	2,364
Jul-84	2,166
Aug-84	1,733
Sep-84	1,972
Oct-84	1,798
Nov-84	1,706
Dec-84	1,808
Jan-85	1,804
Feb-85	1,792
Mar-85	1,789
Apr-85	1,624
May-85	1,532
Jun-85	33
Jul-85	1,127
Aug-85	1,066
Sep-85	1,065
Oct-85	1,938
Nov-85	1,473
Dec-85	1,479
Jan-86	1,645
Feb-86	2,827
Mar-86	2,117
Apr-86	1,932
May-86	2,582
Jun-86	2,272
Jul-86	2,269
Aug-86	2,181
Sep-86	1,960
Oct-86	1,736
Nov-86	1,644
Dec-86	1,744
Jan-87	1,755
Feb-87	1,749
Mar-87	1,742

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Apr-87	1,590
May-87	1,492
Jun-87	38
Jul-87	1,037
Aug-87	985
Sep-87	931
Oct-87	1,969
Nov-87	1,438
Dec-87	1,419
Jan-88	1,414
Feb-88	1,376
Mar-88	1,360
Apr-88	1,402
May-88	1,221
Jun-88	22
Jul-88	813
Aug-88	789
Sep-88	753
Oct-88	1,729
Nov-88	1,286
Dec-88	1,255
Jan-89	1,247
Feb-89	1,241
Mar-89	1,250
Apr-89	1,149
May-89	1,125
Jun-89	29
Jul-89	701
Aug-89	683
Sep-89	738
Oct-89	1,602
Nov-89	1,169
Dec-89	1,149
Jan-90	1,150
Feb-90	1,144
Mar-90	1,140
Apr-90	1,068
May-90	1,118

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Jun-90	24
Jul-90	634
Aug-90	617
Sep-90	587
Oct-90	1,422
Nov-90	1,081
Dec-90	1,052
Jan-91	1,043
Feb-91	1,048
Mar-91	1,059
Apr-91	983
May-91	949
Jun-91	44
Jul-91	573
Aug-91	563
Sep-91	529
Oct-91	1,335
Nov-91	987
Dec-91	971
Jan-92	969
Feb-92	975
Mar-92	974
Apr-92	906
May-92	868
Jun-92	44
Jul-92	525
Aug-92	517
Sep-92	482
Oct-92	1,212
Nov-92	916
Dec-92	922
Jan-93	995
Feb-93	1,023
Mar-93	1,072
Apr-93	1,040
May-93	1,567
Jun-93	1,320
Jul-93	1,373

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Aug-93	1,374
Sep-93	1,175
Oct-93	1,046
Nov-93	963
Dec-93	1,067
Jan-94	1,077
Feb-94	1,075
Mar-94	1,030
Apr-94	1,014
May-94	977
Jun-94	67
Jul-94	651
Aug-94	630
Sep-94	583
Oct-94	1,285
Nov-94	955
Dec-94	956
Jan-95	1,032
Feb-95	1,053
Mar-95	1,359
Apr-95	1,499
May-95	1,463
Jun-95	1,457
Jul-95	1,529
Aug-95	1,530
Sep-95	1,333
Oct-95	1,197
Nov-95	1,110
Dec-95	1,227
Jan-96	1,341
Feb-96	2,482
Mar-96	1,794
Apr-96	1,397
May-96	2,118
Jun-96	1,836
Jul-96	1,862
Aug-96	1,823
Sep-96	1,577

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Oct-96	1,463
Nov-96	1,353
Dec-96	2,837
Jan-97	2,577
Feb-97	2,742
Mar-97	1,934
Apr-97	2,102
May-97	1,986
Jun-97	1,820
Jul-97	1,981
Aug-97	1,778
Sep-97	1,412
Oct-97	1,442
Nov-97	1,430
Dec-97	1,430
Jan-98	2,742
Feb-98	2,597
Mar-98	2,208
Apr-98	2,347
May-98	2,384
Jun-98	1,716
Jul-98	2,425
Aug-98	2,147
Sep-98	1,897
Oct-98	1,757
Nov-98	1,660
Dec-98	1,729
Jan-99	3,076
Feb-99	2,724
Mar-99	2,499
Apr-99	1,507
May-99	2,611
Jun-99	2,285
Jul-99	1,960
Aug-99	1,668
Sep-99	2,128
Oct-99	1,715
Nov-99	1,696

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Dec-99	1,791
Jan-00	1,809
Feb-00	3,073
Mar-00	2,418
Apr-00	1,566
May-00	2,396
Jun-00	2,151
Jul-00	1,931
Aug-00	1,658
Sep-00	1,871
Oct-00	1,806
Nov-00	1,670
Dec-00	1,757
Jan-01	1,775
Feb-01	1,774
Mar-01	1,764
Apr-01	1,716
May-01	1,505
Jun-01	52
Jul-01	1,136
Aug-01	1,083
Sep-01	1,019
Oct-01	1,964
Nov-01	1,511
Dec-01	1,491
Jan-02	1,485
Feb-02	1,475
Mar-02	1,478
Apr-02	1,352
May-02	1,335
Jun-02	58
Jul-02	896
Aug-02	870
Sep-02	824
Oct-02	1,864
Nov-02	1,388
Dec-02	1,375
Jan-03	1,364

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Feb-03	1,352
Mar-03	1,354
Apr-03	1,392
May-03	1,455
Jun-03	1,403
Jul-03	1,249
Aug-03	987
Sep-03	1,393
Oct-03	1,257
Nov-03	1,224
Dec-03	1,279
Jan-04	1,294
Feb-04	2,350
Mar-04	1,123
Apr-04	1,239
May-04	1,234
Jun-04	75
Jul-04	868
Aug-04	843
Sep-04	797
Oct-04	1,723
Nov-04	1,300
Dec-04	1,295
Jan-05	1,394
Feb-05	2,496
Mar-05	1,787
Apr-05	1,489
May-05	2,184
Jun-05	1,917
Jul-05	1,953
Aug-05	1,917
Sep-05	1,702
Oct-05	1,541
Nov-05	1,453
Dec-05	2,938
Jan-06	2,702
Feb-06	2,862
Mar-06	2,368

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Apr-06	2,701
May-06	2,101
Jun-06	2,144
Jul-06	2,627
Aug-06	2,324
Sep-06	2,059
Oct-06	1,840
Nov-06	1,730
Dec-06	1,815
Jan-07	1,805
Feb-07	1,791
Mar-07	1,733
Apr-07	1,703
May-07	1,507
Jun-07	69
Jul-07	1,095
Aug-07	1,044
Sep-07	980
Oct-07	2,002
Nov-07	1,489
Dec-07	1,466
Jan-08	1,472
Feb-08	1,458
Mar-08	1,396
Apr-08	1,340
May-08	1,284
Jun-08	81
Jul-08	858
Aug-08	836
Sep-08	788
Oct-08	1,818
Nov-08	1,359
Dec-08	1,334
Jan-09	1,329
Feb-09	1,327
Mar-09	1,324
Apr-09	1,342
May-09	1,315

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Jun-09	1,250
Jul-09	166
Aug-09	758
Sep-09	1,710
Oct-09	1,252
Nov-09	1,233
Dec-09	1,227
Jan-10	1,232
Feb-10	1,228
Mar-10	1,222
Apr-10	1,248
May-10	1,954
Jun-10	1,738
Jul-10	1,111
Aug-10	1,040
Sep-10	1,736
Oct-10	1,154
Nov-10	1,173
Dec-10	2,662
Jan-11	2,377
Feb-11	2,546
Mar-11	2,011
Apr-11	2,329
May-11	1,760
Jun-11	1,897
Jul-11	2,391
Aug-11	2,115
Sep-11	1,867
Oct-11	1,685
Nov-11	1,575
Dec-11	1,658
Jan-12	1,658
Feb-12	1,624
Mar-12	1,625
Apr-12	1,589
May-12	1,383
Jun-12	53
Jul-12	1,020

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Aug-12	972
Sep-12	920
Oct-12	1,856
Nov-12	1,396
Dec-12	1,380
Jan-13	1,365
Feb-13	1,304
Mar-13	1,365
Apr-13	1,253
May-13	1,203
Jun-13	37
Jul-13	806
Aug-13	785
Sep-13	813
Oct-13	1,584
Nov-13	1,249
Dec-13	1,220
Jan-14	1,205
Feb-14	1,222
Mar-14	1,221
Apr-14	1,197
May-14	1,071
Jun-14	79
Jul-14	707
Aug-14	690
Sep-14	659
Oct-14	1,434
Nov-14	1,154
Dec-14	1,138
Jan-15	1,131
Feb-15	1,125
Mar-15	1,076
Apr-15	1,110
May-15	988
Jun-15	77
Jul-15	636
Aug-15	620
Sep-15	581

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Oct-15	1,281
Nov-15	1,069
Dec-15	1,046
Jan-16	1,055
Feb-16	1,031
Mar-16	1,055
Apr-16	1,041
May-16	925
Jun-16	82
Jul-16	582
Aug-16	566
Sep-16	534
Oct-16	1,273
Nov-16	1,007
Dec-16	2,346
Jan-17	2,007
Feb-17	2,110
Mar-17	1,664
Apr-17	1,750
May-17	1,247
Jun-17	1,416
Jul-17	1,951
Aug-17	1,715
Sep-17	1,486

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Oct-17	1,351
Nov-17	1,262
Dec-17	1,343
Jan-18	1,343
Feb-18	1,320
Mar-18	1,590
Apr-18	1,879
May-18	984
Jun-18	1,246
Jul-18	1,052
Aug-18	897
Sep-18	1,386
Oct-18	1,194
Nov-18	1,189
Dec-18	1,200
Jan-19	1,294
Feb-19	2,381
Mar-19	1,689
Apr-19	1,835
May-19	1,871
Jun-19	1,709
Jul-19	1,931
Aug-19	1,857
Sep-19	1,646

Month-Year	Estimated Reduction in Seepage/ Increase in Flow
Oct-19	1,469
Nov-19	1,378
Dec-19	1,484
Jan-20	1,483
Feb-20	1,417
Mar-20	1,470
Apr-20	1,411
May-20	1,256
Jun-20	61
Jul-20	927
Aug-20	886
Sep-20	836
Oct-20	1,617
Nov-20	1,267
Dec-20	1,233
Jan-21	1,234
Feb-21	1,224
Mar-21	1,218
Apr-21	1,118
May-21	1,067
Jun-21	95
Jul-21	729
Aug-21	709
Sep-21	665

6. Results Summary

Flows in the Lower Mokelumne are analyzed at Camanche Reservoir, below the WDD, and then as outflows to the Delta. The results of flow modeling for both the Baseline Condition and MICUP Flows in the Lower Mokelumne are presented in the following tables below:

- **Table 8** shows monthly and annual diversion (A029835) and rediversion (from Camanche Reservoir) of water modeled for MICUP to estimate flow changes.
- **Table 9** provides the JSA water year type for the October to March and April to September periods, which is used to identify fish flow requirements for each hydrologic year in the MOCASIM simulation of Baseline Condition flows.
- **Table 10** provides annual flows in the lower Mokelumne River for 1) releases from Camanche Dam, 2) below the WDD, and 3) inflow from the Mokelumne River to the Delta (i.e., flows downstream of the Interstate-5 crossing) for both scenarios. Cells are shaded green to designate where lower Mokelumne River outflow is greater under MICUP than Baseline Conditions due to reductions in seepage from groundwater recharge under MICUP.
- **Table 11** provides monthly flows in the lower Mokelumne River for 1) releases from Camanche Dam, 2) below the WDD, and 3) inflow from the Mokelumne River to the Delta (i.e., flows downstream of the Interstate-5 crossing) for both scenarios, along with minimum flow requirements. Cells are shaded green to designate where lower Mokelumne River outflow is greater under MICUP than Baseline Conditions due to reductions in seepage from groundwater recharge under MICUP.

Table 8. Monthly and Annual Diversion (A029835) of Water Modeled for MICUP (acre-feet)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1969	22,013	15,064	22,996	22,314	22,935	4,678	12,000	12,000	12,000	12,000	-	14,711	**158,000**
1970	22,013	15,064	13,761	-	9,377	10,000	11,049	10,363	552	-	-	20,045	**106,890**
1971	22,013	15,064	15,110	-	22,935	14,834	12,000	12,000	8,456	7,793	-	9,583	**150,249**
1972	-	-	-	-	-	-	-	-	-	-	-	-	**9,583**
1973	22,013	15,064	20,273	-	22,935	22,314	12,000	12,000	9,297	8,634	-	20,045	**144,530**
1974	22,013	-	22,996	5,262	22,935	16,750	12,000	12,000	12,000	12,000	-	-	**158,000**
1975	-	-	-	-	22,935	22,314	12,000	12,000	12,000	12,000	-	-	**93,249**
1976	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1977	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1978	-	-	-	-	13,247	13,744	12,000	12,000	2,424	1,762	-	-	**55,177**
1979	-	15,064	20,200	-	22,935	22,314	12,000	12,000	8,057	7,394	-	-	**119,963**
1980	22,013	15,959	14,942	-	22,935	22,314	12,000	12,000	12,000	12,000	-	-	**146,163**
1981	-	-	-	-	-	-	-	-	-	-	-	20,045	**-**
1982	22,013	15,064	22,996	22,314	7,568	-	12,000	12,000	12,000	12,000	-	20,045	**158,000**
1983	22,013	15,064	22,996	22,314	7,568	-	12,000	12,000	12,000	12,000	-	20,045	**158,000**
1984	22,013	15,959	5,602	-	22,935	22,314	12,000	12,000	8,012	7,349	-	3,055	**148,229**
1985	-	-	-	-	-	-	-	-	-	-	-	-	**3,055**
1986	-	15,064	22,996	-	22,935	22,314	12,000	12,000	12,000	12,000	-	-	**131,309**
1987	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1988	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1989	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1990	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1991	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1992	-	-	-	-	-	-	-	-	-	-	-	-	**-**
1993	-	-	-	-	22,935	22,314	12,000	12,000	12,000	12,000	-	-	**93,249**
1994	-	-	-	-	-	-	-	-	-	-	-	-	**-**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1995	-	-	22,996	22,314	22,935	22,314	12,000	12,000	12,000	12,000	-	-	**138,559**
1996	-	15,959	22,996	-	22,935	22,314	12,000	12,000	9,901	9,238	-	20,045	**127,344**
1997	22,013	15,064	10,139	-	6,369	7,088	8,041	7,355	-	-	-	-	**96,114**
1998	22,013	15,064	22,996	22,314	22,935	4,678	12,000	12,000	12,000	12,000	-	-	**158,000**
1999	22,013	15,064	22,996	-	22,935	22,314	12,000	12,000	12,000	11,679	-	-	**153,001**
2000	957	16,402	22,996	-	19,059	19,369	12,000	12,000	5,237	4,574	-	-	**112,595**
2001	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2002	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2003	-	-	-	-	12,993	13,499	12,000	12,000	2,301	1,639	-	-	**54,432**
2004	-	13,990	11,701	-	-	-	-	-	-	-	-	-	**25,691**
2005	-	15,064	22,996	8,249	22,935	22,314	12,000	12,000	12,000	12,000	-	20,045	**139,558**
2006	22,013	15,064	22,996	22,314	7,568	-	12,000	12,000	11,679	11,017	-	5,498	**156,696**
2007	-	-	-	-	-	-	-	-	-	-	-	-	**5,498**
2008	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2009	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2010	-	-	-	-	22,935	22,314	12,000	12,000	11,940	11,278	-	20,045	**92,467**
2011	22,013	15,064	22,996	22,314	7,568	-	12,000	12,000	12,000	12,000	-	-	**158,000**
2012	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2013	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2014	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2015	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2016	-	-	-	-	-	-	-	-	-	-	-	20,045	**-**
2017	22,013	15,064	22,996	22,314	7,568	-	12,000	12,000	12,000	12,000	-	-	**158,000**
2018	-	-	15,775	22,314	603	1,509	2,275	1,589	-	-	-	-	**44,065**
2019	7,171	15,064	22,996	22,314	22,935	19,520	12,000	12,000	12,000	12,000	-	-	**158,000**
2020	-	-	-	-	-	-	-	-	-	-	-	-	**-**
2021	-	-	-	-	-	-	-	-	-	-	-	-	**-**

Notes: [1] Annual flows were calculated from December through November of the following year.

Table 9. JSA Water Year Type for Each Model Year

Hydrologic Year	October - March	April – September
1969	Below Normal	Normal
1970	Normal	Normal
1971	Normal	Below Normal
1972	Normal	Below Normal
1973	Normal	Below Normal
1974	Normal	Normal
1975	Normal	Below Normal
1976	Normal	Critical
1977	Dry	Critical
1978	Critical	Critical
1979	Normal	Below Normal
1980	Normal	Normal
1981	Normal	Dry
1982	Dry	Normal
1983	Normal	Normal
1984	Normal	Normal
1985	Normal	Dry
1986	Below Normal	Normal
1987	Normal	Critical
1988	Dry	Critical
1989	Critical	Below Normal
1990	Dry	Dry
1991	Dry	Dry
1992	Critical	Critical
1993	Critical	Critical
1994	Normal	Critical
1995	Dry	Normal
1996	Normal	Normal
1997	Normal	Normal
1998	Normal	Normal
1999	Normal	Normal
2000	Normal	Below Normal
2001	Normal	Dry
2002	Dry	Below Normal
2003	Below Normal	Below Normal
2004	Normal	Below Normal
2005	Below Normal	Normal
2006	Normal	Normal
2007	Normal	Dry
2008	Dry	Dry
2009	Dry	Below Normal
2010	Normal	Below Normal
2011	Normal	Normal
2012	Normal	Dry
2013	Below Normal	Dry
2014	Dry	Critical
2015	Dry	Critical
2016	Critical	Critical
2017	Below Normal	Normal
2018	Normal	Below Normal
2019	Normal	Normal
2020	Normal	Dry
2021	Below Normal	Critical

Table 10. Annual Flow for Baseline Conditions and MICUP Throughout the Simulation Period (acre-feet)

Year	Annual Baseline Flow			Annual MICUP Flow		
	Camanche Dam Release	Below WDD	Lower Mokelumne River Outflow	Camanche Dam Release	Below WDD[1]	Lower Mokelumne River Outflow[2]
1969	1,088,641	861,424	850,243	999,604	688,714	685,367
1970	707,830	524,077	512,896	639,617	411,853	410,946
1971	508,401	337,341	326,160	427,918	197,553	197,759
1972	267,817	138,800	127,606	267,817	138,800	134,093
1973	677,437	496,493	485,312	596,113	331,918	334,984
1974	672,950	491,806	480,625	598,310	353,851	359,570
1975	560,745	394,311	383,129	514,241	301,062	307,256
1976	188,646	83,814	73,985	188,646	83,814	85,022
1977	153,964	49,135	39,320	153,964	49,135	48,380
1978	291,136	128,817	117,636	254,539	73,640	74,776
1979	459,402	290,864	279,683	400,224	170,900	174,745
1980	901,771	699,552	688,358	826,328	553,389	563,280
1981	280,505	151,222	140,041	271,036	131,177	134,052
1982	1,429,146	1,189,814	1,178,633	1,348,656	1,031,814	1,043,961
1983	1,808,888	1,569,556	1,558,375	1,728,398	1,411,556	1,429,166
1984	608,976	435,865	424,671	540,632	304,627	319,566
1985	238,377	109,360	98,179	238,377	109,360	114,899
1986	1,016,374	799,837	788,656	952,921	668,528	682,257
1987	192,279	84,261	73,081	192,279	84,261	89,225
1988	158,677	50,660	39,466	158,677	50,660	52,886
1989	217,443	88,426	77,245	217,443	88,426	89,329
1990	192,139	84,122	72,941	192,139	84,122	83,977

Year	Annual Baseline Flow			Annual MICUP Flow		
	Camanche Dam Release	Below WDD	Lower Mokelumne River Outflow	Camanche Dam Release	Below WDD[1]	Lower Mokelumne River Outflow[2]
1991	176,845	68,828	57,647	176,845	68,828	67,732
1992	145,116	37,099	25,905	145,116	37,099	35,214
1993	420,906	258,586	247,405	374,402	165,337	168,171
1994	192,279	84,261	73,081	192,279	84,261	83,381
1995	1,181,650	946,118	934,938	1,112,641	807,559	812,168
1996	861,810	661,614	650,419	790,764	514,225	524,914
1997	847,904	651,518	640,337	799,662	575,449	586,903
1998	1,043,343	818,301	807,120	963,775	660,301	674,730
1999	656,307	480,145	468,964	581,578	327,145	341,623
2000	478,389	310,175	298,994	420,076	197,580	210,506
2001	230,873	101,856	90,675	230,873	101,856	107,466
2002	238,159	109,142	97,961	238,159	109,142	112,363
2003	345,580	183,261	172,080	309,106	128,829	133,359
2004	288,601	154,221	143,026	271,098	128,530	131,476
2005	805,662	610,080	598,899	724,492	450,477	462,067
2006	1,103,293	871,849	860,669	1,027,427	729,701	745,793
2007	230,873	101,856	90,675	230,873	101,856	107,359
2008	192,575	84,558	73,363	192,575	84,558	87,388
2009	248,429	119,412	108,231	248,429	119,412	122,464
2010	571,664	406,499	395,318	516,082	293,987	300,305
2011	1,078,134	850,230	839,049	1,007,113	712,275	725,306
2012	239,021	110,004	98,810	239,021	110,004	114,287
2013	217,485	88,468	77,287	217,485	88,468	90,269
2014	173,535	65,515	54,333	173,535	65,515	66,110

Year	Annual Baseline Flow			Annual MICUP Flow		
	Camanche Dam Release	Below WDD	Lower Mokelumne River Outflow	Camanche Dam Release	Below WDD[1]	Lower Mokelumne River Outflow[2]
2015	153,964	49,135	39,320	153,964	49,135	50,058
2016	248,956	117,093	105,899	239,487	97,049	97,352
2017	1,601,659	1,362,593	1,351,413	1,530,639	1,224,639	1,232,759
2018	365,887	204,948	193,767	339,339	160,883	164,981
2019	961,164	747,825	736,644	879,473	589,825	599,188
2020	239,021	110,001	98,806	239,021	110,001	112,669
2021	174,613	69,781	59,965	174,613	69,781	68,024[3]

Notes: [1] Flow below WDD does not account for increases in flows due to reduced seepage under MICUP.
[2] Green shaded cells designated lower Mokelumne River outflow that is greater under MICUP than Baseline Conditions due to reductions in seepage from groundwater recharge under MICUP.
[3] No seepage reduction estimates were available for October to December 2021; however, it's anticipated these months would also have increased flow due to seepage reductions.

Table 11. Monthly Flow for Baseline Conditions and MICUP Throughout the Simulation Period (acre-feet)

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
1969	January	121,648	112,670	112,201	110,211	90,658	91,343	15,372	6,149
	February	94,323	87,429	87,008	88,812	72,366	72,870	13,884	5,554
	March	58,358	43,229	42,685	46,921	20,233	20,128	15,372	9,531
	April	148,908	130,589	129,787	137,840	108,275	107,983	19,339	28,384
	May	226,100	200,111	198,696	214,663	177,176	176,363	19,984	34,802
	June	113,349	82,633	80,812	108,671	77,954	76,233	19,339	17,851
	July	89,869	55,907	54,103	83,869	43,907	43,010	6,149	1,537
	August	84,598	54,954	53,629	78,598	42,954	42,369	6,149	1,537
	September	46,426	22,872	22,012	40,426	10,872	10,552	5,950	1,488
	October	50,763	32,651	32,016	44,763	20,651	20,464	19,984	11,929
	November	19,339	12,403	11,903	19,339	12,403	12,258	19,339	5,950
	December	34,960	25,977	25,392	25,491	11,266	11,794	19,984	6,149
1970	January	218,223	212,539	212,071	206,786	190,527	191,745	19,984	6,149
	February	62,963	58,714	58,292	57,451	43,650	44,678	18,050	5,554
	March	39,000	27,441	26,897	27,563	13,680	13,632	19,984	9,531
	April	38,688	28,383	27,582	38,688	28,383	28,153	19,339	28,384
	May	66,140	44,179	42,764	56,763	34,802	33,997	19,984	34,802
	June	54,448	27,851	26,030	44,448	17,851	16,590	19,339	17,851
	July	42,467	12,853	11,049	36,942	1,804	1,370	6,149	1,537
	August	37,517	11,900	10,575	32,335	1,537	867	6,149	1,537
	September	22,227	2,040	1,179	21,951	1,488	792	5,950	1,488
	October	27,365	11,929	11,294	27,365	11,929	11,736	19,984	11,929
	November	43,558	36,700	36,200	43,558	36,700	36,664	19,339	5,950
	December	55,235	49,547	48,962	45,766	29,502	30,722	19,984	6,149

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
1971	January	49,311	44,641	44,173	37,875	22,629	23,737	19,984	6,149
	February	37,721	34,285	33,864	32,210	19,221	20,394	18,050	5,554
	March	40,349	29,887	29,343	28,912	14,777	14,827	19,984	9,531
	April	24,511	15,352	14,551	24,511	15,352	15,155	14,876	15,352
	May	63,712	42,990	41,575	52,275	20,055	20,085	15,372	17,278
	June	63,038	37,708	35,887	51,970	22,874	21,675	14,876	11,901
	July	57,464	29,188	27,384	51,464	17,188	16,878	6,149	1,230
	August	52,400	28,022	26,697	46,400	16,022	15,604	6,149	1,230
	September	29,096	9,646	8,786	24,868	1,190	983	5,950	1,190
	October	34,182	19,722	19,087	30,286	11,929	11,929	19,984	11,929
	November	26,783	20,742	20,242	26,783	20,742	20,808	19,339	5,950
	December	29,833	25,157	24,572	20,364	15,574	15,682	19,984	6,149
1972	January	19,983	15,845	15,377	19,983	15,845	16,057	19,984	6,149
	February	18,694	15,366	14,931	18,694	15,366	15,607	18,694	5,752
	March	19,983	14,777	14,233	19,983	14,777	14,877	19,984	9,531
	April	24,511	15,352	14,551	24,511	15,352	15,168	14,876	15,352
	May	32,928	17,278	15,863	32,928	17,278	16,437	15,372	17,278
	June	31,938	11,901	10,080	31,938	11,901	10,100	14,876	11,901
	July	24,680	1,804	0	24,680	1,804	530	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	502	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	805	5,950	1,190
	October	20,313	12,510	11,875	20,313	12,510	12,540	19,984	11,929
	November	19,339	15,877	15,378	19,339	15,877	15,934	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	15,536	19,984	6,149
1973	January	71,636	66,184	65,715	60,199	44,171	45,593	19,984	6,149
	February	73,108	69,045	68,623	67,597	53,981	55,067	18,050	5,554

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	March	45,512	34,203	33,659	34,075	13,930	14,351	19,984	9,531
	April	25,395	15,352	14,551	25,395	15,352	15,009	14,876	15,352
	May	66,406	44,728	43,313	54,970	21,793	21,836	15,372	17,278
	June	65,698	39,390	37,569	54,630	17,076	16,524	14,876	11,901
	July	60,234	30,926	29,122	54,234	18,926	18,410	6,149	1,230
	August	55,094	29,760	28,436	49,094	17,760	17,364	6,149	1,230
	September	30,736	10,487	9,627	26,088	1,190	1,191	5,950	1,190
	October	35,632	20,563	19,928	31,315	11,929	12,025	19,984	11,929
	November	86,322	79,650	79,150	86,322	79,650	79,859	19,339	5,950
	December	61,662	56,205	55,620	52,193	36,160	37,755	19,984	6,149
1974	January	90,723	85,361	84,892	79,287	63,349	64,764	19,984	6,149
	February	18,050	14,166	13,745	18,050	14,166	14,721	18,050	5,554
	March	63,358	52,147	51,603	51,921	29,151	30,281	19,984	9,531
	April	47,877	33,645	32,844	42,616	28,383	28,762	19,339	28,384
	May	99,309	77,741	76,326	87,873	54,806	55,260	19,984	34,802
	June	86,526	60,330	58,509	75,458	43,580	43,084	19,339	17,851
	July	75,605	46,415	44,611	69,605	34,415	34,304	6,149	1,537
	August	70,686	45,462	44,137	64,686	33,462	33,684	6,149	1,537
	September	38,139	18,279	17,419	32,139	6,279	6,737	5,950	1,488
	October	43,355	28,058	27,423	37,355	16,058	16,602	19,984	11,929
	November	19,339	15,319	14,819	19,339	15,319	15,894	19,339	5,950
	December	19,983	14,882	14,297	19,983	14,882	15,477	19,984	6,149
1975	January	19,983	15,845	15,377	19,983	15,845	16,686	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	15,708	18,050	5,554
	March	21,515	14,777	14,233	21,515	14,777	15,754	19,984	9,531
	April	24,511	15,352	14,551	24,511	15,352	16,011	14,876	15,352

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	May	90,109	69,386	67,971	78,672	46,452	46,986	15,372	17,278
	June	88,584	63,253	61,433	77,516	40,939	40,761	14,876	11,901
	July	83,861	55,585	53,780	77,861	43,585	43,423	6,149	1,230
	August	78,797	54,419	53,094	72,797	42,419	42,677	6,149	1,230
	September	41,869	22,418	21,558	35,869	10,418	10,913	5,950	1,190
	October	46,955	32,495	31,860	40,955	20,495	21,063	19,984	11,929
	November	26,528	20,487	19,987	26,528	20,487	21,091	19,339	5,950
	December	19,983	15,571	14,985	19,983	15,571	16,183	19,984	6,149
1976	January	19,983	15,846	15,377	19,983	15,846	16,576	19,984	6,149
	February	18,694	15,367	14,932	18,694	15,367	16,118	18,694	5,752
	March	19,983	14,840	14,296	19,983	14,840	15,472	19,984	9,531
	April	13,747	4,463	3,662	13,747	4,463	4,771	7,736	4,463
	May	15,108	1,415	0	15,108	1,415	988	6,149	922
	June	18,294	1,821	0	18,294	1,821	54	5,950	893
	July	17,236	1,115	0	17,236	1,115	763	6,149	922
	August	14,889	922	48	14,889	922	776	6,149	922
	September	10,309	893	257	10,309	893	944	5,950	893
	October	13,785	8,388	7,754	13,785	8,388	9,000	13,527	7,440
	November	13,091	9,629	9,129	13,091	9,629	10,091	13,091	4,760
	December	13,527	9,115	8,529	13,527	9,115	9,470	13,527	4,919
1977	January	13,527	9,390	8,921	13,527	9,390	9,855	13,527	4,919
	February	12,218	8,891	8,470	12,218	8,891	9,398	12,218	4,443
	March	13,527	8,384	7,840	13,527	8,384	8,768	13,527	6,395
	April	13,747	4,463	3,662	13,747	4,463	4,508	7,736	4,463
	May	15,108	1,415	0	15,108	1,415	850	6,149	922
	June	18,294	1,821	0	18,294	1,821	44	5,950	893

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	July	17,236	1,115	0	17,236	1,115	575	6,149	922
	August	14,889	922	48	14,889	922	605	6,149	922
	September	10,309	893	257	10,309	893	786	5,950	893
	October	8,164	2,767	2,132	8,164	2,767	3,289	7,071	2,767
	November	7,924	4,463	3,963	7,924	4,463	4,819	7,736	4,463
	December	9,021	4,612	4,027	9,021	4,612	4,884	7,993	4,612
1978	January	8,750	4,612	4,143	8,750	4,612	5,080	7,993	4,612
	February	7,493	4,165	3,744	7,493	4,165	4,725	7,220	4,165
	March	9,818	4,612	4,067	9,818	4,612	5,142	7,993	4,612
	April	13,622	4,463	3,661	13,622	4,463	4,736	7,736	4,463
	May	35,384	14,662	13,247	23,947	1,415	1,125	6,149	922
	June	40,895	15,565	13,744	29,828	1,821	1,048	5,950	893
	July	44,999	16,723	14,919	38,999	4,723	4,307	6,149	922
	August	39,935	15,557	14,232	33,935	3,557	3,450	6,149	922
	September	23,065	3,317	2,457	21,853	893	795	5,950	893
	October	27,853	13,690	13,056	26,972	11,929	12,203	19,984	11,929
	November	19,339	15,877	15,378	19,339	15,877	16,260	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	15,904	19,984	6,149
1979	January	19,983	15,845	15,377	19,983	15,845	16,300	19,984	6,149
	February	33,469	30,034	29,612	27,958	14,970	16,675	18,050	5,554
	March	45,438	34,977	34,433	34,002	14,777	15,522	19,984	9,531
	April	24,511	15,352	14,551	24,511	15,352	15,316	14,876	15,352
	May	62,887	42,165	40,750	51,450	19,230	19,560	15,372	17,278
	June	62,240	36,910	35,089	51,172	14,596	14,300	14,876	11,901
	July	56,639	28,363	26,559	50,639	16,363	15,926	6,149	1,230
	August	51,575	27,197	25,873	45,575	15,197	14,898	6,149	1,230

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	September	28,697	9,247	8,386	24,669	1,190	1,485	5,950	1,190
	October	33,783	19,323	18,688	30,086	11,929	12,339	19,984	11,929
	November	20,195	15,877	15,378	20,195	15,877	16,347	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	16,079	19,984	6,149
1980	January	204,808	197,447	196,978	193,371	175,434	177,356	19,984	6,149
	February	145,233	139,637	139,202	139,167	123,678	125,528	18,694	5,752
	March	40,181	26,805	26,260	28,744	11,862	12,867	19,984	9,531
	April	40,583	28,383	27,582	40,583	28,383	29,160	19,339	28,384
	May	102,645	78,633	77,218	91,208	55,699	56,443	19,984	34,802
	June	89,888	61,194	59,373	78,820	38,880	38,915	19,339	17,851
	July	79,135	47,308	45,503	73,135	35,308	35,371	6,149	1,537
	August	74,022	46,354	45,030	68,022	34,354	34,827	6,149	1,537
	September	40,612	18,711	17,851	34,612	6,711	7,420	5,950	1,488
	October	45,343	28,490	27,855	39,343	16,490	17,237	19,984	11,929
	November	19,339	13,707	13,207	19,339	13,707	14,488	19,339	5,950
	December	19,983	12,884	12,299	19,983	12,884	13,668	19,984	6,149
1981	January	19,983	15,845	15,377	19,983	15,845	16,757	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	15,657	18,050	5,554
	March	19,983	14,777	14,233	19,983	14,777	15,582	19,984	9,531
	April	21,476	12,317	11,516	21,476	12,317	12,762	13,091	12,317
	May	27,518	11,867	10,452	27,518	11,867	11,615	13,527	11,867
	June	21,858	1,821	0	21,858	1,821	35	5,950	1,190
	July	24,680	1,804	0	24,680	1,804	859	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	815	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,092	5,950	1,190
	October	15,244	7,440	6,805	15,244	7,440	8,303	13,527	7,440

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	November	13,091	9,629	9,130	13,091	9,629	10,257	13,091	4,760
	December	63,159	58,484	57,899	53,690	38,439	40,318	13,527	4,919
1982	January	96,927	87,194	86,725	85,490	65,182	66,901	13,527	4,919
	February	171,040	163,540	163,119	165,529	148,477	150,399	12,218	4,443
	March	118,348	102,402	101,857	106,911	79,405	80,677	13,527	6,395
	April	229,866	210,694	209,892	218,798	188,380	189,743	19,339	28,384
	May	201,772	174,861	173,446	194,204	167,293	167,460	19,984	34,802
	June	109,421	77,761	75,941	109,421	77,761	77,611	19,339	17,851
	July	99,385	64,428	62,623	93,385	52,428	52,801	6,149	1,537
	August	94,041	63,474	62,150	88,041	51,474	52,045	6,149	1,537
	September	51,319	26,995	26,135	45,319	14,995	15,796	5,950	1,488
	October	55,474	36,773	36,139	49,474	24,773	25,651	19,984	11,929
	November	88,316	78,192	77,692	88,316	78,192	79,111	19,339	5,950
	December	113,237	103,499	102,914	103,768	83,454	85,766	19,984	6,149
1983	January	93,079	83,347	82,878	81,642	61,334	63,566	19,984	6,149
	February	134,003	126,503	126,081	128,491	111,439	113,920	18,050	5,554
	March	221,426	205,480	204,935	209,989	182,483	184,339	19,984	9,531
	April	119,418	100,246	99,444	108,350	77,932	79,839	19,339	28,384
	May	283,424	256,513	255,098	275,856	248,945	249,655	19,984	34,802
	June	232,314	200,654	198,833	232,314	200,654	200,986	19,339	17,851
	July	135,425	100,467	98,663	129,425	88,467	89,287	6,149	1,537
	August	130,081	99,514	98,189	124,081	87,514	88,478	6,149	1,537
	September	68,757	44,433	43,573	62,757	32,433	33,599	5,950	1,488
	October	72,912	54,212	53,577	66,912	42,212	43,438	19,984	11,929
	November	144,227	134,102	133,603	144,227	134,102	135,380	19,339	5,950
	December	173,823	164,085	163,500	164,353	144,040	146,678	19,984	6,149

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
1984	January	99,763	94,931	94,462	88,326	72,918	75,431	19,984	6,149
	February	58,401	54,835	54,400	52,336	38,876	41,378	18,694	5,752
	March	30,841	20,204	19,660	25,239	14,602	15,854	19,984	9,531
	April	37,726	28,383	27,582	37,726	28,383	29,706	19,339	28,384
	May	80,517	59,596	58,181	69,080	36,661	37,993	19,984	34,802
	June	68,303	42,770	40,949	57,236	20,456	20,999	19,339	17,851
	July	56,760	28,270	26,466	50,760	16,270	16,632	6,149	1,537
	August	51,893	27,317	25,992	45,893	15,317	15,725	6,149	1,537
	September	28,818	9,499	8,639	24,812	1,488	2,600	5,950	1,488
	October	34,162	19,278	18,643	30,487	11,929	13,092	19,984	11,929
	November	38,488	32,315	31,816	38,488	32,315	33,522	19,339	5,950
	December	23,304	18,466	17,881	20,249	15,412	16,635	19,984	6,149
1985	January	19,983	15,845	15,377	19,983	15,845	17,181	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	16,092	18,050	5,554
	March	19,983	14,777	14,233	19,983	14,777	16,022	19,984	9,531
	April	21,476	12,317	11,516	21,476	12,317	13,139	13,091	12,317
	May	27,518	11,867	10,452	27,518	11,867	11,983	13,527	11,867
	June	21,858	1,821	0	21,858	1,821	33	5,950	1,190
	July	24,680	1,804	0	24,680	1,804	1,127	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	1,066	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,394	5,950	1,190
	October	19,117	11,314	10,679	19,117	11,314	12,618	15,372	11,314
	November	14,876	11,414	10,915	14,876	11,414	12,388	14,876	5,950
	December	15,372	10,963	10,378	15,372	10,963	11,856	15,372	6,149
1986	January	15,372	7,368	6,900	15,372	7,368	8,545	15,372	6,149
	February	327,673	321,134	320,713	322,162	306,071	308,476	13,884	5,554

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	March	175,338	160,688	160,144	163,901	137,692	139,264	15,372	9,531
	April	41,911	28,383	27,582	41,911	28,383	29,514	19,339	28,384
	May	116,128	90,680	89,265	104,691	67,745	68,912	19,984	34,802
	June	82,765	52,601	50,781	71,697	30,287	30,739	19,339	17,851
	July	71,807	38,429	36,625	65,807	26,429	26,894	6,149	1,537
	August	66,579	37,476	36,151	60,579	25,476	26,332	6,149	1,537
	September	37,516	14,415	13,555	31,516	2,415	3,515	5,950	1,488
	October	41,962	24,193	23,559	35,962	12,193	13,295	19,984	11,929
	November	19,339	12,759	12,260	19,339	12,759	13,904	19,339	5,950
	December	19,983	11,709	11,124	19,983	11,709	12,867	19,984	6,149
1987	January	19,983	15,845	15,377	19,983	15,845	17,132	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	16,049	18,050	5,554
	March	19,983	14,839	14,295	19,983	14,839	16,037	19,984	9,531
	April	13,748	4,463	3,661	13,748	4,463	5,251	7,736	4,463
	May	15,107	1,415	0	15,107	1,415	1,492	6,149	922
	June	18,294	1,821	0	18,294	1,821	38	5,950	893
	July	19,533	1,804	0	19,533	1,804	1,037	6,149	922
	August	16,343	1,325	0	16,343	1,325	985	6,149	922
	September	11,059	893	32	11,059	893	964	5,950	893
	October	13,560	8,388	7,753	13,560	8,388	9,722	13,527	7,440
	November	13,091	9,629	9,130	13,091	9,629	10,568	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	9,952	13,527	4,919
1988	January	13,527	9,389	8,921	13,527	9,389	10,335	13,527	4,919
	February	12,655	9,327	8,891	12,655	9,327	10,267	12,655	4,602
	March	13,527	8,383	7,838	13,527	8,383	9,198	13,527	6,395
	April	13,748	4,463	3,661	13,748	4,463	5,063	7,736	4,463

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	May	15,107	1,415	0	15,107	1,415	1,221	6,149	922
	June	18,294	1,821	0	18,294	1,821	22	5,950	893
	July	19,533	1,804	0	19,533	1,804	813	6,149	922
	August	16,343	1,325	0	16,343	1,325	789	6,149	922
	September	11,059	893	32	11,059	893	785	5,950	893
	October	7,939	2,767	2,132	7,939	2,767	3,861	7,071	2,767
	November	7,924	4,463	3,963	7,924	4,463	5,249	7,736	4,463
	December	9,021	4,612	4,027	9,021	4,612	5,282	7,993	4,612
1989	January	8,750	4,612	4,143	8,750	4,612	5,390	7,993	4,612
	February	7,493	4,165	3,744	7,493	4,165	4,984	7,220	4,165
	March	9,818	4,612	4,067	9,818	4,612	5,317	7,993	4,612
	April	24,511	15,352	14,551	24,511	15,352	15,699	14,876	15,352
	May	32,928	17,278	15,863	32,928	17,278	16,988	15,372	17,278
	June	31,938	11,901	10,080	31,938	11,901	10,109	14,876	11,901
	July	24,680	1,804	0	24,680	1,804	701	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	683	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,068	5,950	1,190
	October	15,244	7,440	6,805	15,244	7,440	8,408	13,527	7,440
	November	13,091	9,629	9,130	13,091	9,629	10,299	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	9,682	13,527	4,919
1990	January	13,527	9,389	8,921	13,527	9,389	10,070	13,527	4,919
	February	12,218	8,890	8,469	12,218	8,890	9,612	12,218	4,443
	March	13,527	8,383	7,838	13,527	8,383	8,978	13,527	6,395
	April	21,602	12,317	11,516	21,602	12,317	12,584	13,091	12,317
	May	25,559	11,867	10,452	25,559	11,867	11,570	13,527	11,867
	June	18,294	1,821	0	18,294	1,821	24	5,950	1,190

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	July	19,533	1,804	0	19,533	1,804	634	6,149	1,230
	August	16,343	1,325	0	16,343	1,325	617	6,149	1,230
	September	11,059	1,190	330	11,059	1,190	916	5,950	1,190
	October	13,857	8,388	7,753	13,857	8,388	9,175	13,527	7,440
	November	13,091	9,629	9,130	13,091	9,629	10,211	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	9,585	13,527	4,919
1991	January	13,527	9,389	8,921	13,527	9,389	9,963	13,527	4,919
	February	12,218	8,890	8,469	12,218	8,890	9,517	12,218	4,443
	March	13,527	8,383	7,838	13,527	8,383	8,897	13,527	6,395
	April	21,602	12,317	11,516	21,602	12,317	12,499	13,091	12,317
	May	25,559	11,867	10,452	25,559	11,867	11,401	13,527	11,867
	June	18,294	1,821	0	18,294	1,821	44	5,950	1,190
	July	19,533	1,804	0	19,533	1,804	573	6,149	1,230
	August	16,343	1,325	0	16,343	1,325	563	6,149	1,230
	September	11,059	1,190	330	11,059	1,190	859	5,950	1,190
	October	8,236	2,767	2,132	8,236	2,767	3,467	7,071	2,767
	November	7,924	4,463	3,963	7,924	4,463	4,950	7,736	4,463
	December	9,021	4,612	4,027	9,021	4,612	4,998	7,993	4,612
1992	January	8,750	4,612	4,143	8,750	4,612	5,112	7,993	4,612
	February	7,642	4,314	3,879	7,642	4,314	4,854	7,478	4,314
	March	9,756	4,612	4,067	9,756	4,612	5,041	7,993	4,612
	April	13,748	4,463	3,661	13,748	4,463	4,567	7,736	4,463
	May	15,107	1,415	0	15,107	1,415	868	6,149	922
	June	18,294	1,821	0	18,294	1,821	44	5,950	893
	July	19,533	1,804	0	19,533	1,804	525	6,149	922
	August	16,343	1,325	0	16,343	1,325	517	6,149	922

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	September	11,059	893	32	11,059	893	515	5,950	893
	October	7,939	2,767	2,132	7,939	2,767	3,344	7,071	2,767
	November	7,924	4,463	3,963	7,924	4,463	4,879	7,736	4,463
	December	9,021	4,612	4,027	9,021	4,612	4,949	7,993	4,612
1993	January	8,750	4,612	4,143	8,750	4,612	5,138	7,993	4,612
	February	7,493	4,165	3,744	7,493	4,165	4,766	7,220	4,165
	March	9,818	4,612	4,067	9,818	4,612	5,139	7,993	4,612
	April	13,622	4,463	3,661	13,622	4,463	4,701	7,736	4,463
	May	61,677	40,955	39,540	50,241	18,020	18,172	6,149	922
	June	67,626	42,296	40,475	56,558	19,982	19,481	5,950	893
	July	70,859	42,583	40,779	64,859	30,583	30,152	6,149	922
	August	65,795	41,417	40,092	59,795	29,417	29,466	6,149	922
	September	35,578	15,830	14,969	29,578	3,830	4,144	5,950	893
	October	40,366	26,203	25,569	34,366	14,203	14,615	19,984	11,929
	November	19,339	15,877	15,378	19,339	15,877	16,341	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	16,056	19,984	6,149
1994	January	19,983	15,845	15,377	19,983	15,845	16,453	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	15,375	18,050	5,554
	March	19,983	14,839	14,295	19,983	14,839	15,325	19,984	9,531
	April	13,748	4,463	3,661	13,748	4,463	4,675	7,736	4,463
	May	15,107	1,415	0	15,107	1,415	977	6,149	922
	June	18,294	1,821	0	18,294	1,821	67	5,950	893
	July	19,533	1,804	0	19,533	1,804	651	6,149	922
	August	16,343	1,325	0	16,343	1,325	630	6,149	922
	September	11,059	893	32	11,059	893	615	5,950	893
	October	13,560	8,388	7,753	13,560	8,388	9,039	13,527	7,440

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	November	13,091	9,629	9,130	13,091	9,629	10,085	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	9,489	13,527	4,919
1995	January	14,094	4,919	4,450	14,094	4,919	5,482	13,527	4,919
	February	12,218	4,846	4,425	12,218	4,846	5,478	12,218	4,443
	March	171,388	155,469	154,925	159,951	132,472	133,287	13,527	6,395
	April	164,117	144,973	144,172	153,049	122,659	123,357	19,339	28,384
	May	287,733	260,852	259,437	276,296	237,918	237,966	19,984	34,802
	June	139,519	107,890	106,069	128,451	85,576	85,212	19,339	17,851
	July	117,261	82,336	80,532	111,261	70,336	70,061	6,149	1,537
	August	111,919	81,383	80,058	105,919	69,383	69,588	6,149	1,537
	September	59,959	35,660	34,800	53,959	23,660	24,133	5,950	1,488
	October	64,120	45,439	44,804	58,120	33,439	34,001	19,984	11,929
	November	19,339	11,814	11,315	19,339	11,814	12,424	19,339	5,950
	December	19,983	10,537	9,952	19,983	10,537	11,179	19,984	6,149
1996	January	19,983	13,498	13,029	19,983	13,498	14,370	19,984	6,149
	February	139,666	134,346	133,911	133,601	118,387	120,434	18,694	5,752
	March	75,452	62,448	61,903	64,015	39,451	40,701	19,984	9,531
	April	40,196	28,383	27,582	40,196	28,383	28,979	19,339	28,384
	May	127,192	103,600	102,185	115,755	80,665	81,368	19,984	34,802
	June	74,814	46,549	44,728	63,746	24,234	24,249	19,339	17,851
	July	63,549	32,174	30,370	57,549	20,174	20,232	6,149	1,537
	August	58,469	31,221	29,896	52,469	19,221	19,719	6,149	1,537
	September	32,939	11,388	10,528	27,989	1,488	2,204	5,950	1,488
	October	37,753	21,167	20,532	33,134	11,929	12,757	19,984	11,929
	November	39,983	32,048	31,549	39,983	32,048	32,902	19,339	5,950
	December	151,814	144,791	144,206	142,345	124,746	126,998	19,984	6,149

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
1997	January	381,643	374,753	374,284	370,207	352,740	354,849	19,984	6,149
	February	95,178	89,960	89,538	89,667	74,896	77,216	18,050	5,554
	March	35,378	22,511	21,967	25,239	12,372	13,762	19,984	9,531
	April	40,052	28,383	27,582	40,052	28,383	29,684	19,339	28,384
	May	64,608	41,171	39,756	58,239	34,802	35,373	19,984	34,802
	June	53,046	24,940	23,119	45,958	17,851	17,850	19,339	17,851
	July	41,052	9,845	8,041	37,031	1,804	1,981	6,149	1,537
	August	35,984	8,892	7,567	32,307	1,537	1,990	6,149	1,537
	September	22,005	1,488	627	22,005	1,488	2,039	5,950	1,488
	October	26,850	11,929	11,294	26,850	11,929	12,736	19,984	11,929
	November	32,125	24,293	23,793	32,125	24,293	25,224	19,339	5,950
	December	19,983	13,354	12,769	19,983	13,354	14,199	19,984	6,149
1998	January	48,464	39,841	39,373	37,027	17,829	20,102	19,984	6,149
	February	126,330	119,721	119,300	120,819	104,657	106,833	18,050	5,554
	March	89,941	75,197	74,653	78,504	52,201	53,864	19,984	9,531
	April	112,565	94,647	93,846	101,497	72,333	73,879	19,339	28,384
	May	183,562	158,007	156,592	172,125	135,072	136,041	19,984	34,802
	June	125,841	95,568	93,747	121,162	90,890	90,785	19,339	17,851
	July	104,177	70,684	68,880	98,177	58,684	59,304	6,149	1,537
	August	98,941	69,731	68,406	92,941	57,731	58,553	6,149	1,537
	September	53,213	30,022	29,162	47,213	18,022	19,059	5,950	1,488
	October	57,637	39,801	39,166	51,637	27,801	28,923	19,984	11,929
	November	22,689	13,460	12,960	22,689	13,460	14,620	19,339	5,950
	December	19,983	11,621	11,036	19,983	11,621	12,765	19,984	6,149
1999	January	46,330	41,032	40,563	34,894	19,019	21,626	19,984	6,149
	February	112,049	108,109	107,687	106,538	93,045	95,347	18,050	5,554

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	March	52,554	41,411	40,867	41,117	18,415	20,369	19,984	9,531
	April	38,253	28,383	27,582	38,253	28,383	29,089	19,339	28,384
	May	90,035	68,544	67,129	78,599	45,609	46,806	19,984	34,802
	June	77,547	51,430	49,609	66,479	29,116	29,580	19,339	17,851
	July	66,325	37,219	35,414	60,325	25,219	25,375	6,149	1,537
	August	61,412	36,265	34,940	55,412	24,265	24,609	6,149	1,537
	September	33,624	13,829	12,969	27,624	1,829	3,097	5,950	1,488
	October	38,855	23,608	22,973	33,016	11,929	13,009	19,984	11,929
	November	19,339	15,370	14,870	19,339	15,370	16,566	19,339	5,950
	December	19,983	14,945	14,360	19,983	14,945	16,151	19,984	6,149
2000	January	21,473	16,803	16,334	20,515	15,845	17,186	19,984	6,149
	February	75,527	72,091	71,670	69,018	55,689	58,340	18,050	5,554
	March	50,497	40,036	39,492	39,061	17,040	18,913	19,984	9,531
	April	24,511	15,352	14,551	24,511	15,352	16,117	14,876	15,352
	May	57,059	36,337	34,922	45,623	17,278	18,259	15,372	17,278
	June	56,600	31,270	29,449	45,532	11,901	12,231	14,876	11,901
	July	50,811	22,535	20,731	44,811	10,535	10,662	6,149	1,230
	August	45,748	21,370	20,045	39,748	9,370	9,703	6,149	1,230
	September	25,877	6,427	5,567	23,259	1,190	2,201	5,950	1,190
	October	30,963	16,503	15,868	28,676	11,929	13,100	19,984	11,929
	November	19,339	15,877	15,378	19,339	15,877	17,048	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	16,746	19,984	6,149
2001	January	19,983	15,845	15,377	19,983	15,845	17,152	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	16,074	18,050	5,554
	March	19,983	14,777	14,233	19,983	14,777	15,997	19,984	9,531
	April	21,476	12,317	11,516	21,476	12,317	13,232	13,091	12,317

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	May	27,518	11,867	10,452	27,518	11,867	11,956	13,527	11,867
	June	21,858	1,821	0	21,858	1,821	52	5,950	1,190
	July	24,680	1,804	0	24,680	1,804	1,136	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	1,083	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,349	5,950	1,190
	October	15,244	7,440	6,805	15,244	7,440	8,770	13,527	7,440
	November	13,091	9,629	9,130	13,091	9,629	10,640	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	10,024	13,527	4,919
2002	January	13,527	9,389	8,921	13,527	9,389	10,406	13,527	4,919
	February	12,218	8,890	8,469	12,218	8,890	9,944	12,218	4,443
	March	13,527	8,321	7,777	13,527	8,321	9,255	13,527	6,395
	April	24,511	15,352	14,551	24,511	15,352	15,903	14,876	15,352
	May	32,928	17,278	15,863	32,928	17,278	17,198	15,372	17,278
	June	31,938	11,901	10,080	31,938	11,901	10,138	14,876	11,901
	July	24,680	1,804	0	24,680	1,804	896	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	870	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,154	5,950	1,190
	October	19,117	11,314	10,679	19,117	11,314	12,543	15,372	11,314
	November	14,876	11,414	10,915	14,876	11,414	12,303	14,876	5,950
	December	15,372	10,963	10,378	15,372	10,963	11,753	15,372	6,149
2003	January	15,372	11,234	10,765	15,372	11,234	12,129	15,372	6,149
	February	13,884	10,556	10,135	13,884	10,556	11,487	13,884	5,554
	March	15,372	10,166	9,622	15,372	10,166	10,975	15,372	9,531
	April	24,511	15,352	14,551	24,511	15,352	15,943	14,876	15,352
	May	50,993	30,271	28,856	39,556	17,278	17,317	15,372	17,278
	June	50,730	25,399	23,578	39,662	11,901	11,483	14,876	11,901

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	July	44,745	16,469	14,665	38,745	4,469	3,914	6,149	1,230
	August	39,681	15,303	13,978	33,681	3,303	2,965	6,149	1,230
	September	22,942	3,491	2,631	21,791	1,190	1,723	5,950	1,190
	October	28,028	13,568	12,933	27,208	11,929	12,551	19,984	11,929
	November	19,339	15,877	15,378	19,339	15,877	16,602	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	16,268	19,984	6,149
2004	January	19,983	15,845	15,377	19,983	15,845	16,671	19,984	6,149
	February	32,792	29,356	28,921	26,726	15,366	17,281	18,694	5,752
	March	36,940	26,478	25,934	25,503	14,777	15,356	19,984	9,531
	April	24,511	15,352	14,551	24,511	15,352	15,790	14,876	15,352
	May	32,928	17,278	15,863	32,928	17,278	17,097	15,372	17,278
	June	31,938	11,901	10,080	31,938	11,901	10,155	14,876	11,901
	July	24,680	1,804	0	24,680	1,804	868	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	843	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,126	5,950	1,190
	October	19,117	11,314	10,679	19,117	11,314	12,402	15,372	11,314
	November	14,876	11,414	10,915	14,876	11,414	12,215	14,876	5,950
	December	15,372	10,963	10,378	15,372	10,963	11,673	15,372	6,149
2005	January	15,372	9,387	8,918	15,372	9,387	10,312	15,372	6,149
	February	52,745	47,826	47,405	47,233	32,762	34,837	13,884	5,554
	March	85,666	73,204	72,660	74,230	50,208	51,450	15,372	9,531
	April	52,170	36,632	35,831	43,921	28,383	29,071	19,339	28,384
	May	141,429	118,449	117,034	129,992	95,514	96,282	19,984	34,802
	June	96,956	69,316	67,495	85,888	47,002	47,098	19,339	17,851
	July	74,738	44,024	42,220	68,738	32,024	32,173	6,149	1,537
	August	69,707	43,071	41,746	63,707	31,071	31,664	6,149	1,537

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	September	38,162	17,122	16,262	32,162	5,122	5,964	5,950	1,488
	October	43,097	26,901	26,266	37,097	14,901	15,807	19,984	11,929
	November	19,339	14,388	13,888	19,339	14,388	15,341	19,339	5,950
	December	116,281	109,759	109,174	106,812	89,714	92,068	19,984	6,149
2006	January	113,366	104,258	103,789	101,929	82,245	84,478	19,984	6,149
	February	70,540	63,542	63,120	65,029	48,478	50,918	18,050	5,554
	March	89,409	74,140	73,595	77,973	51,143	52,967	19,984	9,531
	April	266,690	248,223	247,422	255,622	225,909	227,809	19,339	28,384
	May	190,299	164,151	162,736	182,731	156,583	157,268	19,984	34,802
	June	110,269	79,390	77,569	110,269	79,390	79,713	19,339	17,851
	July	69,983	35,850	34,045	63,983	23,850	24,673	6,149	1,537
	August	64,700	34,896	33,571	58,700	22,896	23,896	6,149	1,537
	September	36,853	13,167	12,307	31,014	1,488	2,687	5,950	1,488
	October	41,160	22,945	22,311	35,651	11,929	13,134	19,984	11,929
	November	24,276	14,655	14,155	24,276	14,655	15,885	19,339	5,950
	December	25,747	16,633	16,048	20,249	11,136	12,366	19,984	6,149
2007	January	19,983	15,845	15,377	19,983	15,845	17,181	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	16,091	18,050	5,554
	March	19,983	14,777	14,233	19,983	14,777	15,966	19,984	9,531
	April	21,476	12,317	11,516	21,476	12,317	13,219	13,091	12,317
	May	27,518	11,867	10,452	27,518	11,867	11,959	13,527	11,867
	June	21,858	1,821	0	21,858	1,821	69	5,950	1,190
	July	24,680	1,804	0	24,680	1,804	1,095	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	1,044	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,309	5,950	1,190
	October	15,244	7,440	6,805	15,244	7,440	8,808	13,527	7,440

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	November	13,091	9,629	9,130	13,091	9,629	10,619	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	9,998	13,527	4,919
2008	January	13,527	9,389	8,921	13,527	9,389	10,393	13,527	4,919
	February	12,655	9,327	8,891	12,655	9,327	10,349	12,655	4,602
	March	13,527	8,383	7,838	13,527	8,383	9,234	13,527	6,395
	April	21,602	12,317	11,516	21,602	12,317	12,856	13,091	12,317
	May	25,559	11,867	10,452	25,559	11,867	11,736	13,527	11,867
	June	18,294	1,821	0	18,294	1,821	81	5,950	1,190
	July	19,533	1,804	0	19,533	1,804	858	6,149	1,230
	August	16,343	1,325	0	16,343	1,325	836	6,149	1,230
	September	11,059	1,190	330	11,059	1,190	1,117	5,950	1,190
	October	13,857	8,388	7,753	13,857	8,388	9,572	13,527	7,440
	November	13,091	9,629	9,130	13,091	9,629	10,489	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	9,867	13,527	4,919
2009	January	13,527	9,389	8,921	13,527	9,389	10,249	13,527	4,919
	February	12,218	8,890	8,469	12,218	8,890	9,796	12,218	4,443
	March	13,527	8,321	7,777	13,527	8,321	9,100	13,527	6,395
	April	24,511	15,352	14,551	24,511	15,352	15,893	14,876	15,352
	May	32,928	17,278	15,863	32,928	17,278	17,178	15,372	17,278
	June	31,938	11,901	10,080	31,938	11,901	11,330	14,876	11,901
	July	24,680	1,804	0	24,680	1,804	166	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	758	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	2,040	5,950	1,190
	October	20,313	12,510	11,875	20,313	12,510	13,128	19,984	11,929
	November	19,339	15,877	15,378	19,339	15,877	16,611	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	16,216	19,984	6,149

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
2010	January	19,983	15,845	15,377	19,983	15,845	16,608	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	15,528	18,050	5,554
	March	19,983	14,777	14,233	19,983	14,777	15,455	19,984	9,531
	April	24,511	15,352	14,551	24,511	15,352	15,799	14,876	15,352
	May	70,913	50,190	48,775	59,476	27,256	27,795	15,372	17,278
	June	70,007	44,677	42,856	58,939	22,362	22,279	14,876	11,901
	July	64,665	36,389	34,584	58,665	24,389	23,695	6,149	1,230
	August	59,601	35,223	33,898	53,601	23,223	22,939	6,149	1,230
	September	32,581	13,130	12,270	26,611	1,190	2,065	5,950	1,190
	October	37,667	23,206	22,572	32,028	11,929	12,448	19,984	11,929
	November	45,776	39,735	39,235	45,776	39,735	40,408	19,339	5,950
	December	107,928	103,252	102,667	98,458	83,207	85,284	19,984	6,149
2011	January	59,856	51,006	50,538	48,419	28,994	30,903	19,984	6,149
	February	39,046	32,256	31,834	33,535	17,192	19,316	18,050	5,554
	March	142,136	127,147	126,603	130,699	104,151	105,618	19,984	9,531
	April	165,011	146,837	146,036	153,943	124,523	126,051	19,339	28,384
	May	203,403	177,571	176,156	195,835	170,003	170,348	19,984	34,802
	June	112,431	81,875	80,054	112,431	81,875	81,951	19,339	17,851
	July	102,470	68,678	66,874	96,470	56,678	57,265	6,149	1,537
	August	97,212	67,725	66,400	91,212	55,725	56,516	6,149	1,537
	September	52,474	29,052	28,191	46,474	17,052	18,058	5,950	1,488
	October	56,843	38,830	38,196	50,843	26,830	27,881	19,984	11,929
	November	27,269	17,857	17,357	27,269	17,857	18,932	19,339	5,950
	December	19,983	11,395	10,810	19,983	11,395	12,468	19,984	6,149
2012	January	19,983	15,845	15,377	19,983	15,845	17,035	19,984	6,149
	February	18,694	15,366	14,931	18,694	15,366	16,555	18,694	5,752

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	March	19,983	14,777	14,233	19,983	14,777	15,858	19,984	9,531
	April	21,476	12,317	11,516	21,476	12,317	13,105	13,091	12,317
	May	27,518	11,867	10,452	27,518	11,867	11,835	13,527	11,867
	June	21,858	1,821	0	21,858	1,821	53	5,950	1,190
	July	24,680	1,804	0	24,680	1,804	1,020	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	972	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,250	5,950	1,190
	October	19,117	11,314	10,679	19,117	11,314	12,535	15,372	11,314
	November	14,876	11,414	10,915	14,876	11,414	12,311	14,876	5,950
	December	15,372	10,963	10,378	15,372	10,963	11,758	15,372	6,149
2013	January	15,372	11,234	10,765	15,372	11,234	12,130	15,372	6,149
	February	13,884	10,556	10,135	13,884	10,556	11,438	13,884	5,554
	March	15,372	10,166	9,622	15,372	10,166	10,987	15,372	9,531
	April	21,476	12,317	11,516	21,476	12,317	12,768	13,091	12,317
	May	27,518	11,867	10,452	27,518	11,867	11,655	13,527	11,867
	June	21,858	1,821	0	21,858	1,821	37	5,950	1,190
	July	24,680	1,804	0	24,680	1,804	806	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	785	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,143	5,950	1,190
	October	15,244	7,440	6,805	15,244	7,440	8,389	13,527	7,440
	November	13,091	9,629	9,130	13,091	9,629	10,378	13,091	4,760
	December	13,527	9,118	8,533	13,527	9,118	9,753	13,527	4,919
2014	January	13,527	9,389	8,921	13,527	9,389	10,126	13,527	4,919
	February	12,218	8,890	8,469	12,218	8,890	9,691	12,218	4,443
	March	13,527	8,383	7,838	13,527	8,383	9,059	13,527	6,395
	April	13,748	4,463	3,661	13,748	4,463	4,859	7,736	4,463

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	May	15,107	1,415	0	15,107	1,415	1,071	6,149	922
	June	18,294	1,821	0	18,294	1,821	79	5,950	893
	July	19,533	1,804	0	19,533	1,804	707	6,149	922
	August	16,343	1,325	0	16,343	1,325	690	6,149	922
	September	11,059	893	32	11,059	893	691	5,950	893
	October	13,560	8,388	7,754	13,560	8,388	9,187	13,527	7,440
	November	13,091	9,629	9,129	13,091	9,629	10,284	13,091	4,760
	December	13,527	9,115	8,529	13,527	9,115	9,667	13,527	4,919
2015	January	13,527	9,390	8,921	13,527	9,390	10,052	13,527	4,919
	February	12,218	8,891	8,470	12,218	8,891	9,595	12,218	4,443
	March	13,527	8,384	7,840	13,527	8,384	8,916	13,527	6,395
	April	13,747	4,463	3,662	13,747	4,463	4,771	7,736	4,463
	May	15,108	1,415	0	15,108	1,415	988	6,149	922
	June	18,294	1,821	0	18,294	1,821	77	5,950	893
	July	17,236	1,115	0	17,236	1,115	636	6,149	922
	August	14,889	922	48	14,889	922	668	6,149	922
	September	10,309	893	257	10,309	893	838	5,950	893
	October	8,164	2,767	2,132	8,164	2,767	3,413	7,071	2,767
	November	7,924	4,463	3,963	7,924	4,463	5,032	7,736	4,463
	December	9,021	4,612	4,027	9,021	4,612	5,073	7,993	4,612
2016	January	8,750	4,612	4,143	8,750	4,612	5,198	7,993	4,612
	February	7,642	4,314	3,879	7,642	4,314	4,910	7,478	4,314
	March	9,818	4,612	4,067	9,818	4,612	5,123	7,993	4,612
	April	13,622	4,463	3,661	13,622	4,463	4,702	7,736	4,463
	May	17,066	1,415	0	17,066	1,415	925	6,149	922
	June	21,858	1,821	0	21,858	1,821	82	5,950	893

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	July	24,680	1,804	0	24,680	1,804	582	6,149	922
	August	21,617	1,325	0	21,617	1,325	566	6,149	922
	September	13,846	893	32	13,846	893	567	5,950	893
	October	18,820	11,314	10,679	18,820	11,314	11,953	15,372	11,314
	November	18,268	12,227	11,727	18,268	12,227	12,734	14,876	5,950
	December	72,971	68,295	67,710	63,502	48,250	50,011	15,372	6,149
2017	January	247,276	237,543	237,074	235,839	215,531	217,069	15,372	6,149
	February	337,498	329,998	329,576	331,986	314,934	316,622	13,884	5,554
	March	158,397	142,451	141,907	146,961	119,455	120,574	15,372	9,531
	April	209,127	189,955	189,154	198,059	167,641	168,590	19,339	28,384
	May	188,619	161,708	160,293	181,051	154,140	153,972	19,984	34,802
	June	130,497	98,837	97,016	130,497	98,837	98,432	19,339	17,851
	July	87,169	52,211	50,407	81,169	40,211	40,358	6,149	1,537
	August	81,824	51,258	49,933	75,824	39,258	39,648	6,149	1,537
	September	45,408	21,084	20,223	39,408	9,084	9,709	5,950	1,488
	October	49,562	30,862	30,228	43,562	18,862	19,579	19,984	11,929
	November	46,299	36,175	35,675	46,299	36,175	36,937	19,339	5,950
	December	19,983	10,512	9,927	19,983	10,512	11,269	19,984	6,149
2018	January	19,983	15,845	15,377	19,983	15,845	16,719	19,984	6,149
	February	18,050	14,722	14,300	18,050	14,722	15,620	18,050	5,554
	March	41,013	30,552	30,008	29,577	14,777	15,823	19,984	9,531
	April	74,425	60,975	60,173	63,357	38,661	39,738	14,876	15,352
	May	38,107	17,881	16,466	37,503	17,278	16,847	15,372	17,278
	June	38,067	13,409	11,589	36,559	11,901	11,326	14,876	11,901
	July	31,566	4,079	2,275	30,429	1,804	1,052	6,149	1,230
	August	26,795	2,914	1,589	26,000	1,325	897	6,149	1,230

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	September	16,655	1,190	330	16,655	1,190	1,716	5,950	1,190
	October	21,858	11,929	11,294	21,858	11,929	12,488	19,984	11,929
	November	19,384	15,877	15,378	19,384	15,877	16,566	19,339	5,950
	December	19,983	15,574	14,989	19,983	15,574	16,189	19,984	6,149
2019	January	27,686	19,785	19,317	20,515	12,614	13,439	19,984	6,149
	February	87,982	81,952	81,531	82,470	66,889	68,848	18,050	5,554
	March	115,426	101,465	100,920	103,990	78,468	79,613	19,984	9,531
	April	153,829	136,727	135,926	142,761	114,413	115,447	19,339	28,384
	May	157,964	133,292	131,876	146,527	110,357	110,813	19,984	34,802
	June	131,132	101,762	99,942	120,065	82,242	82,130	19,339	17,851
	July	81,993	49,452	47,648	75,993	37,452	37,579	6,149	1,537
	August	76,827	48,499	47,174	70,827	36,499	37,031	6,149	1,537
	September	42,202	19,749	18,888	36,202	7,749	8,534	5,950	1,488
	October	46,801	29,527	28,893	40,801	17,527	18,361	19,984	11,929
	November	19,339	13,271	12,772	19,339	13,271	14,149	19,339	5,950
	December	19,983	12,343	11,758	19,983	12,343	13,242	19,984	6,149
2020	January	19,983	15,845	15,377	19,983	15,845	16,859	19,984	6,149
	February	18,694	15,366	14,931	18,694	15,366	16,348	18,694	5,752
	March	19,983	14,777	14,233	19,983	14,777	15,703	19,984	9,531
	April	21,476	12,317	11,516	21,476	12,317	12,927	13,091	12,317
	May	27,518	11,867	10,452	27,518	11,867	11,708	13,527	11,867
	June	21,858	1,821	0	21,858	1,821	61	5,950	1,190
	July	24,680	1,804	0	24,680	1,804	927	6,149	1,230
	August	21,617	1,325	0	21,617	1,325	886	6,149	1,230
	September	13,846	1,190	330	13,846	1,190	1,166	5,950	1,190
	October	19,117	11,314	10,679	19,117	11,314	12,297	15,372	11,314

Year	Month	Baseline Condition Flows			MICUP Flows			Minimum Flow Requirements	
		Camanche Total Release	Below WDD	Lower Mokelumne River Outflow	Camanche Total Release	Below WDD[1]	Lower Mokelumne River Outflow[2]	Camanche Total Release (JSA)	Below WDD (JSA+HRL)
	November	14,876	11,414	10,914	14,876	11,414	12,181	14,876	5,950
	December	15,372	10,960	10,374	15,372	10,960	11,607	15,372	6,149
2021	January	15,372	11,234	10,766	15,372	11,234	11,999	15,372	6,149
	February	13,884	10,557	10,136	13,884	10,557	11,360	13,884	5,554
	March	15,372	10,228	9,685	15,372	10,228	10,902	15,372	9,531
	April	13,747	4,463	3,662	13,747	4,463	4,780	7,736	4,463
	May	15,108	1,415	0	15,108	1,415	1,067	6,149	922
	June	18,294	1,821	0	18,294	1,821	95	5,950	893
	July	17,236	1,115	0	17,236	1,115	729	6,149	922
	August	14,889	922	48	14,889	922	757	6,149	922
	September	10,309	893	257	10,309	893	923	5,950	893
	October	13,785	8,388	7,754	13,785	8,388	7,754[3]	13,527	7,440
	November	13,091	9,629	9,129	13,091	9,629	9,129[3]	13,091	4,760
	December	13,527	9,115	8,529	13,527	9,115	8,529[3]	13,527	4,919

Notes: [1] Flow below WDD does not account for increases in flows due to reduced seepage under MICUP.
[2] Green shaded cells designated lower Mokelumne River outflow that is greater under MICUP than Baseline Conditions due to reductions in seepage from groundwater recharge under MICUP.

Appendix J

Noise Model Outputs

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/30/2024
Case Description: NSJWCD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
NSJWCD North System	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Crane	No	16	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Crane			85.0	77.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
	Total		85.0	86.1	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: NSJWCD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
NSJWCD South System	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Crane	No	16	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Crane			85.0	77.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
	Total		85.0	86.1	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: NSJWCD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
NSJWCD PODs	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Crane	No	16	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Crane			85.0	77.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
	Total		85.0	86.1	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: NSJWCD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
NSJWCD ASR Wells	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Drill Rig Truck	No	20	84.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Drill Rig Truck			84.0	77.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
		Total	85.0	84.4	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: NSJWCD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
NSJWCD Recharge Basins	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Scraper	No	40	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Dozer	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: SEWD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
SEWD West Linden	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Crane	No	16	85.0		50.0	0.0
Drill Rig Truck	No	20	84.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Night	Day	Calculated (dBA) Evening	Night	Day Evening	Night
Equipment	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq	Lmax Leq
Excavator	85.0 81.0	N/A N/A	N/A N/A	N/A N/A	N/A N/A
Excavator	85.0 81.0	N/A N/A	N/A N/A	N/A N/A	N/A N/A
Compactor (ground)	80.0 73.0	N/A N/A	N/A N/A	N/A N/A	N/A N/A
Front End Loader	80.0 76.0	N/A N/A	N/A N/A	N/A N/A	N/A N/A

Front End Loader			80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Crane			85.0	77.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Drill Rig Truck			84.0	77.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	Total		85.0	86.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: SEWD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
SEWD Mosher Creek	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Scraper	No	40	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Dozer	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: SEWD Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
SEWD East Mosher Creek	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Scraper	No	40	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Dozer	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/23/2025
Case Description: City of Stockton Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
City of Stockton Recharge Basins	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Scraper	No	40	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Dozer	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 01/23/2025
Case Description: City of Stockton Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
City of Stockton Dry Wells	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Excavator	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Drill Rig Truck	No	20	84.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A	N/A	N/A	N/A	N/A	N/A	N/A				
Drill Rig Truck			84.0	77.0	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				
	Total		85.0	85.6	N/A	N/A	N/A	N/A	N/A	
N/A	N/A	N/A	N/A	N/A	N/A	N/A				

Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: WID Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Storm Drain Basins	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Scraper	No	40	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Dozer	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 12/16/2024
Case Description: WID Project Components

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Recharge Basins	Industrial	60.0	55.0	50.0

Equipment

Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Dozer	No	40	85.0		50.0	0.0
Excavator	No	40	85.0		50.0	0.0
Compactor (ground)	No	20	80.0		50.0	0.0
Front End Loader	No	40	80.0		50.0	0.0
Pickup Truck	No	40	55.0		50.0	0.0
Scraper	No	40	85.0		50.0	0.0

Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Dozer	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Excavator	85.0	81.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Compactor (ground)	80.0	73.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Front End Loader	80.0	76.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pickup Truck	55.0	51.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

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Roadway Construction Noise Model (RCNM),Version 1.1

Report date: 02/06/2025
Case Description: Nighttime ASR Well Construction

**** Receptor #1 ****

Description	Land Use	Baselines (dBA) Daytime	Evening	Night
Nighttime ASR Well Construction	Industrial	60.5	55.0	50.0

Equipment

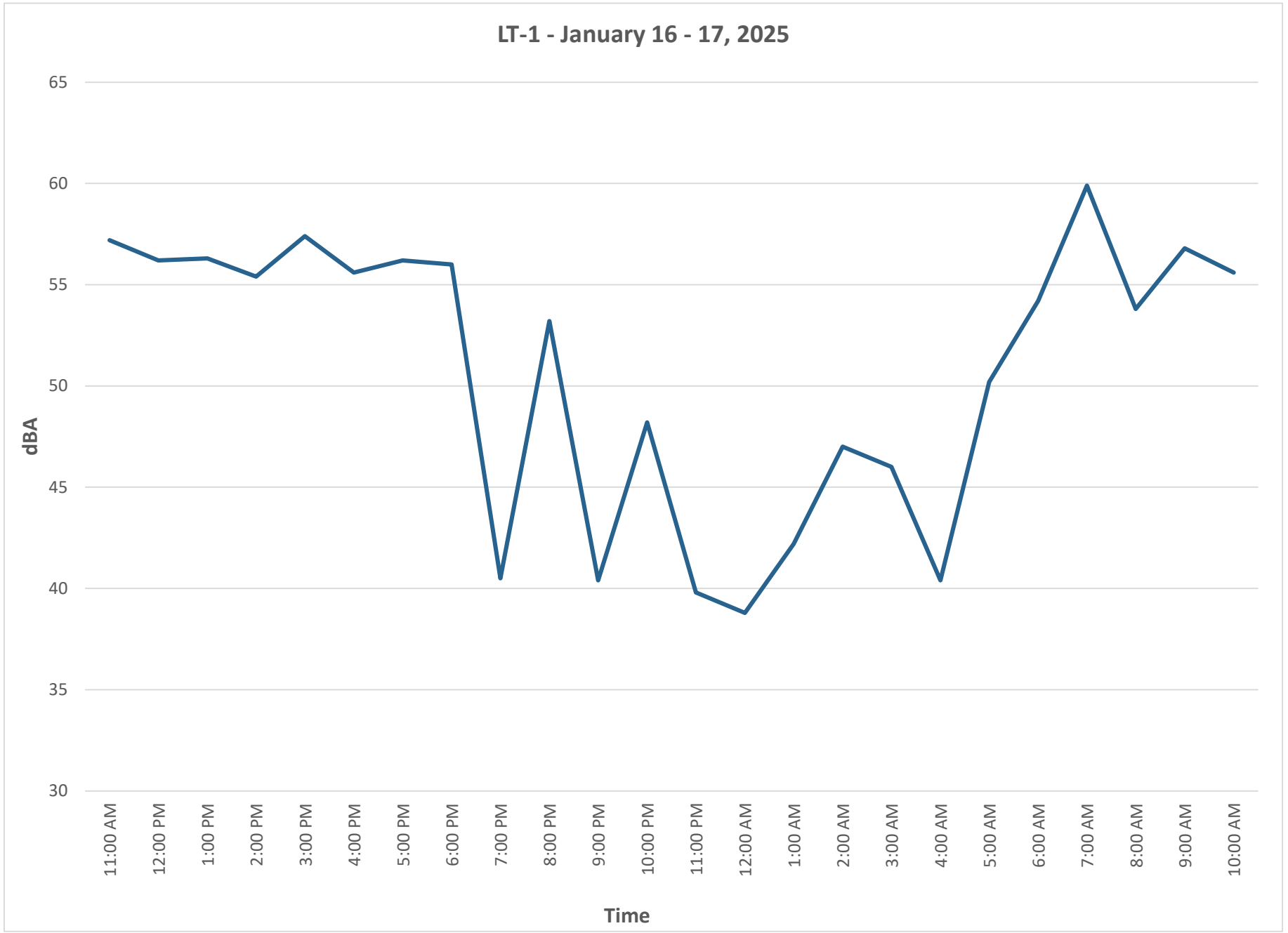
Description	Impact Device	Usage (%)	Spec Lmax (dBA)	Actual Lmax (dBA)	Receptor Distance (feet)	Estimated Shielding (dBA)
Auger Drill Rig	No	20	85.0		50.0	0.0

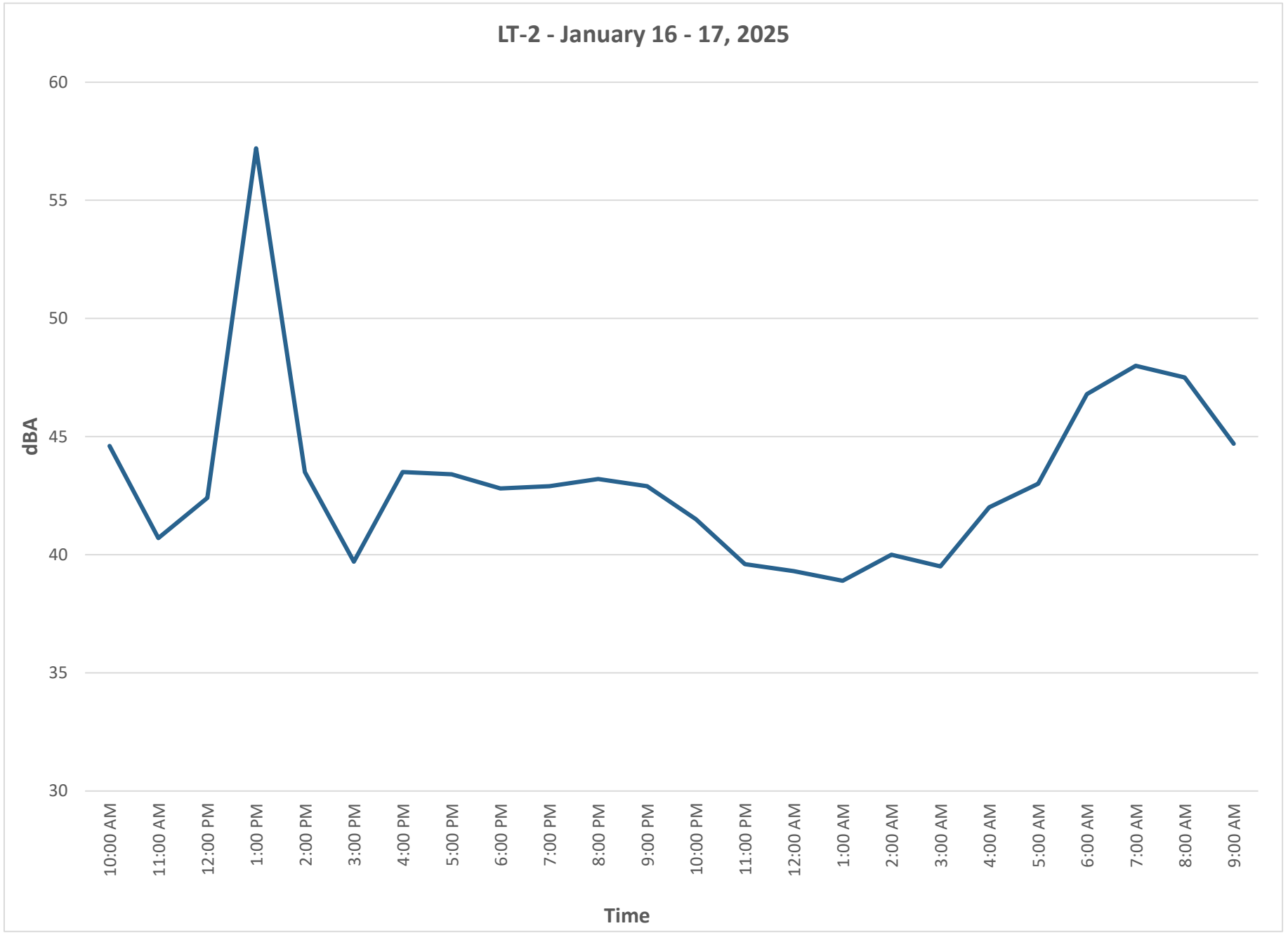
Results

Noise Limits (dBA)

Noise Limit Exceedance (dBA)

Equipment	Calculated (dBA) Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq	Day Lmax	Day Leq	Evening Lmax	Evening Leq	Night Lmax	Night Leq
Auger Drill Rig	85.0	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Total	85.0	78.0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A


LT-1 - January 16 - 17, 2025
65
60
55
50
45
40
35
30
dBA
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
12:00 AM
1:00 AM
2:00 AM
3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
10:00 AM
Time


LT-2 - January 16 - 17, 2025
60
55
50
45
40
35
30
dBA
10:00 AM
11:00 AM
12:00 PM
1:00 PM
2:00 PM
3:00 PM
4:00 PM
5:00 PM
6:00 PM
7:00 PM
8:00 PM
9:00 PM
10:00 PM
11:00 PM
12:00 AM
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3:00 AM
4:00 AM
5:00 AM
6:00 AM
7:00 AM
8:00 AM
9:00 AM
Time