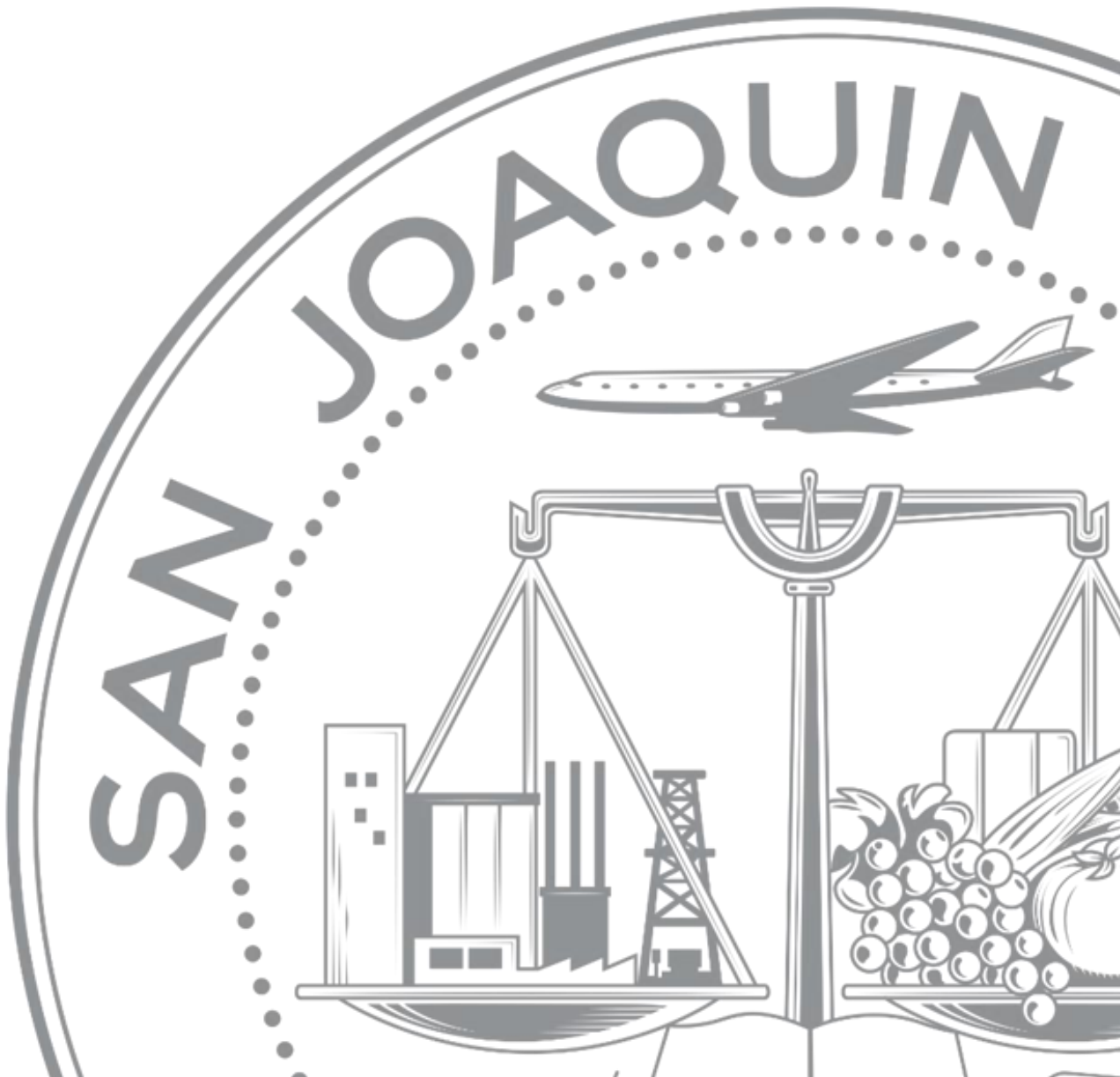


SAN JOAQUIN
— COUNTY —
Greatness grows here.

San Joaquin County Local Hazard Mitigation Plan

April 2023





FEMA

April 18, 2023

Tiffany Heyer
Director of Emergency Operations
San Joaquin County – Office of Emergency Services
2101 E. Earhart Road, Suite 300
Stockton, CA 95206

Dear Tiffany Heyer:

The *San Joaquin County Local Hazard Mitigation Plan 2023* was officially adopted by San Joaquin County on April 11, 2023 and submitted for review and approval to the Federal Emergency Management Agency (FEMA). The review is complete, and FEMA finds the plan to be in conformance with the Code of Federal Regulations, Title 44, Part 201, Section 6 (44 C.F.R. 201.6).

This plan approval ensures San Joaquin County's continued eligibility for funding under FEMA's Hazard Mitigation Assistance programs, including the Hazard Mitigation Grant Program (HMGP), the Building Resilient Infrastructure and Communities program (BRIC), and the Flood Mitigation Assistance (FMA) program. All requests for funding are evaluated individually according to eligibility and other program requirements. Approved hazard mitigation plans may also be eligible for points under the National Flood Insurance Program's Community Rating System (CRS).

FEMA's approval is for a period of five years, effective starting the date of this letter. Prior to **April 18, 2028**, San Joaquin County must review, revise, and submit their plan to FEMA for approval to maintain eligibility for grant funding. The enclosed plan review tool provides additional recommendations to incorporate into future plan updates.

If you have any questions regarding the planning or review processes, please contact the FEMA Region 9 Hazard Mitigation Planning Team at fema-r9-mitigation-planning@fema.dhs.gov.

Sincerely,

for Kathryn Lipiecki
Director, Mitigation Division
FEMA Region 9

BEFORE THE BOARD OF SUPERVISORS OF THE COUNTY OF SAN JOAQUIN
STATE OF CALIFORNIA

RESOLUTION

R-23-54

ADOPTION AND APPROVAL OF THE SAN JOAQUIN COUNTY LOCAL HAZARD
MITIGATION PLAN

WHEREAS, San Joaquin County recognizes the threat that natural hazards pose to people and property within San Joaquin County; and,

WHEREAS, San Joaquin County has prepared a local multi-hazard mitigation plan, hereby known as San Joaquin County Local Hazard Mitigation Plan, in accordance with the Disaster Mitigation Act of 2000; and,

WHEREAS, the 2023 San Joaquin County Local Hazard Mitigation Plan identifies mitigation goals and actions to reduce or eliminate long-term risk to people and property in San Joaquin County from the impacts of future hazards and disasters; and,

WHEREAS adoption by the San Joaquin County Board of Supervisors demonstrates their commitment to the hazard mitigation and achieving the goals outlined in the 2023 San Joaquin County Local Hazard Mitigation Plan.

NOW, THEREFORE, BE IT RESOLVED THIS BOARD OF SUPERVISORS DOES HEREBY adopt the 2023 San Joaquin County Local Hazard Mitigation Plan.

PASSED AND ADOPTED April 11, 2023, by the following vote of the Board of Supervisors, to wit:

AYES: **Canepa, Patti, Ding, Rickman**

NOES: **None**

ABSENT: **Villapudua**

ABSTAIN: **None**

ATTEST: RACHÉL DeBORD
Clerk of the Board of Supervisors
County of San Joaquin
State of California

By **Rachél DeBord**



Robert Rickman

ROBERT RICKMAN
Chairman, Board of Supervisors
County of San Joaquin
State of California

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1 INTRODUCTION

As defined in Title 44 Code of Federal Regulations (CFR) Subpart M, Section 206.401, hazard mitigation is “any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards.” As such, hazard mitigation is any work to minimize the impacts of any hazard event before it occurs. Hazard mitigation aims to reduce losses from future disasters. It is a process that identifies and profiles hazards, analyzes the people and facilities at risk, and develops mitigation actions to reduce or eliminate hazard risk. Implementing the mitigation actions—which include short- and long-term strategies that may involve planning, policy changes, programs, projects, and other activities—is the result of this process.

Over the past two decades, the Disaster Mitigation Act of 2000, known as (DMA 2000,) federal law, has driven local hazard mitigation planning. On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), amending the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Title 42 of the United States Code Section 5121 et seq.) and repealing the act’s previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for state, tribal, and local entities to coordinate mitigation planning and implementation efforts closely. This new section also provided the legal basis for the Federal Emergency Management Agency’s (FEMA) mitigation plan requirements for the Hazard Mitigation Assistance grant programs.

1.1 2023 LOCAL HAZARD MITIGATION PLAN

The goal of the planning process is to assess hazards and develop prioritized action plans to reduce risks in San Joaquin County. The updated information represents progress since 2018 and presents planned hazard mitigation work for the next five years. The plan’s intended scope meets the Federal Disaster Mitigation Act requirement of 2000 (Public Law 106-390). The 2023 LHMP is organized according to the FEMA Local Hazard Mitigation Plan Handbook and was revised to reflect the system upgrades, improvements, and mitigations the County has completed since 2018. The 2023 LHMP will be submitted to the California Governor’s Office of Emergency Services (Cal OES) for review by January 2023 before FEMA approval. The County team will promptly address comments and incorporate requested edits to keep within the Cal OES review schedule. Once the Cal OES review of the 2023 LHMP is complete, the County team will send the plan to FEMA for an assessment and approval period. In response to any FEMA comments, the County team will assign tasks to staff members to incorporate requested edits for the resubmittal of the final plan for FEMA approval.

1.2 PURPOSE

The Local Hazard Mitigation Plan intends to provide strategies for the County and other local jurisdictions to identify and implement mitigation actions for reducing damages from various natural and technological disasters. This Local Hazard Mitigation Plan should develop an ongoing process for mitigating damage before and after a disaster. Revisions of the General Plan(s) will include new suggestions and planning guidance for hazard mitigation goals, objectives, actions, and implementation strategies.

The 2023 LHMP outlines a process for assessing and analyzing those hazards to which San Joaquin County is most vulnerable. The process can improve the County’s resilience by performing a hazard risk assessment, using available tools to complete a capabilities assessment, and then identifying mitigation actions for these hazards.

The 2023 LHMP analyzes the risk posed to people and property by natural hazards and considers mitigation actions that the County could implement before such events. The goal is to reduce the

risk to life and safety and the risk of property damage and service disruption caused by these natural hazards.

Mitigation projects and programs identified in the 2023 LHMP may be given priority for funding and technical assistance by the State and Federal government. The projects most likely to receive financing mitigate more than one hazard and address risks of concern to more than one agency. This 2023 LHMP establishes prioritized mitigation goals and adopts a five-year implementation timeline, which the County will seek to implement, subject to funding and resource limitations.

1.3 PLAN STRUCTURE

This primary document's goals, actions, and strategies are only for the County's unincorporated areas. Jurisdictions can develop a local hazard mitigation plan for their authority or participate in the County's program. The 2023 LHMP is organized to follow FEMA's Local Mitigation Plan Review Tool, which demonstrates how hazard mitigation plans meet the DMA 2000 regulations. As such, the specific planning elements of this review tool are discussed in their appropriate plan sections.

- **Section 2: Community Profile**- Provides basic information on a broad range of factors and better understands the community's context. This information permits specific areas, issues, and linkages to be identified and analyzed.
- **Section 3: Planning Process** - Provides an overview of the 2017-2018 planning process. It identifies planning team members and describes their involvement with the planning process. This section details stakeholder outreach, public involvement, and continued public involvement. It provides an overview of the existing plans and reports, details how the Planning Process incorporates those documents into the 2023 LHMP, and provides a plan update method and schedule.
- **Section 4: Hazard Identification and Risk Assessment** - Identifies hazards affecting the Operational Area and profiles each risk with a list of past occurrences, threat analysis, and map or geographic description of the risk area.
- **Section 5: Mitigation Strategy** - Documents County mitigation goals, mitigation strategies by hazard type, and a list of projects that would mitigate sites of past or potential future damages.
- **Section 6: Plan Update, Evaluation, and Maintenance** - Procedures to maintain this ongoing plan. This element ensures that the County monitors the mitigation projects for modification, adds new projects, and completes mitigation actions.
- **Section 7: Plan Adoption** - Documentation of plan adoption, including the County and other jurisdictions, level of participation, risk assessment, and mitigation actions.
- **Section 8: Appendices**

2 COMMUNITY PROFILE

San Joaquin County is located in the heart of the central San Joaquin Valley and has a population of approximately 685,300. The County has land use regulatory authority over all unincorporated land within the County, including 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 regions, not under County jurisdiction (e.g., public schools, prisons).

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

Significant population and employment growth are expected to occur within the County over the time frame of the General Plan (i.e., 2035) and will impact many aspects of the County, including agriculture, unincorporated communities, and employment opportunities. Shifting from historically inefficient development patterns in the Central Valley will require developers to increase the efficient use of existing infrastructure, reduce pollution and other modes of active transportation, and preserve agricultural and open space lands.

As the agricultural center of California, San Joaquin County's farmland and agricultural heritage is preserved. Farms continue to produce a diverse array of high-quality agricultural produce and products. Both traditional and innovative farming practices flourish throughout the County. Residents understand, appreciate, and are proud of the role agriculture plays in the history and economy of the County.

The County's economy is diverse and robust in its global role as a source of food and agricultural commodities, a destination for tourists (The Delta, Agro-tourism, Wineries), and a supply of high-tech and "green" manufactured products. Expanded educational opportunities and a highly interconnected shipping system provide a broad range of jobs across diverse industries, including those related to small, local businesses and new start-ups. Excellent schools and leadership programs prepare youth as the next generation of the County's workforce.

San Joaquin County is linked to regional, state, and international destinations through an extensive network of roads, railways, waterways, and airports. Residents and businesses throughout the County are connected to the world through high-speed communications infrastructure. Communities are internally connected through an efficient and safe system of roadways, bridges, transit, bikeways, pedestrian trails, and sidewalks. County residents and farm equipment move together safely on well-managed and maintained roads.

Natural assets, such as air quality, the Delta, river corridors, and soils, are preserved, and residents know their importance. Aggregate resources supply the long-term development needs of the region and state. Energy efficiency and the use of alternative modes of transportation conserve energy resources, and new, sustainable energy resources are fully developed, providing clean and inexpensive energy.

The County values and protects its natural and cultural resources with expanded opportunities for residents and visitors to enjoy the County's heritage and natural setting. Recreation opportunities, such as the Delta, waterways, and regional parks, are available and accessible to all County residents and visitors.

Agriculture, residents, and natural habitats are challenged to receive a continuous, cost-effective, and adequate clean water supply. The groundwater basin is challenged to sustain a state of equilibrium due to inconsistent precipitation throughout the region.

The Delta is a “Place” of statewide significance and maintains its historical role in the County. Delta channels convey water, which supports a thriving agriculture industry, diverse wildlife populations, world-class recreational opportunities, navigable boating routes, and the transportation of commercial goods. Fortified and well-maintained Delta levees provide safety and security to residents, patrons, infrastructure, and crops.

Communities and cities maintain their unique geographic identities, separated by agriculture and open space lands. Growth and development occur predominantly within and adjacent to existing communities and cities. A new expansion is carefully planned, including establishing community services and facilities in keeping with the existing community character.

Every community is desirable because of its range of housing choices, local job opportunities, access to services and shopping, great schools and parks, and sufficient infrastructure. Residents and businesses celebrate the rural heritage and small-town feel of their communities and the ethnic diversity of residents.

Finally, San Joaquin County is celebrated for the health and well-being of its residents. Residents and businesses proactively minimize their impacts on climate change and air quality. The County maintains plans and safeguards against potential hazards, such as flooding and wildland fires.

2.1 FLOODPLAIN MANAGEMENT PLANNING

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum National Flood Insurance Program (NFIP) requirements. An additional indicator of floodplain management capability is the active participation of local jurisdictions in the CRS, adding extra local measures to protect from flooding. All 18 creditable CRS mitigation activities are assigned a range of point values. Communities can apply for an improved CRS class after accumulating points and reaching identified thresholds. Class ratings, ranging from 10 to 1, are tied to flood insurance premium reductions. As class ratings improve (decrease), the percent reduction in flood insurance premiums for NFIP policyholders in that community increases. Under CRS, discounted flood insurance premium rates reflect the reduction in flood risk. They result when community actions meet the three goals of CRS:

- Reducing flood damage to insurable property
- Strengthening and supporting the insurance aspects of the NFIP
- Encouraging a comprehensive approach to floodplain management

In 1993, San Joaquin County joined CRS and currently possesses a class 7 rating, entitling flood insurance policyholders to receive up to a 15% premium discount annually. The floodplain management planning activities for Unincorporated San Joaquin County are addressed throughout the 2023 LHMP.

3 THE PLANNING PROCESS

The 2023 LHMP seeks to identify where San Joaquin County can take reasonable actions to minimize the adverse effects and dangers posed by disaster events before they occur. Despite the County's efforts to reduce the potential for damage and harm while increasing readiness to respond to such circumstances, the potential for significant injury and damage arising from natural disasters remains.

3.1 OVERVIEW OF THE LHMP PROCESS

3.1.1 Opportunities for Stakeholders

The Office of Emergency Services works closely with the communities in its Operational Area, including the Special Districts in the County. The OES Staff sent a link to the existing 2018 LHMP plan, announced the beginning of the LHMP planning process, and requested a review and comments. OES sent an email to the identified Planning Teams members with a copy of the LHMP and asked them to review and provide updates on the current status of identified projects, or other pertinent information, to be reflected in the update.

Stakeholders were invited in writing (email) and during the OES Stakeholder meetings to participate in this LHMP project. Primary outreach efforts focused on County Departments, Special Districts, and neighboring communities. A list of planning team members is on the following page. The Senior Emergency Planner for OES was the project manager for this update.

All planning team members attended meetings (See Appendix A for agendas, sign-in sheets, and meeting dates) and provided input on the following:

- Types of hazards, their impacts, vulnerabilities, and previous occurrences
- Reviewed a variety of plans, technical reports, and studies.
- Developed mitigation goals
- Reviewed development trends
- Attended public meetings

The County Office of Emergency Services also held various planning meetings within the working group. The planning meetings accomplished several critical requirements, including defining general priorities, compiling and prioritizing hazard mitigation strategies, and determining the appropriate departments for implementing mitigation strategies.

3.1.2 Plan Development Participants

The Core Team comprises County departments, with the Office of Emergency Services as the Lead Agency, which has historically received disaster reimbursement and mitigation funds for measures impacted by a disaster and municipality stakeholders. The Core LHMP Planning Team was comprised of:

- San Joaquin County Department of Public Works:
Deputy Director Maintenance Superintendent
Channel Maintenance Superintendent
Management Analyst II
- San Joaquin County General Services/Parks & Recreation:
Park Administrator
- San Joaquin County Sheriff's Office:
Lieutenant (Operations)
- San Joaquin County Office of Emergency Services:
Emergency Planning Team

- California Office of Emergency Services:
Local Hazard Mitigation Planning Unit and Emergency Services Coordinator
- City of Escalon:
Planning Team
- City of Lodi:
Planning Team
- City of Tracy:
Planning Team
- City of Stockton:
Planning Team

The Extended Planning Team was comprised of:

- Stockton Metropolitan Airport:
Airport Operations Supervisor
- San Joaquin County Community Development:
(GIS) Geographic Info Systems Program Management
- San Joaquin County Environmental Health:
Assistant Director
- San Joaquin County Public Health Services:
Public Health Emergency Preparation Coordinator
- San Joaquin County Agricultural Commissioner:
Deputy Agricultural Commissioner
- American Red Cross:
NGO – Coordinator
- County of San Joaquin Reclamation Districts:
Board Trustees / RD Engineers
- KSN Engineering:
Civil Engineering and Emergency Planning

3.1.3 Contractors and Outside Assistance

There were no additional contractors or assistance during this revision process.

3.1.4 Planning Team Committee

OES held a kick-off planning team meeting on October 18, 2022 and kept the planning team informed email. The kick-off meeting was conducted virtual via MS Teams. The sign-in sheets, team list, agendas, and other documentation from the planning sessions will be in Appendix A.

3.2 PUBLIC INVOLVEMENT

A draft copy of the 2023 LHMP was made available to the public. The review period gave the community two opportunities to comment on the draft 2023 LHMP.

- The draft 2023 LHMP was published on the OES County website (<https://www.sjgov.org/departments/oes/local-hazard-mitigation-planning>) for three weeks, starting on October 17, 2022. OES made changes based on public review comments and incorporated into the 2023 LHMP. The comments from the public can be found in Appendix B. The comments were used by the Planning Team in helping to determine the hazard priority and was instrumental in determining our High-Priority Hazards. We received many public comments on flooding and drought which is aligned with the goals outlined in the plan. We received many comments that do not meet the intent of this current LHMP, they will be addressed in the development and update of other County plans.

- In addition to the three-week public review comment period, OES also provided an opportunity for public comments on the draft 2023 LHMP at a virtual and in person public town hall meeting on November 10, 2023. OES advertised the meeting and agenda items on the SJGov website, social media, and through email updates to staff and stakeholders. No Public comments were received at these meetings to be incorporated into the 2023 LHMP.

3.3 PLAN PREPARATION

Revision to this LHMP followed the process of past revisions, but was expanded to include additional elements based on updated Federal review guide procedures and requirements. The San Joaquin County Hazard Mitigation Planning Committee's process for this current revision followed these steps from October through December 2022:

- Contact standing LHMP (County department) committee members and request a review of the current Local Hazard Mitigation Plan for revision comments
- Review the LHMP Review Guide for format and content requirements
- Meet with staff to discuss and assign tasks
- Send participation requests to planning team members.
- Update and revise LHMP
- Post ongoing drafts of the revised plan for review and comments
- Implement an official "public comment" schedule to obtain additional feedback on hazard assessment, mitigation projects, and mitigation resources available
- Submit for State and Federal approval
- Submit to the County Board of Supervisors for approval and adoption upon approval from Cal OES and FEMA

Ahead of a virtual kickoff meeting on October 18, 2022, OES staff reviewed and updated relevant information from the 2017 LHMP. All planning team members were identified and sent a copy of the basic revised plan and invited to participate in the kickoff meeting. During the kickoff meeting, it was discussed that much of the review process would be conducted virtually. All members listed in Appendix A attended the virtual meeting.

Team members were given until October 28, 2022 to provide feedback and input on the draft LHMP. On October 24, 2022, OES published a survey to collect the Team and public's input on the threat and probability of hazards within the County. This survey identified hazards perceived to cause risk to the community based solely on probability of occurring and NOT the severity of the hazard. The survey participants voted on a scale of least likely to highly likely for a hazard to pose a threat to the community. The Core Planning team utilized this data to complete a risk assessment and verify the priority hazards for the County.

The Core Team conducted outreach to partners to submit projects related to the priority hazards. Project submissions were due to OES by November 4, 2022. By November 7, 2022, OES emailed the Planning Team to rank the new and existing projects utilizing the STAPLEE Method. The Core Planning Team also hosted two town halls on November 10, 2022, one virtual and one in person, with minimal attendance.

3.3.1 Draft Plan Review

As Sections of the plan were reviewed and updated, OES posted the project on the OES website for review and comment.

3.4 USE OF EXISTING PLANS IN THE LHMP PROCESS

3.4.1 Review and Incorporation of existing plans, studies, reports, and technical information.

San Joaquin County OES maintains over 25 plans covering emergency operations, support, hazards, and functions for the Operational Area. Plans are reviewed on a triennial basis and can be reviewed explicitly after a significant incident or training.

- Specific plans and programs are reviewed for inclusion in this update for planning consistency among documents. Relevant information from reviewed projects, studies, reports, and technical information incorporated into the mitigation plan includes:
- State Hazard Mitigation Plan – OES has examined the State Hazard Mitigation Plan for recent updates on statewide hazard events and data for consistency.
- San Joaquin County’s 2017 Local Hazard Mitigation Plan - Reviewed so OES could update the Plan.
- General Plan December 2016 - Demographics and land use were cross-referenced for inclusion into this Plan as part of the overall community profile. Additionally, area vulnerabilities identified in Specific Plan Areas were included as part of the vulnerability and risk assessment for wildfire, landslide, and flood. OES enclosed The General and Specific Plans in the County’s capability assessment inventory
- Emergency Operations Plan – Reviewing the 2022 EOP gathering information about the assessed natural hazards.
- THIRA – The THIRA was reviewed for Hazard Identification and Risk Assessments and updated in November 2016. OES incorporated Hazard maps from the THIRA into the LHMP.
- Emergency Preparedness Plans – Contains agriculture, Medical Health, and public health information.
- Flood and Dam Failure Plan – OES reviewed the Plan for consistency for use as a reference in the “flood” section of the LHMP.
- Dam and Reclamation District Emergency Action Plans – Were reviewed for content and Inundation Data to ensure consistency with Cal OES dam inundation data.

3.5 CONTINUED PUBLIC INVOLVEMENT

OES will utilize strategies which include public outreach and awareness campaigns to improve public understanding of and response to hazard.

A completed copy of the plan will be available on the San Joaquin County Office of Emergency Services website in an accessible format. The approved plan will be open for public review and comment. The project manager will publish annual questionnaires and/or surveys on Social Media to garner public feedback on the approved plan. The project manager will monitor the LHMP website and County’s social media accounts for input on any changes, updates requested, and to address comments regarding the 2023 LHMP, including mitigation action implementation and the 2028 LHMP kickoff.

3.6 MONITORING, EVALUATING, AND UPDATING THE PLAN

This section describes OES’s method to monitor, evaluate, and update the LHMP.

3.6.1 Monitor and Evaluation

This plan will be monitored and evaluated by a subset of the planning team, specifically the OES LHMP project manager. If updated, OES will conduct plan revisions per FEMA’s “Local Hazard Mitigation Planning (LHMP) Handbook (March 2013). The plan will be submitted to the Board of

Supervisors for approval and publically shared. OES will update every five years. The update process will begin at least one year before the five-year expiration date. By following this process, OES can:

- Make sure that the mitigation strategy is implemented under the plan.
- Establish the basis for an ongoing mitigation program locally.
- Ensure that long-term monitoring of hazards is a routine activity.
- Integrate the principles of mitigation into the decisions of community officials. This is important because it provides a clear understanding of daily responsibilities and department roles.
- Maintain involvement and accountability for the program's progress.

The project manager will complete the Annual Review Tracker every January and after any major disaster to ensure that the 2023 LHMP is relevant and effective in achieving the plan’s goals, focuses on increasing public awareness, and assists with curtailing the number of structures in hazardous locations. FEMA-funded mitigation projects will continue to be tracked and reviewed using FEMA Mitigation Progress Report forms; OES will include progress summaries in the Annual Review Tracker (Table A) at the beginning of each year.

Pending grant / funding approval (early 2023) the County will begin the process of writing a comprehensive Multi-Jurisdictional Hazard Mitigation Plan.

Table 1 Plan Revision Updates

Year	Disasters	Mitigation Actions	New Studies/ Reports	Public Outreach	Changes made to LHMP
2023					
2024					
2025					
2026					
2027					

4 HAZARD IDENTIFICATION

4.1 HAZARD IDENTIFICATION

Hazard identification describes the nature of the hazard, disaster history, location, extent/severity, and probability of future events. According to the Comprehensive Preparedness Guide, 201: Threat and Hazard Identification and Risk Assessment Guide, 2d ed. (CPG 201), dam failure, drought, earthquake, flood, landslide, tsunami, and wildfire are classified as natural hazards. CPG 201 does not classify climate change, outbreak/epidemic/pandemic, or public safety power shutoff. Therefore, the dangers profiled for this LHMP are discussed in alphabetical order and not by CPG 201 classification. The order does not signify the level of risk.

4.1.1 Hazard Categories

Using the following terminology organizes known hazards into local, state, and federal “commonly recognized” categories, especially weather-related threats. Commonly recognized types allow more accessible research into past events and smoother discussions with other jurisdictions and agencies.

Air Pollution: Caused by releasing gases, chemicals, foul odors, or physical materials suspended in the atmosphere. These materials can cause adverse health effects due to the toxicity of the chemical itself or by particulates causing physical distress on the respiratory system. Chemical air pollution includes

- air releases from a hazardous materials spill,
- industrial emissions, or
- Air inversions are trapping vehicle emissions.

Physical material air pollution includes smoke from fires and dust storms. Foul odors can be created by excess or uncontrolled sewage or garbage.

Animal Pests: In San Joaquin County, birds and small mammals damage or consume agricultural products. Insects in all stages can damage crops by consumption or using crops for larvae production. Small mammals such as ground squirrels and birds can cause damage to fruit and nut-producing crops. Animal pests also include burrowing mammals such as gophers, moles, or beavers that can weaken levee structures by their activity.

Animal Diseases: Diseases carried by or that have infected other organisms. Diseases can move from one species to another (zoonotic) or be unique only to one species (vector).

Civil Disturbance: A general term used to describe some form of disturbance caused by a group. It is usually a protest against political organizations or policies, economic concerns, or even the results of a sports contest. Examples range from passive resistance and sit-ins to riots, acts of sabotage, and all-out civil chaos.

Dam Failure: An event where the dam or part of the dam itself fails, or water otherwise overtops the barrier without the dam failing. Considered “installations containing dangerous forces” under International Humanitarian Law, dam failure has a massive impact on people and the environment.

Dense Fog: During rainy seasons, additional moisture creates a fog that diminishes visibility and creates a hazard, especially for transportation. San Joaquin County is subject to periods of localized thick fog in the winter called Tule Fog. This dense fog creates a visibility hazard on roads, freeways, airports, and rail lines throughout the county.

Drought: A period of deficiency of the needed water supply. In California, the deficit caused by a lack of precipitation can significantly impact agriculture, cause damage to soils (salt intrusion), and lead to public water use limitations.

Earthquake: A movement in the earth's crust that Seismologists can quantifiably measure by seismic waves. They are most commonly found on plate boundaries. Still, they can also be associated with volcanic activity and occur anywhere on the earth. Earthquakes range from small and profound sub-surface events to large-scale near-surface events that have catastrophic effects on artificial structures and natural topography.

Energy Shortages: Loss in the ability of the power grid or energy infrastructure to meet the current needs of a type of consumption. Impairment can include a drop in oil reserves leading to gasoline shortages, the disruption of an electrical power grid (transmission systems), or overloading the power grid due to excessive demand. Events and resources far beyond the boundaries of San Joaquin County can influence energy shortages.

Excessive Rain: A period of precipitation that can overcome the natural ability of the environment or fabricated structures to control the runoff. The deluge may lead to local or widespread flooding. Excessive rain in areas outside the County, such as the Sierra Nevada Mountains and foothills, can still affect the County by having runoff through the river systems of the Central Valley and into the Delta.

Expansive Soils: Clay soils (present in San Joaquin County expand with the addition of water and contract when it dries out. The change in volume when in contact with buildings, roadways, underground utilities, or levees can cause severe damage.

Extreme Temperature - Cold: A period where winter temperature drops below the point where most of the population or agriculture can adequately deal with it. Extreme cold temperatures in San Joaquin County can adversely affect sensitive populations such as the elderly or homeless and seriously affect crops such as fruit trees.

Extreme Temperature - Heat: A span where the temperature rises quickly to a higher-than-average temperature and then drops (spike). A prolonged period of hot days beyond expectation. For temperatures to be considered extreme, they must adversely impact human health or agriculture.

Flood: Occurs when water reaches and tops some height above a given benchmark point, posing a threat to life or property caused by rising or spilling water. The sources of the floodwaters can be diverse. In San Joaquin County, flooding can occur from excessive rain overloading the river and levee system, a dam failure, or a levee failure. Floods can be slow, such as rising water in a river, or rapid such as a catastrophic flood caused by dam or levee failure. Flooding can create significant physical, economic, agricultural, and social harm to affected areas.

General Fire Threats: These are County fires that may spread beyond an initial dwelling or involve chemicals that pose a more significant threat than the fire itself. Examples include fires in intense wind environments moving through residential areas and fires at chemical storage and use facilities such as Port of Stockton.

Ground Contamination: The discharge of chemicals into the soil. Sources of ground contamination are underground storage tanks (often fuels), the application of pesticides, leachate from landfills, and the dumping of chemicals and other waste directly onto the soil. Contaminated soils damage water supplies, make land areas untenable for habitation or other human use and require expensive long-term remediation.

Hazardous Material Emergencies: Events where the release of dangerous material, substance, or waste threatens people, property, or the environment. A hazardous material emergency will

require the response of specially trained personnel with the correct equipment to contain, control, and clean up the material involved.

High Winds: Wind that causes physical damage to structures, trees, or agriculture within the county. High winds can also pose a flying debris hazard to the public and interfere with transportation systems.

Landslide: The downslope movement of rock and soil over a surface that can no longer maintain stability (incompetence). Influenced by gravity, landslides can be exacerbated by water flow, earthquakes, erosion, and manufactured disruptions such as excavation and construction.

Land Subsidence: A lowering of the land surface in response to subsurface weathering, the collapse or slow settlement of underground mines, or the removal of subsurface fluids such as oil or water from an aquifer.

Levee Break: Like a dam, a break is where the levee can no longer control the water. Generally, when levees do break, they are under stress due to the significant retention of water between the levee banks. Water saturation (boils), overtopping and erosion, land subsidence, earthquake, burrowing animals, or general lack of maintenance cause levee breaks.

Noise Pollution: Unwanted and unpleasant human, animal, or machine-created sound that interferes with the activity or balance of human or animal life. Sources of noise pollution include transportation systems, motor vehicles, car alarms, emergency service sirens, office equipment, barking dogs, power tools, audio entertainment systems, loudspeakers, and noisy people.

Plant Pathogens: Diseases carried by organisms (vectors) or caused by environmental conditions. Organisms that cause plant diseases include fungi, viruses, protozoa, bacteria, and parasitic plants.

Plant Pests: Insect that destroys plant or crop through consumption or use of the plant as a receiver for larvae. San Joaquin County monitors plant pests closely. Abatement programs are in place by the County Agricultural Commissioner's office.

Public Health Emergency: An emergency declared by the county or the state public health officer of a health threat to the general populace of the county. Public Health Emergency could be a pandemic such as COVID-19, H1N1 flu, West Nile Virus epidemic, or excessive temperatures.

Soil Erosion: The gradual surface soil loss or movement due to energy or friction created by gravity, water, or wind. Soil erosion can intensify when forceful and persistent winds act upon loose soil. Essentially, this can cause dust storms posing a significant adverse health effect, an environmental hazard, and an agricultural disaster.

Terrorism: Defined by the U. S. Department of Defense as "the unlawful use of, or threatened use of violence to inculcate fear, intended to coerce or intimidate governments or societies as to the pursuit of goals that are generally political, religious or ideological."

Tornadoes and Severe Thunderstorms: An associated period of severe weather that can cause catastrophic damage. Although relevant, they are uncommon in San Joaquin County.

Train Derailment: An accident on a railway in which a train leaves the rails resulting in damage, injury, and death. Broken or misaligned rails, excessive speed, faults in the train and its wheels, and collisions can cause derailment with obstructions on the track. Derailment can also be a secondary effect in the aftermath of a collision between two or more trains. The most significant derailment hazard is when a freight train with cars of LNG or LPG is involved. Derailed LNG and LPG cars involved in a fire with the right circumstances create a catastrophic explosion and fire called a BLEVE (Boiling Liquid Expanding Vapor Explosion).

Water Pollution: A material that harms a water body. The most common type of water pollution is a discharge of oil. However, almost any liquid or solid may be a water pollutant. Water pollution can adversely affect the biomass of an impacted area, damage water supply sources, injure those who come into contact, and create significant economic harm.

Weapons of Mass Destruction (WMD): Weapons designed to kill or injure large numbers of people and damage the physical infrastructure. Weapons of Mass Destruction may also cause environmental harm that would adversely affect people. WMDs also include nuclear, biological, radiological, and chemical (NBC) weapons.

Wildland Fires: Uncontrolled fires in rural areas and sparsely populated regions with limited vehicle access. A wildland fire is different from general fire threats by their sometimes-extensive size, the speed at which they can travel, and the ability to change direction and jump gaps. San Joaquin County is increasingly becoming a Wildland Urban Interface (WUI) zone. The WUI is the zone of transition between unoccupied land and human development. It is the line, area, or location where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

Winter Storms: Periods of intense weather can include low temperatures, heavy rain, snow or sleet, high winds, and icing conditions. The general climate in San Joaquin County is not known for severe weather conditions, but the potential is there for winter storms to occur.

4.1.2 Table of Previous Incidents

One method to identify hazards is to look at the events that have triggered federal and/or state disaster declarations that included San Joaquin County. Federal and state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government’s capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments’ capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance. In other words, a presidential disaster declaration puts federal recovery programs in place to help disaster victims, business, and public agencies. The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations (Farm Service Agency 2018). The quantity and types of damage are the determining factors.

Table 2- Previous Occurrences in San Joaquin County

Previous Occurrences – Earth Movement		
Date:	Location:	Comments:
1881	Linden	This quake possibly located on the Tracy-Stockton Fault had an estimated Modified Mercalli intensity of VII.
1906	Countywide	The San Francisco earthquake of 1906, which caused historic destruction in the City, also caused strong seismic shaking in San Joaquin County.
1940	Linden	Two small quakes occurred with a Richter Magnitude of 4. It is not known if these earthquakes were connected to the Tracy-Stockton fault.
1979	Countywide	- Seismic shaking with unverified impacts in the Delta
1980	Countywide	- Seismic shaking with unverified impacts in the Delta.
1983	Countywide	- Seismic shaking with unverified impacts in the Delta.
1983	Countywide	- Seismic shaking with unverified impacts in the Delta.

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1984	Countywide	-Seismic shaking with unverified impacts in the Delta.
1989	City of Tracy Countywide	-Localized damages occurred within the City. -Rolling seismic waves were felt throughout the County.
2006	Corral Hollow Rd	-Heavy rains caused a landslide along Corral Hollow Road at a Lawrence Livermore Labs site.
2019	RD 2064 along Stanislaus River	A large tree fell into the river causing the water to divert into the SJC side of the bank which led to erosion of a portion of the levee.
Previous Occurrences – Energy Shortage		
1973-74	Countywide	Middle East Oil Embargo
1978-83	Countywide	Gasoline/Energy Shortage & Recession
1991	Countywide	Iraq's invasion of Kuwait resulting in U.S. military Action
2000	Countywide	Statewide energy shortage causes rolling blackouts
2019	Out of County	San Joaquin County communication systems are threatened during PSPS event in Calaveras Co.
2020	Countywide	Public Safety Power Shut Offs during wildfire season
2022	Countywide	Excessive heat event stressed the power grid and caused sporadic instances of power loss.
Previous Occurrences – Fire		
2002	Contiguous counties to Calaveras County	USDA Secretarial – winds, drought & fire
2002	Eligible contiguous County business owners	SBA – physical and economic injury disaster loans – Santana Row Fire – Santa Clara County
2020	Multiple locations throughout Santa Clara County, Alameda County, Contra Costa County, San Joaquin County, Merced and Stanislaus County	SCU Complex Fire- 396,624 acres burned along the Coastal Range from Merced County into San Joaquin County.
Previous Occurrences – Floods		
1980	Reclamation Districts: 2 Union West 38 Staten 524 Middle Roberts 544 Upper Roberts 548 Terminous 684 Lower Roberts 756 Bouldin 2023 Venice 2027 Mandeville 2028 Bacon 2029 Empire 2030 McDonald 2033 Brack 2037 Rindge 2039 Upper Jones 2040 Victoria 2041 Medford 2042 Bishop 2044 King 2072 Woodward	FEMA Declaration 3078, Public Assistance \$604,400, Individual Assistance \$1,454,800 TOTAL: \$2,059,200

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1980	Reclamation Districts: 2038 Lower Jones 2039 Upper Jones	FEMA Declaration 633, Public Assistance \$2,730,329 Individual Assistance \$8,077,400 TOTAL: \$10,807,729
1982	Countywide damages, include: Reclamation Districts: 2 Union West 38 Staten 348 New Hope 548 Terminous 684 Upper Roberts 756 Bouldin 2023 Venice 2027 Mandeville 2029 Empire 2030 McDonald 2033 Brack 2037 Rindge 2038 Lower Jones 2040 Victoria 2041 Medford 2044 King 2113 Fay	FEMA Declaration 651, Public Assistance \$427,000 Individual Assistance \$200,000 TOTAL: \$627,000
1982	2030 McDonald	FEMA Declaration 669, Public Assistance \$4,642,500 Individual Assistance \$5,245,789 TOTAL: \$9,888,289
1982	Reclamation Districts: 2 Union West 38 Staten 348 New Hope 524 Middle Roberts 544 Upper Roberts 548 Terminous 684 Lower Roberts 756 Bouldin 773 Fabian 1007 Pico & Nagle 2023 Venice 2027 Mandeville 2028 Bacon 2029 Empire 2030 McDonald 2033 Brack 2037 Rindge 2038 Lower Jones 2039 Upper Jones 2040 Victoria 2041 Medford 2042 Bishop 2044 King 2058 Pescadero 2072 Woodward 2086 Canal Ranch 2089 Stark	FEMA Declaration 677, Public Assistance \$ 23,455,600 Individual Assistance \$ 3,224,510 TOTAL: \$ 26,680,110

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	2113 Fay	
1986	Countywide, including: Reclamation District: 348 New Hope	FEMA Declaration 758, Public Assistance \$ 8,239,000 Individual Assistance \$ 11,500,000 TOTAL: \$19,739,000
1994	2027 Mandeville	TOTAL: \$750,000
1996	Countywide including: Reclamation Districts: 2058 Pescadero 2062 Stewart 2064 River Junction 2075 McMullin 2095 Paradise 2096 Wetherbee Lake 2107 Mossdale	FEMA Declaration 1155, Public Assistance \$ 14,725,364 Individual Assistance \$ 84,937,350 TOTAL: \$99,662,714
1998	Countywide	FEMA Declaration 1203, Public Assistance \$ 1,437,000 Individual Assistance \$ 1,666,000 TOTAL: \$ 3,103,000
2004	Reclamation Districts:2038 Lower Jones 2039 Upper Jones	FEMA Declaration 1529, Public Assistance \$ 42,488,326 Individual Assistance \$44,977,071 TOTAL: \$ 87,465,397
1995	Countywide	State Proclamation
1997	Countywide	State Proclamation
2006	Countywide	State Proclamation
2017	Countywide	(January & February Storms) Local Proclamation \$1,683.659.19
2017	Countywide	FEMA Declaration 4308 , \$ unknown as of 9/2017
Previous Occurrences – Hazardous Materials		
1998	Tracy	Tracy Tire Fire
1989	Manteca	Freight train derailment
2006	Stockton	Freight train derailment
Annually	Countywide	Hazardous Materials - County agencies typically respond to more than 200 spills/incidents per year
Previous Occurrences – Train Derailment		
1989	Mariposa Road	Amtrak derailment 53 injured
Previous Occurrences – Public Health Emergencies		
2009	San Joaquin County	11 Hospitalizations, 0 Deaths 7
2004	Countywide	West Nile Virus – 3 human cases reported
2005	Countywide	West Nile Virus – 36 human cases reported
2006	Countywide	West Nile Virus – 8 human cases reported
2020-Current	Countywide	2019 Novel Coronavirus (COVID-19) Pandemic
2022-Current	Countywide	2022 Monkeypox Outbreak
Previous Occurrences – Drought		
1977	Countywide	Drought
1990	Countywide	Drought
2002	Countywide	Drought - USDA – Ag
2004	Countywide	Drought with associated agricultural losses
2008	Countywide, Central Valley Drought	Drought
2014	Statewide	Drought (2014-2017)
2021	Statewide	Drought (2020-current)

Previous Occurrences – Weather : Extreme Temperature		
2003	Countywide	Extreme heat with agricultural and economic losses
2006	Countywide	Extreme heat. At least 23 human deaths attributed to heat conditions, crop damages, loss of agricultural productivity, and livestock fatality. Agricultural losses in production expected to continue into 2007. Agricultural Losses up to \$21,052,101
2013	Countywide	Freeze Event
2016	Countywide	Cold temperatures
2022	Countywide	Extreme Heat event impacted a majority of the State.
Previous Occurrences – Weather : Severe Thunderstorms		
1982	Countywide	Excessive Rain – USDA Cost- \$48,097,424
1990	Countywide	Excessive Rain – Local Disaster – Cherries Cost - \$35,000,000
1993	Countywide	Excessive Rain – FEMA Cost - \$10,250,000
1995	Countywide	Storm - FEMA – Crop damage Cost - \$6,020,000
1995	Countywide	Storm - FEMA-1046-DR-CA
1995	Countywide	Excessive Rain – Local Disaster - Cherry crop Damage Cost - \$11,050,000
2002	Contiguous counties to Calaveras County	Winds, drought & fire out of County – USDA Secretarial - ag losses
2005	Countywide	Hail and excessive rain
2006	Countywide	Heavy winds & excessive rain
2021	Countywide	October Atmospheric River created flooding issues as local pumps and storm drains were unable to keep pace with the deposition of precipitation in the County.
2022	Countywide	Tornado touchdown 8 miles ESE of Isleton
Previous Occurrences – Civil Disturbance		
2020	Sporadic	George Floyd Protests in various cities around the County.
Previous Occurrences – Terrorism		
1989	Stockton	Cleveland Elementary School Shooting,

4.1.3 Hazard Public Perception Survey Results

A survey was conducted with the core planning team, extended stakeholder team, and public. This survey identified hazards perceived to cause risk to the community based solely on probability of occurring and NOT the severity of the hazard. The survey participants voted on a scale of least likely to highly likely for a hazard to pose a threat to the community. The ranking for the survey was based on the following:

- Highly Likely: Near 100% probability in next year
- Likely: Between 50 and 100% probability in next year, or at least one chance in 10 years
- Neutral: Equal chances of occurring or not occurring
- Unlikely: Between 1 and 49% probability in next year or at least one chance in next 100 years
- Highly Unlikely: Less than 1% probability in next 100 years.

Survey results listed below are displayed based on the total number of votes received in each category. The votes indicate the perception of likelihood of each hazard occurring within the County.

Table 3- Hazard Perception Public Survey

Hazard Descriptions	Highly Likely	Likely	Neutral	Unlikely	Highly Unlikely
Drought	97	39	20	4	7
Energy Shortage	72	58	27	4	6
Air Pollution	55	54	37	17	5
Public Health Emergency	65	37	35	16	14
Extreme Temperature - Heat	53	48	34	21	11
Water Pollution	48	49	30	29	11
General Fire Threats	41	47	41	28	10
Civil Disturbance	44	42	51	17	14
Levee Break	42	44	42	20	19
Terrorism	44	40	43	29	11
Wildland Fires	43	41	47	21	15
Dense Fog	36	47	37	33	15
Flood	29	51	43	24	20
Ground Contamination	31	47	49	26	14
Earthquake	27	45	50	32	13
Weapons of Mass Destruction (WMD)	42	30	31	34	30
Dam Failure	29	35	43	31	29
Hazardous Material Emergencies	25	39	51	37	14
Animal Pests	19	38	55	38	18
High Winds	18	37	58	34	20
Noise Pollution	19	33	43	48	24
Plant Pests	10	38	60	37	22
Excessive Rain	15	31	49	38	34
Animal Diseases	14	27	54	40	30
Extreme Temperature - Cold	11	25	41	50	39
Expansive Soils	15	20	56	41	35
Plant Pathogens	11	23	53	42	38
Winter Storms	11	22	39	53	42
Soil Erosion	8	20	58	47	34
Tornados and Severe Thunderstorms	6	22	39	52	48
Land Subsidence	9	14	32	50	62
Train Derailment	11	12	33	57	54
Landslide	5	15	28	57	61

4.1.4 Limitations

Loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic or economic parameter data
- The unique nature, geographic extent, and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents have to prepare for a specific hazard event
- The uncertain spatial accuracy of the dam inundation area data.
- Lack of a standardized model for assessing sea level rise impacts. Multiple models provide multiple results. Not all models were run in the development of the sea level rise analysis.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate and should be used only to understand relative risk. Over the long term, the planning partners will collect additional data to assist in estimating potential losses associated with other hazards.

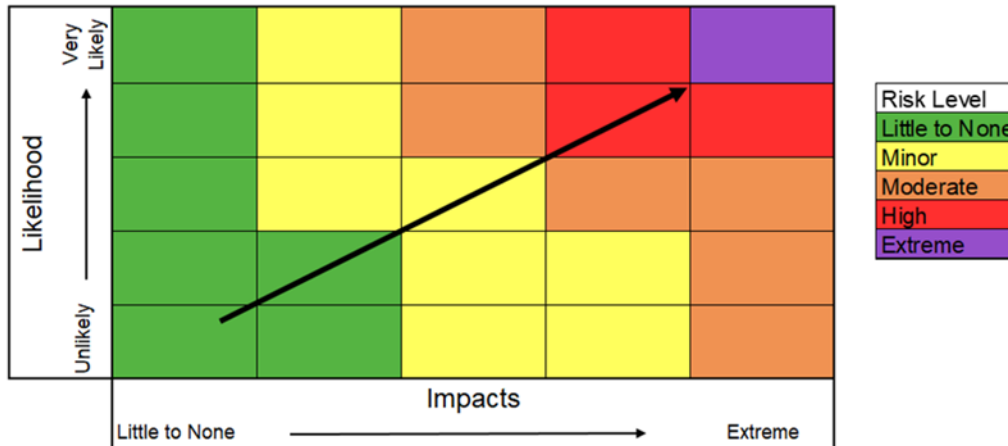
4.2 RISK ASSESSMENT

Risk to natural hazards is a combination of hazard, vulnerability and capability. This section of the LHMP looks at both hazards and vulnerability. The risk assessment process identifies and profiles relevant hazards and assesses the exposure to lives, property and infrastructure to these hazards. The goal of the risk assessment is to estimate the potential losses in San Joaquin County from a hazard event.

This process also allows communities in the County to better understand their potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce the risks from future hazard events. The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

The Core Planning Team utilized the results of the public survey to assess and prioritize the highest priority hazards based on historical data and impact-probability matrices.

Figure 1- Impact-Probability Matrix- Designed by the Core Planning Team to differentiate between the risk and impact of an incident and the likelihood of it occurring



The risk assessments in this plan describe the risks associated with each hazard of concern identified. Vulnerability of exposed structures and infrastructure was evaluated by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. Data used to support this assessment included the following:

- County GIS data
- Statewide and nationwide GIS datasets to support mitigation planning
- California SHMP 2018
- San Joaquin County LHMP 2017
- Neighboring Jurisdictional HMPs
- FEMA and Dam Flood Inundation Mapping
- Written descriptions of inventory and risks provided by the jurisdictions
- Online data sources
- Data and information from existing plans and studies
- Input from the team members

The planning team established the hazards listed below as being High-Priority for the jurisdiction. These hazards were further profiled in the below subsection.

1. Flooding
2. Dam Related Incidents
3. Drought
4. Wildfire

4.3 HAZARD PROFILE

Overall hazard significance was based on a combination of information the Core Planning Team deemed to be relevant to the profile of the hazards. Each hazard profile was evaluated utilizing the following subcategories:

- Hazard/Problem Definition – This section gives a description of the hazard and associated issues followed by details on the hazard specific to the County Planning Area.
- Geographic Area – This section gives a spatial description of the potential location or areas of the County where the hazard expected to impact.
- Extent (Magnitude/Severity) – This section gives a description of the potential strength or magnitude of the hazard as it pertains to the County. It describes how much damage could occur as a result of a hazard event.

- Previous Occurrences – This section contains information on historical incidents, including impacts where known. Historical incident worksheets were used to capture information from participating jurisdictions on past occurrences.
- Probability of Future Occurrence – The frequency of past events is used in this section to gauge the likelihood of future occurrences. The likelihood of future occurrences is categorized into one of the following classifications:
- Vulnerabilities are summarized for all natural hazards. The vulnerability assessment addresses who or what is vulnerable to natural hazards or climate stressors, where someone or a critical facility is susceptible to damage, and when and why these assets may be vulnerable.

Table 4- Hazard Profile Reference Table

Geographic Area	Probability of Future Occurrence	Magnitude/Severity	Significance/Vulnerability
Extensive: 50-100% of planning area	Highly Likely: Near 100% chance of occurrence in next year or happens every year.	Catastrophic—More than 50 % of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths	High: widespread potential impact
Significant: 10-50% of planning area	Likely: Between 10 and 100% chance of occurrence in next year or has a recurrence interval of 10 years or less.	Critical—25-50 % of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability	Medium: moderate potential impact
Limited: Less than 10% of planning area	Occasional: Between 1 and 10% chance of occurrence in the next year or has a recurrence interval of 11 to 100 years	Limited—10-25 % of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability	Low: minimal potential impact
	Unlikely: Less than 1% chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.	Negligible—Less than 10 % of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid	

4.3.1 Flooding

Hazard Problem/Description: A flood is the temporary inundation of water or mud on normally dry land. Heavy or prolonged rain or dam collapse can cause inundation, as can flash floods. Urban flooding occurs in developed areas where the amount of water generated from rainfall and runoff exceeds the storm water systems’ capacity. As land is converted from agricultural to urban uses, it often loses its ability to absorb rainfall. Rain flows over impervious surfaces such as concrete and asphalt and into nearby storm sewers and streams. This runoff can result in the rapid rise of floodwaters. During urban floods, streets can become inundated, and storm drains often back up because of the volume of water and become blocked by vegetative debris like yard waste, which can cause additional flooding. Development in or near the floodplain puts lives and property at risk. Flood damage can include structure inundation, erosion of stream banks, road embankments, foundations footings for bridges, impact damage from debris, and blockage of infrastructure, cropland destruction, and sewage releases from damaged tanks, and economic loss to agriculture.

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss. Certain health hazards are common to flood events. Standing water and wet materials in structures can become breeding grounds for microorganisms such as bacteria, mold, and viruses. This can cause disease, trigger allergic reactions, and damage materials long after the flood. When floodwaters contain sewage or decaying animal carcasses, infectious disease

becomes a concern. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts.

Floodplains are defined as the areas immediately adjacent to a channel from a river, stream, or other waterway. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage and based on FEMA guidelines, the floodplain most often refers to the area that is inundated by the 100-year flood, or the flood that has a one percent chance occurrence in any given year of being equaled or exceeded. The 1%-annual-chance flood is the national minimum standard to which communities regulate their floodplains through the FEMA National Flood Insurance Program (NFIP). The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. A 0.2%-annual-chance flood event would be slightly deeper and cover a greater area than a 1%-annual chance flood event. The potential for flooding can change and increase through various land use changes and changes to land surface, which may result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

A levee is a raised area that runs along the banks of a river or canal. Levees reinforce the banks and help prevent flooding. By confining the flow, levees can also increase the speed of the water. Levees can be natural or manmade. A natural levee is formed when sediment settles on the riverbank, raising the level of the land around the river. To construct a manmade levee, workers pile dirt or concrete along the riverbanks, creating an embankment. This embankment is flat at the top, and slopes at an angle down to the water. For added strength, sandbags are sometimes placed over dirt embankments. Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe flood events.

Levees reduce, not eliminate, the risk to individuals and structure behind them. A levee system failure or overtopping can create severe flooding and high-water velocities. It is important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Geographic Area: Extensive All of San Joaquin County is subject to flooding of some level. Areas of particular vulnerability to floods are around the Delta and waterways.

The County is located within the San Joaquin River watershed. The San Joaquin River is one of the longest rivers in Central California after the Sacramento River. The 366-mile long river starts in the Sierra Nevada and flows through the agricultural region of the Northern San Joaquin Valley, where it meets up with the Sacramento River at the Sacramento-San Joaquin Delta, a 1,000-square mile system of channels and islands that drains more than 40 percent of the State's lands. It eventually flows through to Suisun Bay, San Francisco Bay, and the Pacific Ocean.

An important source of irrigation water as well as a wildlife corridor, the San Joaquin is among the most heavily dammed and diverted of California's rivers. Over the length of the San Joaquin River is fed by many other rivers and streams, and most notably the Stanislaus and Tuolumne rivers. Surface water from the San Joaquin River is also stored and diverted within the watershed. Most of the surface water in the upper San Joaquin River is stored and diverted at Millerton Lakes Friant Dam near Fresno. In the central portion of the watershed, many agricultural and municipal users received water from irrigation districts, such as the Modesto, Merced, Oakdale, South San Joaquin, and Turlock Irrigation Districts.

Central Valley Flood Protection Plan (CVFPP): The physical risks associated with potential flooding and the regulatory requirements for floodplain management are important considerations

when decisions are being made regarding future land use throughout the County. Those same risks guide the local and community-level emergency response needs. Economic growth and prosperity in the County are dependent upon federal, state, and local agency involvement on regional and local flood management systems. Flood protection regulations within California have been increased over the past few years through legislation. This legislation included the requirement for the California DWR and Central Valley Flood Protection Board (CVFPP) to prepare and adopt the CVFPP by 2012 and update every 5 years. The legislation also established certain flood protection requirements for local land use decision-making based on the CVFPP. The law sets a higher standard for flood protection for the entire San Joaquin Valley. The standard was set for an urban level flood protection necessary to withstand a 1 in 200 chance of a flood event occurring in any given year (200-year flood) for areas developed or planned to have a population of at least 10,000. It also requires impacted counties to collaborate with cities to develop flood emergency response plans.

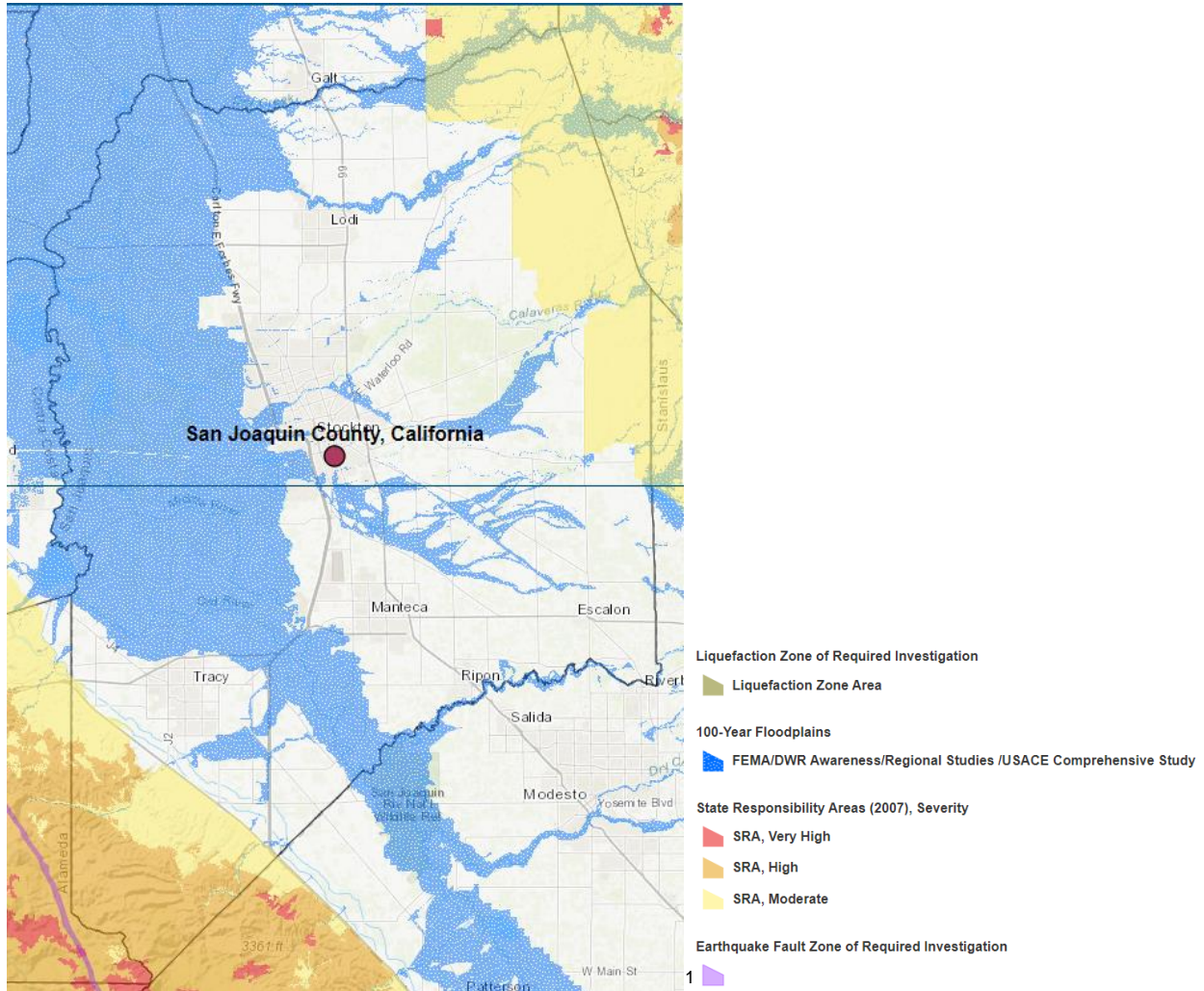
Magnitude/ Severity: Critical Flooding in San Joaquin impacts many areas, such as people, roads, buildings residential /commercial, parks/recreation areas, agriculture, and critical facilities.

Fiscal ramifications from flooding can happen due to road closures that affect businesses, County-owned park closures, and airport closures. County staff working during a flood event can cause a financial burden on San Joaquin's economy.

While there are some benefits associated with flooding, such as the replenishment of sediments and nutrients to agricultural lands, it is considered a hazard to development in floodplains. Floods can cause many cascading effects. Fire can break out as a result of dysfunctional electrical equipment. Hazardous materials can also get into floodways, causing health concerns and polluted water supplies. In many instances during a flood, the drinking water supply will be contaminated.

Flooding can have a major economic impact on the economy. Effects on the agriculture economy can be devastating, and a large amount of area at risk to flooding in the County is agricultural. Flooding can damage crops and livestock. In addition to the obvious impacts on crops and animals, flooding can have deleterious effects on soil and the ability to reinvigorate the agricultural activities impacted once the flood waters recede. Damage to water resources such as underground irrigation systems, water storage reservoirs, springs and other natural water bodies could have a serious effect upon agriculture operations.

Figure 2- Cal OES My Hazards Map- San Joaquin County as of October 2022



Previous Occurrences: Acampo Road and State Route 99, known as “Cooper’s Corner,” historically floods (approximately every ten years) during heavy rainfall. When this area floods, there is repeated damage to local elementary schools, residences, and businesses. There have been road closures and evacuations due to the flooding in this area.

The undercrossing at State Route 99 continues to flood due to vandalism and a poorly functioning backflow valve on the levee side of the Mokelumne River. Equipment failure has resulted in frequent flooding of the frontage road beneath the underpass. Frequent flooding causes damage to the roadway, and the inundation impacts the farms, businesses, and residences in this area.

Culverts located at Kennefick Road just north of Liberty Road have washed away during heavy rains. Damaged conduits destroyed over 100 feet of Kennefick Road, temporarily eliminating access to properties north of Liberty Road, which is the only access point for that area.

Howard Road Bridge, located over the San Joaquin River, suffered a slip-out failure on an uppermost portion of the northeast side of the eastern approach to the bridge. This failure is approximately 100 feet long by 40 feet wide, which has compromised the integrity of the roadway/bridge. Failure of the roadway in this area would limit access to critical portions of French

¹ <https://myhazards.caloes.ca.gov/>

Camp and Lathrop communities. The collapse will affect local businesses and residents traveling on this road/bridge.

Due to poor drainage and mix-use properties on the south side of West Larch Road, sheet runoff occurred going north into the County's southern conveyance ditch located at the south side of West Larch Road. The runoff was over capacity for the current ditch, which was reduced due to encroachments and undersized driveway culvert crossings. Overflow from these issues resulted in the inundation of West Larch Road and properties (businesses/residences) in the drainage areas.

Continuous rains have caused the outer banks of the lake in the park to erode, affecting the park benches, picnic areas, and recreational equipment rental. Chrisman Road residential area continues to flood during heavy rainstorms, which causes homes to retain water in residential buildings due to flooding. The Purdy Culvert system located at the end of Partridge Road (a private road, non-county maintained) in Acampo, in a mixed residential and agricultural use area, needs to be replaced or upgraded due to flooding causing the site to overflow.

Probability of Future Events: The County is Highly-Likely to face a flood incident in the future. Localized flooding such as a roadway or neighborhood is more probable than widespread flooding.

Due to the history of past flooding events and the natural drainage pattern of the County, flooding in San Joaquin County is likely to continue to occur. The potential for failure of one of the many levees throughout the County could create more risk for flooding. The 100-year flood is the flood that has a one percent chance in any given year of being equaled or exceeded. Based on past events, flooding events less severe than a 100-year flood and those outside of the 100-year floodplain occur frequently during periods of heavy rains.

Vulnerability: There are roughly 30,287 properties in San Joaquin County that have more significant than a 26% chance of being severely affected by flooding over the next 30 years. This represents 64% of all properties in San Joaquin County and facilities sinking on their pilings, particularly in the downtown "old town" area.

In California, only about 230,000 homes and other buildings have flood insurance policies, which are separate from homeowners insurance. That means only about 2% of properties are covered against flooding.

Over a 50-year period, the average annual economic damages estimate more than quadruples in the San Joaquin River Basin because of estimated population and regional economic growth and the increased flood risk brought on by climate change. The largest increase in economic damages are projected to occur in the San Joaquin River Basin.

In addition to the damage to properties, flooding can cut off access to utilities, emergency services, and transportation and may impact the overall economic well-being of an area. Impacts of flooding will disproportionately affect socially vulnerable communities. Future floods are expected to increase peak water surface elevations and cause more damage in tidally-influenced areas of the lower San Joaquin River watershed because of rising sea levels.

Atmospheric rivers have been identified as the primary source of significant flood events in the Central Valley. The strength and quantity of Atmospheric Rivers significantly influence annual flood risk. Climate change science predicts that atmospheric rivers will become stronger and wetter, increasing their potential to cause catastrophic events that could overwhelm many parts of the current flood system.

Underfunding and complex, time-consuming permits continue to cause a backlog of deferred maintenance and greater risk to life, property, and the environment. Deferred maintenance may escalate repair, rehabilitation, and replacement needs. Federal agencies share responsibility for flood management with State and local agencies, but each level of government has its own policies, procedures, funding, and timing, all of which can slow progress.

4.3.2 Dam Related Incidents

Hazard/Problem Description: Dam failure is the breakdown, collapse, or other failures of a dam structure characterized by the uncontrolled release of impounded water that results in downstream flooding. In the event of a dam failure, the energy of the water stored behind even a small dam is capable of causing loss of life and severe property damage if development exists downstream. An uncontrolled breach is the unintentional discharge from the impounded water body and is considered a failure. Dam failure can result from natural events or human-induced events. Dams have received more attention recently in the emergency management community as potential targets for terrorist acts.

Dams are built for various uses, including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they usually are engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped and fail. Overtopping is the primary cause of earthen dam failure in the United States. Dam failures can also result from any one or a combination of the following reasons:

- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping, or rodent activity
- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

Water released by a failed dam generates tremendous energy. It can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts on life safety will depend on the warning time and the resources available to notify and evacuate the public. Significant loss of life could result in catastrophic effects

Controlled release or spillway flooding: Spillways are designed to relieve pressure on dams and prevent dam failures. Flooding downstream often results when spillways flow, though the potential for flooding due to discharge from dam outlet structures can also result from excessive rain events. However, controlled releases of water from dams is a measure that can prevent or minimize spillway flooding or structure failure by regulating capacity in a managed way. Even controlled releases can lead to unpredictable flooding, depending on environmental and weather conditions, or even human error.

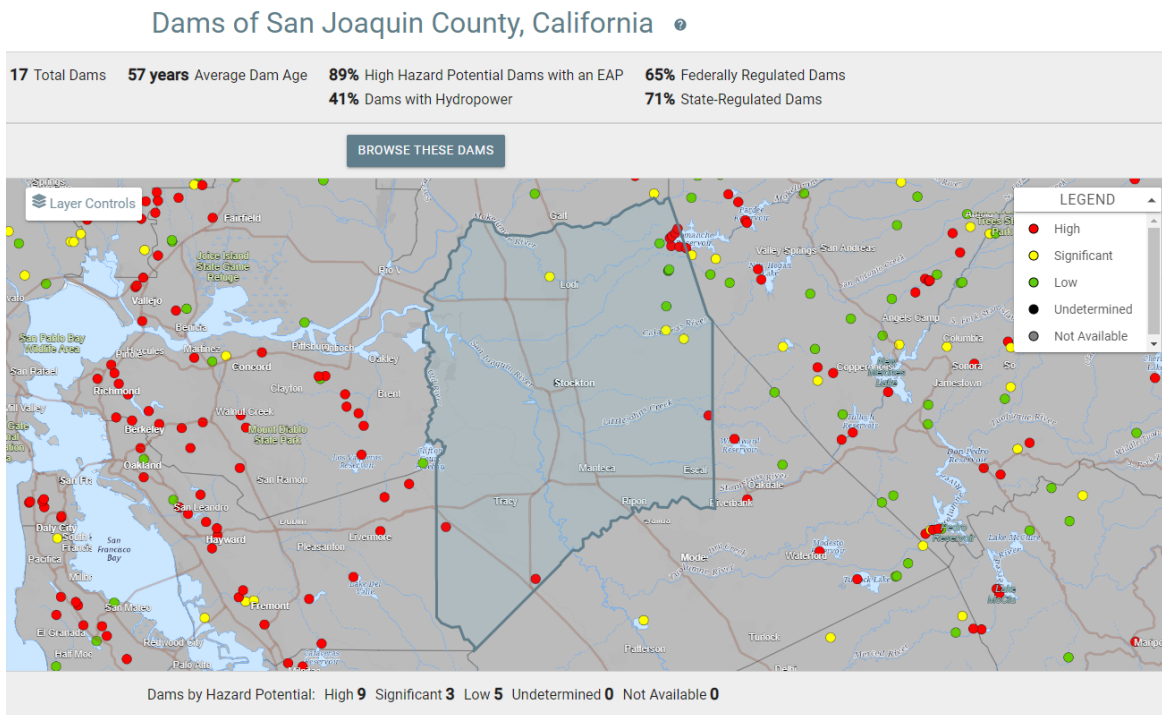
Generally, there are three types of dams: concrete arch or hydraulic fill, earth-rockfill, and concrete gravity. Every kind of dam has different failure characteristics. A substantial arch or hydraulic fill dam can fail almost instantaneously: the flood wave builds up rapidly to a peak and then gradually declines. An earth-rockfill dam fails slowly due to erosion of the breach: the downstream flood wave will build progressively to a height and decline until the reservoir is empty.

And a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

Geographic Area or Location: Significant According to the California Department of Water Resources (DWR) Jurisdictional Dams and the National Inventory of Dams (NID) databases, there are 20 dams of concern to San Joaquin; seven of which are in the County and 13 upstream of the County. It is important to note that the inundation areas only represent some dams that pose a risk; some information is unavailable in GIS or not allowed for release in a public document. Virtually no urban areas in the County are free from flooding in the event of dam failure. Potential impacts are most significant for all major cities in the County and rural communities such as Clements, Lockeford, Mokelumne, Linden, etc.

The Army Corps of Engineers is responsible for safety inspections of some federal and non-federal dams in the United States that meet size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency’s capabilities, practices, and regulations regarding design, construction, operation, and maintenance of dams; and developed guidelines for inspection and evaluation of dam safety (U.S. Army Corps of Engineers, 2017). It is important to note that this data base is updated only periodically, and therefore the information reflected may not be reflective of the most recent inspection dates for each facility listed.

Figure 3-National Inventory of Dams by Hazard Potential- (US Army Corps of Engineers)
San Joaquin County- October 2022



Magnitude/Severity: Catastrophic- Since the County has several high and significant hazard dams, there is potential for loss of life and property damage. The inundation areas for each dam are generally downstream. They include large rural and urban areas on the valley floor below the dams. Adjacent jurisdictions could also be affected by a dam failure. The extent of the impact depends on the nature of the failure and the location of the dam. The largest populations potentially at risk would be Lodi, Stockton, Lathrop, and Manteca. The hazard risk also applies to

² <https://nid.usace.army.mil/#/>

the County's most rural communities. A severe storm, earthquake, or erosion of the embankment and foundation leakage may cause dam collapse and structural failure in the County or other nearby counties. Seismic activity may cause inundation by the action of a seismically induced wave that overtops the dam without causing dam failure but significant flooding downstream. Landslides flowing into lakes and reservoirs may also cause dams to fail or overtop.

Warning Time: Warning time for dam failure depends on the cause of the failure. In case of extreme precipitation or snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, there may be no warning time. A dam's structural type also affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until the reservoir is empty or the breach resists further erosion. Concrete dams also tend to begin with a partial breach. The time of breach formation ranges from a few minutes to a few hours.

All populations in a dam failure inundation zone would be exposed to the risk of a dam failure. The potential for loss of life is affected by the capacity and number of evacuation routes available to populations living in areas of potential inundation. Some land uses are more vulnerable to dam failure inundation, such as single-family homes, while others are less vulnerable, such as agricultural land or parks. Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use. Vulnerable properties are those closest to the dam inundation area. These properties would experience the largest, most destructive surge of water. Low-lying areas are also vulnerable since they are where the dam waters would collect. Large flood events can affect crops and livestock as well as lifeline critical utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies. Flooding, including that from dam failure, causes many impacts to agricultural production, including water contamination, damage to crops, loss of livestock, increased susceptibility of livestock to disease, flooded farm machinery, and environmental damage to and from agricultural chemicals.

Reservoirs held behind dams affect many ecological aspects of a river. River topography and dynamics depend on a wide range of flows, but rivers below dams often experience long periods of very stable flow conditions caused by releases followed by no releases. Water releases from dams usually contain very little suspended sediment; this can lead to scouring of river beds and banks. The environment would be exposed to a number of risks in the event of dam failure. The inundation could introduce many foreign elements into local waterways. This could result in destruction of downstream habitat and could have detrimental effects on many species of animals, especially endangered species such as salmon.

Previous Occurrences: There is no history of dam failure affecting the County, but according to the historical information, there have been recurring issues with flooding due to high flows released below dams in the area.

Probability: Unlikely Dam failure events are infrequent and usually coincide with events that cause them, such as earthquakes, landslides and excessive rainfall and snowmelt. There is a "residual risk" associated with dams that remains after safeguards have been implemented. The residual risk is associated with events beyond those that the facility was designed to withstand. However, the probability of dam failure is low in today's regulatory environment.

Vulnerability: Transportation routes are vulnerable to dam inundation and have the potential to be wiped out, creating isolation issues. This includes all roads, railroads and bridges in the path of the dam inundation. Those that are most vulnerable are those that are already in poor condition and would not be able to withstand a large water surge. Utilities such as overhead power lines, cable and phone lines could also be vulnerable. Loss of these utilities could create additional isolation issues for the inundation areas.

Dam failure presents a significant potential for disaster, because there would be considerable loss of life and property in addition to the possible loss of power and water resources. A failure of any of the 5 high hazard dams in the County could flood approximately 75% of the area, with New Melones and Don Pedro being the most catastrophic. The resulting dam failure would cause the loss of critical life lines in the county.

In the event of a dam failure the majority of Stockton would be inundated with 16 feet of water. The most common cause of dam failure is prolonged rainfall that produces flooding. Failures due to other natural events such as earthquakes or landslides are significant because there is little advance warning. The best way to mitigate dam failure is through the proper construction, inspection, maintenance, and operation of the dam. Dams have received more attention in the emergency management community as a potential target for terrorist acts.

4.3.3 Drought

Hazard/Problem Description: In the most general sense, drought is defined as a deficiency of precipitation over an extended period of time (usually a season or more), resulting in a water shortage. The effects of this deficiency are often called drought impacts. Natural impacts of drought can be made even worse by the demand that humans place on a water supply.

Drought is a gradual phenomenon. Normally, one dry year does not constitute a drought in California, but rather serves as a reminder of the need to plan for droughts. California's extensive system of water supply infrastructure (reservoirs, groundwater basins, and interregional conveyance facilities) generally mitigates the effects of short-term dry periods for most water users.

Drought can have secondary impacts. For example, drought is a major determinant of wildfire hazard, in that it creates greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation, along with reduced water supply for firefighting purposes. Drought is also an economic hazard. Significant economic impacts on California's agriculture industry can occur as a result of short- and long-term drought conditions; these include hardships to farmers, farm workers, packers, and shippers of agricultural products. In some cases, droughts can also cause significant increases in food prices to the consumer due to shortages

Geographic Area: Extensive- Drought is a regional hazard, and at its worst can affect the entire State of California with varying levels of dryness and drought activity. It is safe to assume that unless the drought event is at its very beginning or very end, if any area of San Joaquin County is affected by any level of drought, the other areas of the County are experiencing varying effects as well. Drought can affect the entire county. Drought also has major impacts the agricultural community throughout the county. The Mountain House community is particularly vulnerable during drought conditions due to insufficient water for the community.

Magnitude/ Severity: Critical- The magnitude of a drought's impact is directly related to the severity and length. The severity of a drought depends on water availability and moisture deficiency, the time period, and the size and location of the affected area. The longer the drought persists and the larger the area impacted, the more severe the potential impacts. Droughts can be a short-term event over several months or a long-term event that lasts for years or even decades.

San Joaquin County uses a combination of publicly available tools, as well as internal reporting to monitor the extent of drought. The tools used include: The U.S. Drought Monitor (USDM), California Department of Water Resources Current Groundwater Levels Live map, California Data Exchange Center Current Conditions for Reservoirs and Current Snowpack. San Joaquin County Environmental Health Department is an active participant in the Agricultural Drought Task Force

where they provide monthly and annual well permit data. This data provides perspective about the number of newly established wells to provide potable water for residential communities.

All of San Joaquin County is vulnerable to drought. Drought is one of the few hazards with the potential to impact all the citizens of the County through water restrictions, economic losses, and increased energy costs. The urbanized areas of the County and the agriculture industry are most likely to experience hardships associated with reduced water supply. Impacts include water restrictions associated with domestic supplies, agricultural and livestock losses and economic impacts, hydroelectric power reductions, and increased costs for water. Secondary effects include susceptibility to wildfires and increased groundwater pumping that can contribute to land subsidence problems and degraded water quality.

A few examples of economic impacts include:

- Loss of income from drought destroyed crops
- Expenses due to increased cost of irrigation or cost to drill new wells
- Increased cost of purchasing and delivering feed and water for their animals
- Cascading losses associated with businesses supporting agriculture.

Drought also affects the environment in many different ways. Plants and animals depend on water, just like people. When a drought occurs, their food supply can shrink and their habitat can be damaged. Sometimes the damage is only temporary and their habitat and food supply return to normal when the drought is over. But sometimes drought's impact on the environment can last a long time, maybe forever. Examples of environmental impacts include:

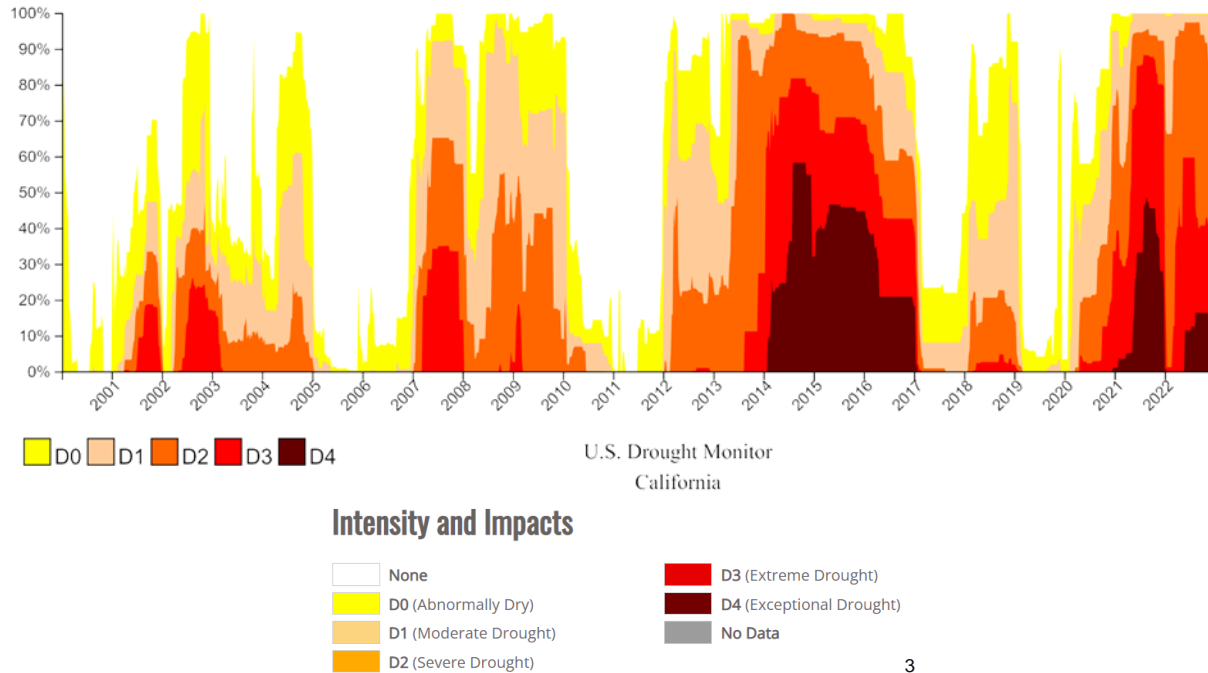
- Losses or destruction of fish and wildlife habitat
- Lack of food and drinking water for wild animals
- Increase in disease in wild animals, because of reduced food and water supplies
- Migration of wildlife
- Increased stress on endangered species or even extinction
- Lower water levels in reservoirs, lakes, and ponds
- Loss of wetlands
- More wildfires
- Wind and water erosion of soils
- Poor soil quality

Social impacts of drought are ways that drought affects people's health and safety. Social impacts include public safety, health, conflicts between people when there isn't enough water to go around, and changes in lifestyle. Examples of social impacts include:

- Anxiety or depression about economic losses caused by drought
- Health problems related to low water flows and poor water quality
- Health problems related to dust
- Loss of human life
- Threat to public safety from an increased number of forest and range fires
- Reduced incomes
- People may have to move from farms into cities, or from one city to another

Previous Occurrences: Historically, California has experienced severe drought conditions. The state's available record for determining hydrologic risks is short, only going back about 100 years. San Joaquin County is currently experiencing a drought, with the emergency being proclaimed in April 2021. The County has also suffered from drought in 1928-1934; 1976-1977; 1987-1992; 2001-2002; 2007-2009; 2012-2016. The USDM for California offers a representation of the drought cycle including frequency, duration, and severity.

Figure 4- U.S. Drought Monitor Time Series- October 2022



3

Probability of Future Events: It is highly likely that the County will suffer from a drought in the future. Historical drought data for the County and the San Joaquin Valley region indicate there have been five significant multi-year droughts in the last 91 years. This equates to a multi-year drought every 18 years on average, or a 5 percent chance of a drought in any given year (probability). Based on this data, droughts will likely affect the County. Given the historical occurrence of severe drought impacts throughout the County and across the State, the Planning Team understands that drought will continue to pose a high degree of risk to the entire County, potentially impacting crops, livestock, water resources, the natural environment at large, buildings and infrastructure (from cascading or compound hazards), and local economies

Vulnerabilities: During drought conditions there are typically higher reports of public and domestic dry wells based on the Household Water Supply Shortage Reporting System, and reports provided by the California State Water Resource Board’s Division of Drinking Water (DDW). In San Joaquin County the duration of drought conditions typically last three to five years, followed by a wet period of one to three years. This leaves little time for grand water recharge.

San Joaquin County supports a \$3.2 billion agricultural industry. During periods of drought, water curtailments are placed on farmers resulting in crop removal, placing an economic hardship on the farming industry and the consumer. Some of the crops in San Joaquin County impacted are:

- Almonds
- Cotton
- Wheat
- Asparagus
- Tomato

³ [Time Series | U.S. Drought Monitor \(unl.edu\)](https://www.unl.edu/drought-monitor/time-series)

4.3.4 Wildfire

Hazard/Problem: A wildfire is an uncontrolled fire spreading through vegetative fuels, such as grasslands, brush, or woodlands and posing danger and destruction to property and watersheds. Wildfires can occur in areas essentially void of development, or in areas where development intermingles with the natural area known as the wildland-urban interface (WUI), a general term that applies to development adjacent to landscapes that support wildfire. Many wildfires occur in locations that abound in grasslands and brush. Heavier fuels with high temperatures, low humidity, low rainfall, and high winds all work to increase wildfire risk.

While wildfires are often the direct result of lightning strikes, more and more they can be caused by downed power lines, mechanical equipment, or are the result of human activities like landscape debris burns, carelessness, or arson. Wildfires often start in undeveloped areas and public land areas, such as state and federal lands, but can spread to urban areas where structures and other human development are more concentrated. The predominant dangers from wildfires are:

- Injury or loss of life to people in the affected area and
- The destruction of vegetation, property, wildlife.

Communities throughout California are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. Wildfire risk is predominantly associated with WUI areas. However, significant wildfires can also occur in heavily populated areas, although urbanized and developed areas that are not contiguous with vast areas of wildlands are typically considered safer from wildfires.

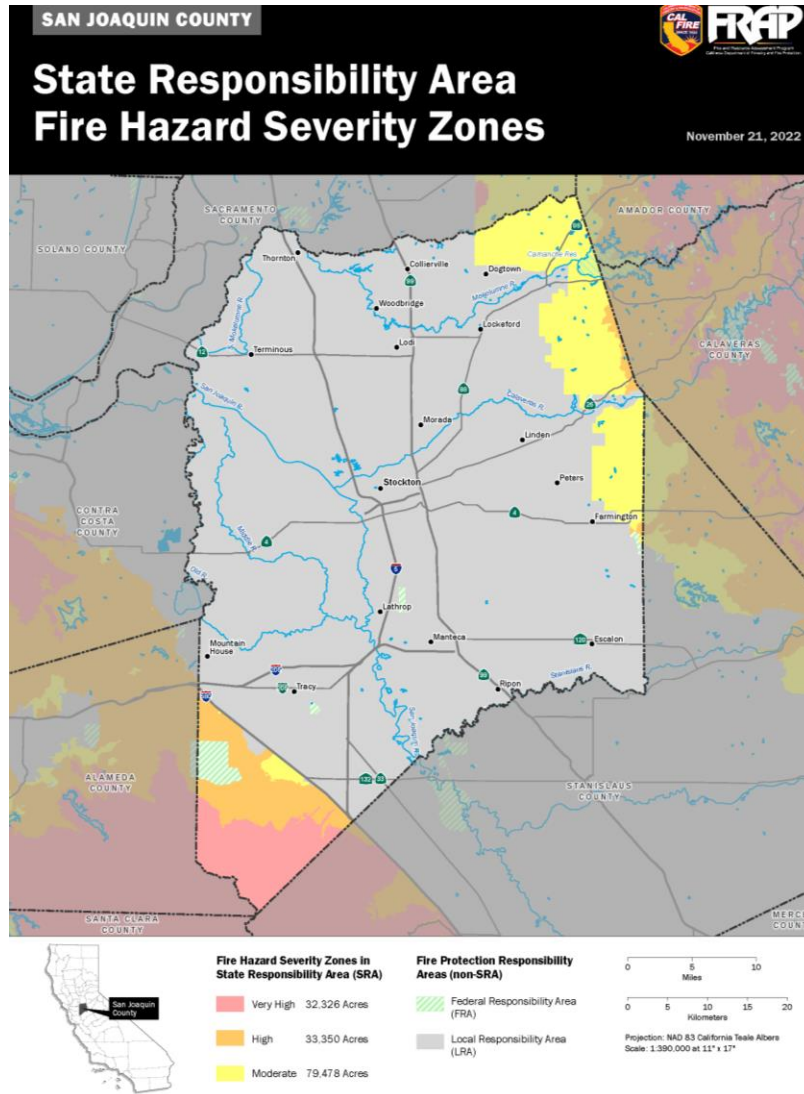
San Joaquin County is exposed to a variety of wildfire hazard conditions that vary based on fuels, topography, weather, and human behavior. CAL FIRE, as required by Government Code Section 51181, has undertaken a statewide program to map areas of potential wildfire severity, and to describe the potential for wildfires to occur in a given area; the resulting Fire Hazard Severity Zones (FHSZs) were adopted in November 2007 for the State Responsibility Areas (SRA) and adopted in September 2007 for the Local Responsibility Area (LRA). Over the past few years, CAL FIRE has been building the new model for a 2022 update. The latest technologies will be used in the mapping and will include new factors now available including land use changes, recent fire history, new significant wind event data, as well as a model that is more spatially detailed. The hazard maps are being updated to more accurately reflect the zones in California that are susceptible to wildfire. The hazard mapping process will incorporate new science in local climate data and improved fire assessment modeling in determining hazard ratings.

Fire Hazard Severity Zone maps evaluate “hazard,” not “risk”. They are like flood zone maps, where lands are described in terms of the probability level of a particular area being inundated by floodwaters, and not specifically prescriptive of impacts. “Hazard” is based on the physical conditions that create a likelihood and expected fire behavior over a 30 to 50-year period without considering mitigation measures such as home hardening, recent wildfire, or fuel reduction efforts. “Risk” is the potential damage a fire can do to the area under existing conditions, accounting for any modifications such as fuel reduction projects, defensible space, and ignition resistant building construction.

Geographic Area or Location: Significant- Both urban and wildland fires conditions exist in San Joaquin County, which increase the chances for damage to property, loss of life and/or injury. In the WUI, where development has expanded into rural, higher-risk areas, wildfires can result in major losses of property and structures. In most of the County, Cal FIRE ranks fuel loading as low. Fuels are mainly crops and grasses. In the far western and eastern portions of the County in areas identified by Cal FIRE as SRAs, there is undeveloped and rugged terrain that contains

highly flammable grass, brush, and some larger fuels, which are ranked as moderate fuel hazards, primarily in the area west of Interstate 5 (I-5). The far western portion of the County includes the Diablo Range, located west of I-5. The far eastern portion of the County includes the Sierra Nevada foothills. These two areas are managed by Santa Clara Unit (SCU) on the West, Tuolumne Calaveras Unit (TCU), Amador El Dorado Unit on the East, and are the two areas in the County that are rated as having the highest possible critical fire weather frequency on an annual basis.

Figure 5- Fire Hazard Severity Zones- Cal FIRE mapped fire hazards within State Responsibility Areas (SRA) based on fuel loading, slope, fire weather, and other relevant factors present, including areas where winds have been identified by the department as a major cause of wildfire spread.



Magnitude/ Severity: Limited – Vegetation (or fuel) plays a major role in fire behavior and shaping fire hazard potential. Vegetation distribution throughout the County varies by location and topography, with dramatic differences observed between the western, central, and eastern portions of the County. For instance, fire behavior in brush fuel types, such as chapparral produces higher flame lengths than that in grassland, although spread rates are typically slower. Fire behavior in forests is variable, depending on surface fuel conditions and the presence of ladder fuels. Fuel loading in developed areas susceptible to wildfire becomes even more complex. The introduction of some ornamental plantings as landscaping and groundcover can dramatically

increase the fire loading of a neighborhood. Gazebos, fencing, patios, decks and even the structures themselves add even more fuel. Once structures become involved in fire, the problem compounds as embers cast out thousands of feet onto combustible roofs well removed from the wildland area. Steep terrain also plays a key role in the rate at which wildfires spread, as fires will normally burn much faster uphill. Generally, when the gradient of a slope doubles, the rate of spread of a fire will also double. Steep topography also channels air flow, thereby creating erratic wind patterns. Fire suppression in steep areas is also complicated by limited accessibility, and the effectiveness of firefighters and equipment are hampered by lack of access roads. Another factor that can increase the severity of wildfires in the County is areas with high percentages of dead trees, which may be a result of the prolonged drought situations.

Major wildland fires can completely destroy ground cover. If heavy rains follow a major fire, flash floods, heavy erosion, land subsidence and mudflows can occur. After a wildland fire passes through an area, the land is laid bare of its protective vegetation cover and is susceptible to excessive runoff and erosion from winter storms. The intense heat from the fire can also cause a chemical reaction in the soil that makes it less porous, and the fire can destroy the root systems of shrubs and grasses that aid in stabilizing slope material. These cascading effects can have ruinous impacts on people, structures, infrastructure, and agriculture. Fire threat provides a measure of fuel conditions and fire potential in the ecosystem, representing the relative likelihood of “damaging” or difficult to control wildfire occurring for a given area.

San Joaquin County’s vulnerability to wildfires varies, with some areas of the County along the far western and eastern portions being at greater risk than the central and more urbanized portion of the County. Generally, this hazard is a medium concern given the increasing frequency and severity of wildfires in California. High fuel loads in some areas of the County along with geographical and topographical features near Eastern and Western borders create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, low relative humidity, and periodic winds, can result in frequent and sometimes catastrophic fires. Even the relatively flat central parts of the County are not immune to fire; hot and sometimes windy weather combined with dry vegetation and a denser population can result in an increase in the number of ignitions.

Previous Occurrences: There has been one state and federal disaster declaration in San Joaquin County related to wildfire that occurred in 2020. In August 2020, a portion of the SCU Lightning Complex Fire, which is the 4th largest fire by acres burned (396,624 acres) in state history, extended into San Joaquin County, burning approximately 24,332 acres. A total of 28 structures were identified as damaged or destroyed as part of the SCU Lightning Complex Incident, including 16 residences.

Probability: Occasional – Fire starts are highly likely during each fire season; though, they rarely result in large-scale wildfires in San Joaquin County. Information obtained from the Cal FIRE Redbook lists multiple fires, the largest in the most recent past consumed approximately 24,332 acres. Based on climate and weather in the County and the fuels, topography, and a past fire history which indicates a low number of large wildfires (300 acres or greater) per year, it is likely that fires will continue to occur in the future.

Vulnerability Assessment: San Joaquin County has seen a rise in wildland fire threat due to local drought conditions as well as new construction occurring around urban / wildland fire interface areas. As the growth of local residential areas continues into unincorporated areas of the County, the threat of wildfire continues to grow as well.

In an area that lies south west of Tracy, a new residential tract (Tracy Hills) has started development which will directly encroach on wildland areas that were previously under evacuation

orders during the SCU Lightning Complex wildfire. There are approximately 5,980 home sites that are planned with the average home having 4 bedrooms. That is an estimated population of almost 24,000 people for that area.

4.4 OMISSION OF HAZARDS

Certain hazards were excluded from consideration for this LHMP Update. Those hazards that occur infrequently or have little or no impact on the County were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, crop, and economic damage. The ability of a community to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard.

Severe Weather: While the County has faced significant severe weather issues in the past, many end up manifesting in other hazards such as flood or drought. Severe Weather has been addressed in other state, regional, and County planning mechanisms. The threat of severe weather alone was not a threat the Planning team decided to include.

Seismic: The County is located in Seismic Zone 3, as defined by the Uniform Building Code. Building standards and regulations in this zone assume earthquakes with the potential to make standing difficult and to cause stucco and some masonry walls to fall. Strong ground shaking could result in damage to unreinforced masonry buildings built before 1933. While the County has a history of seismic activity, the likelihood and magnitude of a significant incident are minimal.

Climate Change: Climate change is a growing threat to California's economy, environment, and public health. California is leading the efforts in the United States in introducing legislation and providing tools and incentives to local governments to help reduce greenhouse gas emissions, which are warming the planet. The state is also taking action to prepare for the unavoidable impacts of climate change, including the increased likelihood of flooding and drought, both high vulnerability risks for San Joaquin County. The planning team omitted Climate Change as a natural hazard as it is not a hazard itself, rather it exacerbates the frequency and impact of known hazards.

Homelessness: Many residents reported concerns with environmental and health and safety issues related to homeless encampments in the Public Survey. Five years ago, almost 70% of people experiencing homelessness in San Joaquin County were sheltered (1,173), while only 30% (515) were living without a safe place to sleep at night – on the streets, in parks, in cars, and by the river. In 2019, however, more than three times as many people experiencing homelessness are now living without a safe place to sleep at night (1,558 or almost 60% of the total population) and the percent of individuals and families living in shelters has decreased to only 40% (down from almost 70% in 2015). Homelessness is a community priority; it impacts everyone, from our neighbors who are unstably housed to those who have already fallen into homelessness, to our first responders, business community, and critical infrastructure.

While homelessness is not a specific hazard, many issues in other hazards can be exacerbated by homelessness. Issues involve homeless digging into levee systems, debris in waterways or utility systems, tunneling under bridges or roadways, etc. Homeless issues will be addressed in the appropriate hazards and plans as needed.

4.5 SEVERE OR REPETITIVE LOSS PROPERTIES

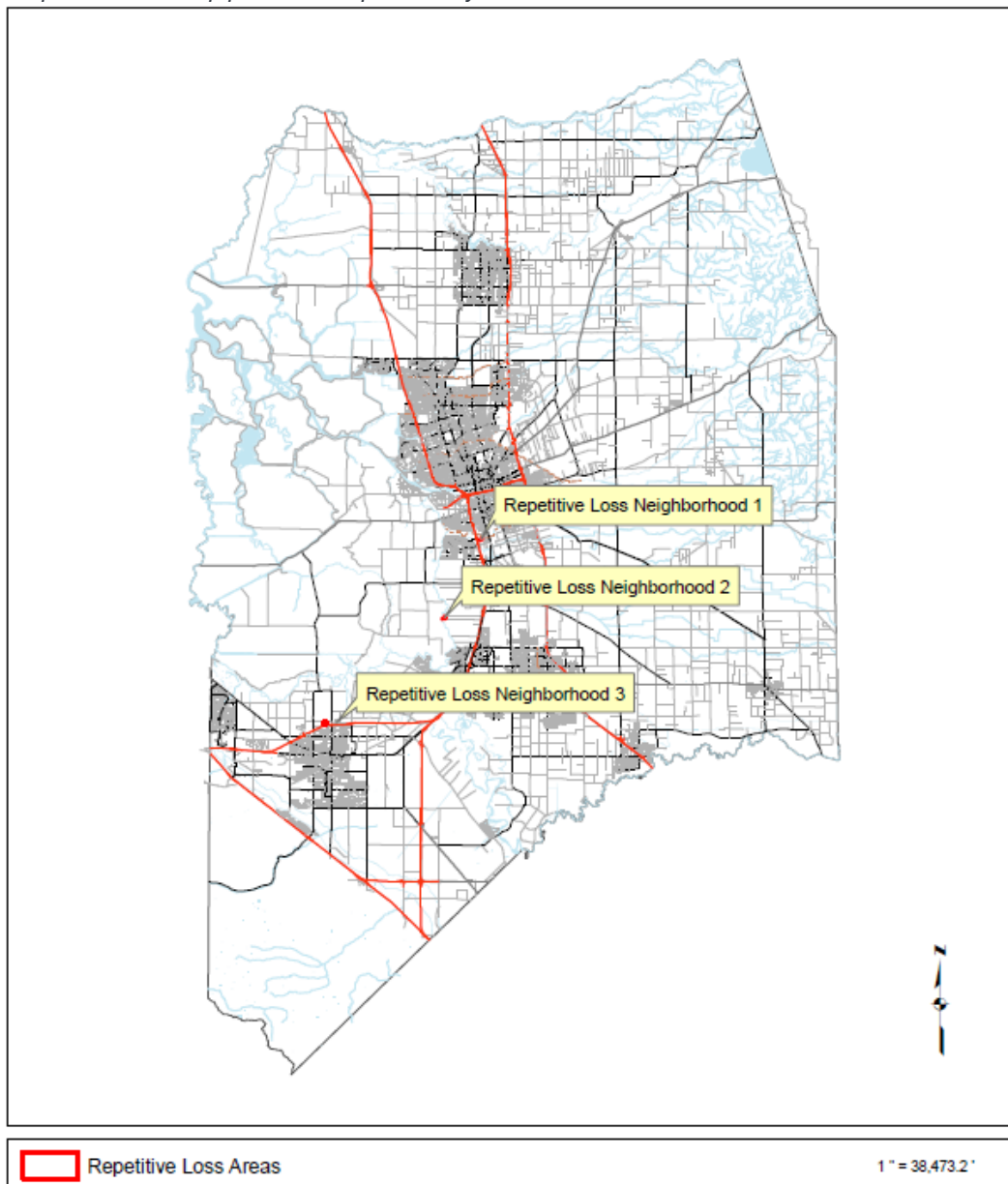
San Joaquin County participates in NFIP. The NFIP considers a property a Repetitive Loss (RL) property if two or more flood insurance claims of more than \$1,000 have been paid within any 10-year period since 1978. A Severe Repetitive Loss (SRL) property is defined by the NFIP as a

residential property with at least four NFIP claim payments (including building and contents) over \$5,000 each, and the cumulative amount of such claims payments exceeds \$20,000. There have been five (5) RL structures within Unincorporated San Joaquin County with 13 paid losses totaling \$281,497.60. Of these RL buildings, 1 is located within the A zone and 4 are in the B or X zone.

The Repetitive Loss properties have been grouped into Repetitive Loss Areas (RLAs). A RLA consists of Repetitive Loss Properties and the surrounding properties that experience the same or similar flooding conditions, whether or not the buildings on those surrounding properties have been damaged by flooding. Figure 7 below shows the 3 RLAs in San Joaquin County based on an analysis of the location of the RL properties

The San Joaquin County Department of Public Works - Water Resources Floodplain Management Section annually reaches out to property owners and is happy to seek FEMA grants to assist with the cost of mitigation.

Figure 6- Repetitive Loss Map per San Joaquin County Public Works 2022



5 MITIGATION STRATEGY

5.1 EXISTING AUTHORITIES, POLICIES, PROGRAMS AND RESOURCES

San Joaquin County Code Chapter 9-1605 – Flood Hazards provides San Joaquin County authority to adopt regulations designed to promote the public health, safety, and general welfare of its citizenry. San Joaquin County routinely performs activities such as issuing building permits, approving development plans, and repairing roads. The County is conscious that actions should reflect the vision and goals by using the most current building codes, restricting development in hazard-prone areas, or making infrastructure decisions based on our risk assessment findings. As a result, goals are defined for this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of the community, public and private;
- Are nonspecific in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- They are time-independent in that they are not scheduled events.

San Joaquin County is dedicated to reducing flooding risks and participates in the National Flood Insurance Program (NFIP) Community Rating System (CRS). This program rewards communities that take steps that go beyond minimum NFIP floodplain management requirements to reduce the risk from flooding. The County has a CRS classification of 7 which means that County residents with properties in areas with a high level of flood risk receive a 15% discount on their flood insurance premiums each year. A 5% discount applies in lower risk areas.

San Joaquin County OES maintains over 25 plans covering emergency operations, support, hazards, and functions for the Operational Area. Specific plans and programs are reviewed for updates to ensure consistency among documents. Relevant information from reviewed projects, studies, reports, and technical information are utilized by OES and the County to ensure mitigation measures and information are incorporated widely in the County.

San Joaquin County Office of Emergency Services reviews and updates different types of plans annually. County staff participates in emergency management training, exercises, and drills, such as Emergency Action Planning exercises (Dam Inundation), Earthquake Preparedness, SEMS/NIMS, and other State and Federal training. If the budget allows, San Joaquin County would either have the ability to hire staff permanently or limited term, given the circumstances. The Office of Emergency Services researches grant opportunities for emergency management or hazard mitigation.

Additional capabilities can be added by additional training for County staff with emergency response or recovery responsibilities. This includes staff at all levels of County government to ensure the existing policies and programs within the County are being adhered to.

The 2017 LHMP was included in the County General Plan under Safety. The County's Mitigation Strategy is guided by the vision of a safe and resilient County. Our mission is to integrate existing laws and programs into a mitigation strategy that will serve the citizens by reducing and preventing injury and damage from natural hazards.

The County routinely performs activities such as issuing building permits, approving development plans, and repairing roads. While the County is conscious that these activities should reflect our vision and goals, it could be enhanced by using the most current building code, restricting development in hazard-prone areas, or making infrastructure decisions based on risk assessment findings.

Goals are stated without regard to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

5.2 NATIONAL FLOOD INSURANCE PLAN

San Joaquin County participates in NFIP. The NFIP makes federally-backed flood insurance available to homeowners, renters, and business owners in participating communities. FEMA has prepared a detailed Flood Insurance Study (FIS) for most participating communities. The study presents water surface elevations for floods of various magnitudes, including the 1% annual chance flood (or 100-year flood) and the 0.2% annual chance flood (or 500-year flood). Base flood elevations and the boundaries of the 100- and 500-year floodplains are shown on Flood Insurance Rate Maps (FIRM), which are the principal tools for identifying the extent and location of the riverine flood hazard. FIRMs are the most detailed and consistent data sources available. In many communities, they represent the minimum area of oversight under their floodplain management program. Participants in the NFIP must, at a minimum, regulate development in floodplain areas under NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 100-year flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.
- Interpret flood zones to show on the FIRM upon request from residents, realtors, and insurance agents to help determine if flood insurance is required
- Provide, at no charge, copies of elevation certificates for new structures and substantially improved installations constructed since 1992.

Given the flood hazard and risk in the planning area and recognizing the importance of the NFIP in mitigating flood losses, an emphasis is placed on continued compliance with the NFIP by San Joaquin County. As NFIP participants, these communities have and will continue to make every effort to remain in good standing with NFIP. This includes continuing to comply with the NFIP's requirements for adopting official FEMA floodplain maps and maintaining, enforcing, and updating local floodplain regulations.

5.3 MITIGATION GOALS

- Goal 1: Prevent Future Hazard Related Losses of Life and Property
- Goal 2: Increase Public Awareness/Action of Vulnerability to Hazards
- Goal 3: Improve Community Emergency Services/Management Capability
- Goal 4: Implement and Complete Identified High Priority Projects Listed in the Plan

The STAPLEE Process was implemented to analyze and prioritize San Joaquin County's mitigation actions. The risk assessment was reviewed, and impacts were analyzed to help prioritize mitigation actions. Each mitigation action was evaluated on the above-listed goals.

5.4 MITIGATION ACTIONS

5.4.1 Action #1- Howard Road

Northeast side on the eastern approach to the bridge over the San Joaquin River

Hazards Addressed: Flooding

Project: The embankment on Howard Road bridge approach over the San Joaquin River suffered a slip-out failure on the upper most portion of the northeast side of the eastern approach to bridge. The scope of work for the project is to provide embankment reinforcement.

Responsible office and Name or Title: Kris Balaji (Director of Public Works), Public Works, Project Manager/Working Contact- David Mendoza

Priority: 2

Cost Estimate: Option #2 \$1,424,099.00

Potential Funding Source: Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, Highway users tax account (HUTA), or Measure K local streets repair

Time Frame: 12 months (Construction ongoing, estimated completion November 2022)

5.4.2 Action #2- Kennefick Road

Hazards Addressed: Flooding

Project: Flooding resulting from heavy rains washed away the culverts and destroyed over 100 feet of Kennefick Road eliminating access to properties north of Liberty Road. The project is to increase the drainage capacity beneath Kennefick Road with a larger diameter culverts or a box culvert.

Responsible office and Name or Title: Fritz Buchman (Director of Public Works), Public Works, Project Manager/Working Contact- David Mendoza

Priority: 3

Cost Estimate: \$ 587,191.00

Potential Funding Source: Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, Highway users tax account (HUTA), or Measure K local streets repair

Time Frame: 8 months (Estimated construction to begin in July 2023)

5.4.3 Action #3- North Frontage Road

Backflow valve (North 99 Frontage Road)

Hazards Addressed: Flooding

Project: Flooding poses a safety risk for users of the roadway and has caused damage to the structural section of the roadway. The Project is to reduce the flooding of the roadway section with the design and construction of improved backflow prevention valve and theft proof enclosure. In addition, repair of the roadway section that has been flooded.

Responsible office and Name or Title: Fritz Buchman (Director of Public Works), Public Works, Project Manager/Working Contact- David Mendoza

Priority: 4

Cost Estimate: \$ 226,092.00

Potential Funding Source: Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, Highway users tax account (HUTA), or Measure K local streets repair

Time Frame: 14 months

5.4.4 Action #4- Larch Road

Between South Corral Hollow Road North Tracy Boulevard

Hazards Addressed: Flooding

Project: Larch Road between South Corral Hollow Road North Tracy Boulevard, concerning the southern ditch that runs along the length of the project (approx. 5,200 feet). The objective of this project is to mitigate the impact of flooding. Poor drainage on the rural residential and mix-use properties along the south side of west Larch Road results in sheet flow runoff towards the north that finds its way into the County's southern conveyance ditch on the south

side of West Larch Road. This runoff overwhelms this ditch's current capacity, reduced by encroachment and undersized culvert crossings. The trench is approximately 5,200 feet long and drains to southerly flowing drainage along north Tracy Boulevard. The project is to reduce the flooding of the roadway section with the design and construction of an improved backflow prevention valve and theft-proof enclosure. In addition, repair the roadway section that flooded.

Responsible office and Name or Title: Fritz Buchman (Director of Public Works), Public Works, Project Manager/Working Contact- David Mendoza

Priority: 5

Cost Estimate: \$ 226,092.00

Potential Funding Source: Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, Highway users tax account (HUTA), or Measure K local streets repair

Time Frame: 14 months

5.4.5 Action #5- Purdy Culvert Replacement

Hazards Addressed: Flooding

Project: Installation of an additional storm drain culvert

Responsible office and Name or Title: Matthew Ward, Engineer IV, Department of Public Works

Priority: 7

Cost Estimate: \$ 10,000

Potential Funding Source: Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, General Fund, or Road Fund

Time Frame: 18 months

5.4.6 Action #8 - Corral Hollow Creek

Chrisman Road Elevation of residences

Hazards Addressed: Flooding

Project: Elevation of Homes

Responsible office and Name or Title: Matthew Ward, Engineer IV, Department of Public Works

Priority: 8

Cost Estimate: \$ 300,000

Potential Funding Source: Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, General Fund, or Road Fund

Time Frame: 36 months

5.4.7 Action #7- San Joaquin County Climate Change Plan

Hazards Addressed: Climate Change

Project: Develop a county wide climate change plan

Responsible office and Name or Title: San Joaquin County Office of Emergency Services

Priority: 12

Cost Estimate: \$ 100,000

Potential Funding Source: Emergency Management Plan Grant, Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, General Fund

Time Frame: 24 months

5.4.8 Action #12- Vegetation Management Coordination

Fire Wise Community Coordination

Hazards Addressed: Wildfire and/or Wildland Urban Interface Fires

Project: Two incidents involving the Wildland Urban Interface have occurred in the County, prompting participants to recommend this project to address this low occurrence threat. The anticipated outcome of the County Coordinator grant program is to create a report establishing a baseline of all fire mitigation agencies inclusive of contact information, area represented, and a gap analysis identifying needs and improvements. Establish information for fire mitigation agencies that could take the form of a newsletter, information portal or website, as determined by the collective group. Quantifying the coordination efforts for meetings, trainings, and coordinated events by increased participation from various groups. County Coordinator will work on grant applications, identification of regional mitigation efforts, and completion of reports required for grant progress and management of this grant. This program would also look to strengthen the relationships with the Cal FIRE Units with State Responsibility Areas within the County, creating collaboration opportunities for vegetation management or additional mitigation efforts.

Responsible office and Name or Title: County Coordinator (new position) / Fire Agencies Chiefs

Priority: 11

Cost Estimate: \$ 170,000

Potential Funding Source: Cal Fire County Coordinator Grant, Special District Funding, General Fund

Time Frame: 12 months

5.4.9 Action #13- Drought Awareness Campaign

Hazards Addressed: Drought

Project: Develop a Public Awareness Campaign to advertise and promote on the SJReady webpage to encourage water conservation during drought conditions.

Responsible office and Name or Title: Tiffany Heyer, Office of Emergency Services

Priority: 13

Cost Estimate: \$ 25,000

Potential Funding Source: Emergency Management Plan Grant, Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, General Fund

Time Frame: 24 months

5.4.10 Action #14- Dam Partnerships

Hazards Addressed: Dam Failure

Project: Continue to partner with dam operators to identify projected flood path of travel as if total loss of dam occurs. Additionally, implement an alert system capable of notifying residents of emergencies through landlines, cell phones, and emails in the immediate path of a failure

Responsible office and Name or Title: Tiffany Heyer, Office of Emergency Services

Priority: 14

Cost Estimate: \$ 10,000-\$250,000

Potential Funding Source: Emergency Management Plan Grant, Hazard Mitigation Grant Program, Pre-disaster Mitigation Grant, General Fund

Time Frame: 36 months

5.5 ACTION PLAN FOR PRIORITIZING MITIGATION ACTIONS

If San Joaquin County receives grant funding, a benefit-cost analysis will be completed for each project. Economic considerations will be a crucial factor in project selection. Qualitative benefits, including quality of life and help to the community, will also be considered. The County and Planning Team used the STAPLEE Process to prioritize the mitigation actions below.

Table 6- Implementation Strategy

Implementation Strategy				
Action I.D.	Lead Agency	Funding Source(s)	Completion Date	Critical Interim or Pilot Activities
Howard Rd: Stabilize/reinforce slope	SJC Public Works	Measure K; HMPG; PDMG; Highway User Tax Account	12 months	- Prepare a design concept report with alternatives - Begin encumbering rights of way
Kennefick Rd: Increase drainage capacity	SJC Public Works	Measure K; HMPG; PDMG; Highway User Tax Account	6 months	- Project design - Stabilize/reinforce
N. Frontage Rd: Backflow Prevention Valve	SJC Public Works	Measure K; HMPG; PDMG; Highway User Tax Account	18 months	- Project design with alternatives - Construct/install valve - Repair roads
Larch Rd: Flood Mitigation	SJC Public Works	Measure K; HMGP; PDMG; Highway User Tax Account	12 months	- Remove existing culverts - Install larger culverts - Widen or line ditch
Purdy Culvert Replacement	SJC Public Works	Measure K; HMGP; PDMG; Highway User Tax Account	18 months	-Installation of an additional storm drain culvert
Corral Hollow/Chrisman Rd: Residence Elevation	SJC Public Works	HMGP; PDMG; Road Fund; General Fund	36 months	- Elevation of homes
Vegetation Management / Fire Wise	Fire Districts	CalFire CCG; Special Dist; General Fund	12 months	- Fire Wise Community - Vegetation Management / Fuel Reduction
Co. Climate Change Plan	SJC OES	EMPG, HMGP, PDMH, General Fund	24 months	-Develop a County wide climate change plan
Drought Awareness	SJC OES	EMPG, HMGP, PDMH, General Fund	24 months	- Develop a Public Awareness Campaign to advertise and promote on the SJReady webpage to encourage water conservation during drought conditions.
Dam Partnerships and Alerting	SJC OES	EMPG, HMGP, PDMH, General Fund	36 months	- Continue to partner with dam operators to identify projected flood path of travel as if total loss of dam occurs. Additionally, implement an alert system capable of notifying residents of emergencies through landlines, cell phones, and emails in the immediate path of a failure

5.6 INTEGRATION OF LOCAL HAZARD MITIGATION PLAN

Another important implementation mechanism that is highly effective and low-cost is the incorporation of this LHMP, its recommendations and underlying principles, into other County plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. This plan should also be cross-referenced when related planning mechanisms are updated as described in this Plan's capability assessments, the County already implements policies and programs to reduce losses to life and property from hazards. This Plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include:

- County general and master plans
- County Emergency Operations Plans and other emergency management efforts
- County ordinances
- Flood/storm water management/master plans
- Community Wildfire Protection plans
- Capital improvement plans and budgets
- Other plans and policies outlined in the capability assessment
- Other plans, regulations, and practices with a mitigation focus.

The Planning Team involved in these other planning mechanisms has agreed to integrating the findings and recommendations of this Plan, with other plans, programs, etc., as appropriate. Implementation, incorporation into existing planning mechanisms will be done through the routine actions of:

- Monitoring other planning/program agendas;
- Attending other planning/program meetings;
- Participating in other planning processes; and
- Monitoring community budget meetings for other community program opportunities.

The successful implementation of this mitigation strategy will require constant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Examples of the incorporation of the LHMP into existing planning mechanisms include:

- As recommended by Assembly Bill 2140, the County should adopt (by reference or incorporation) this LHMP into the Safety Element of their General Plan(s). Evidence of such adoption (by formal, certified resolution) shall be provided to CAL OES and FEMA.
- Integration of flood actions identified in this mitigation strategy with implementation priorities in existing Flood Plan. Key people responsible for development and implementation of the County's Flood Plan participated on the HMPC. Key projects were identified and integrated specifically into this LHMP, while others currently of lesser priority should be referenced in their source document. Actual implementation of these projects will likely occur through these other plans' processes through the efforts of each responsible jurisdiction and departments.
- Use of risk assessment information to inform future updates of the hazard analysis in the San Joaquin County and jurisdictional Emergency Operations Plans.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this hazard mitigation plan.

6 REVIEW, EVALUATION AND MAINTENANCE

6.1 CHANGES IN DEVELOPMENT

Due to the economy the last 3-5 years, there has been very little development within the county's unincorporated area. Therefore, the hazard-prone regions have not increased vulnerability since the last plan approval. Even though the County General Plan has specific build-outs for development, steps will be taken to lessen the hazard-prone areas.

6.2 PROGRESS IN MITIGATION EFFORTS

Previous mitigation actions from the last LHMP reflect completed, deferred, ongoing, or deleted. See the Mitigation Action table below.

Table 7- Mitigation Project Status

Project Name	New	Completed	On-going	Deferred	Cancelled
Elevation of structures			X		
Alternate pump power at low underpass				X	
Improve public drainage system			X		
Seismic retrofit essential facilities			X		
Storm drainage facilities			X		
Levee seismic/erosion improvements			X		
Erosion and Sediment Control Regulations			X		
Howard Rd Stabilize/reinforce slope			X		
Kennefick Rd: Increase drainage capacity			X		
N. Frontage Rd: Backflow Prevention Valve			X		
Larch Rd: Flood Mitigation			X		
Oak Grove Park: Erosion Mitigation		X			
Acampo Area: Drainage		X			
Purdy Culvert Replacement			X		
200-year Floodplain Code		X			
Corral Hollow/Chrisman Rd: Residence Elevation			X		
Countywide Drought Plan		X			
Countywide Climate Change Plan			X		

6.3 CHANGES IN PRIORITIES

Overall priorities have remained relatively the same since the last plan update with the notable exception of wildfire. Two incidents involving Wildland Urban Interface occurred in the County to cause participants to recommend a project to address this low occurrence threat.

7 PLAN ADOPTION

OES operates under the oversight and guidance of a Board of Supervisors. Following the update of the plan, the LHMP will be submitted to Cal OES and, ultimately, FEMA for review and acceptance. Within approximately four weeks of FEMA's approval of the 2023 LHMP, OES will present the final plan to the Board of Supervisors during a regularly scheduled meeting for formal adoption.

8 REFERENCES

Department of Water Resources (DWR). 2022. Central Valley Flood Protection Plan Update. Available at: https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Flood-Management/Flood-Planningand-Studies/Central-Valley-Flood-Protection-Plan/Files/CVFPPUpdates/2022/2022updateCVFPP22_layout_v9_plus_Append_BC.pdf

Rheinheimer, D. E., and J. H. Viers. 2014. "Combined Effects of Reservoir Operations and Climate Warming on the Flow Regime of Hydropower Bypass Reaches of California's Sierra Nevada". *River Research And Applications* 31 (3): 269-279. doi:10.1002/rra.2749

9 APPENDICES

9.1 PLANNING TEAM Plan Kickoff Memo



Office of Emergency Services
A Division of General Services

Tiffany Heyer, Deputy Director of General Services
Emergency Operations

October 11, 2022

MEMORANDUM

TO: Planning Team
FROM: Tiffany Heyer, Office of Emergency Services Director
SUBJECT: Local Hazard Mitigation Plan Update

The San Joaquin County Office of Emergency Services has been in the process of identifying funding to update and create a multi-jurisdictional hazard mitigation plan (MJHMP). While we have been identified as pre-approved for the State match funding, the Federal grant has not yet been reviewed or awarded. This has pushed the start of the new Hazard Mitigation Plan until sometime in 2023. During that time, the current Local Hazard Mitigation Plan will expire. In order to ensure we remain in compliance, eligible for funding, and current projects are able to be completed, we are initiating an urgent review and update to the County's Local Hazard Mitigation Plan (see attached). This update is only expected to meet current Federal requirements, which change in 2023, and bridge the gap until the funding is approved for the MJHMP.

We apologize for the accelerated timeframe and time of year for this ask but, two items are driving this need for a rapid turnaround. During the transition in staffing at OES, time was lost when the initial review and drafting could have occurred. Compounding this, we were just made aware of concerning the pivot in the review process time table by the California Governor's Office of Emergency Services and the Federal Emergency Management Agency. OES will be on a very aggressive time table to complete the necessary revisions, reviews, and submissions of the plan to State reviewers by 12/05/22.

We ask you to review the current Local Hazard Mitigation Plan (attached) by October 18, 2022. Areas of emphasis include Hazard Categories, Impacts and Vulnerabilities, Mitigation Strategy, Goals, and Actions. A survey link will be available on <https://www.sjqov.org/department/oes> in the coming days, to identify and rate new or current hazards, as well as identify impacts and vulnerabilities of those hazards. There will also be a link available to submit mitigation goals, actions, or strategies. These links and documents will also be available to the public. Additionally, OES intends to host virtual and in-person town halls for the public to gather input and feedback.

A virtual meeting will be held on October 18, 2022 at 2 P.M to discuss the plan, updates, and steps moving forward. Please ensure that your agency representative (or alternate) is available for this meeting, as our timeline is accelerated and imperative to remaining compliant. We appreciate your time, patience, and involvement to get this plan updated and approved in such a condensed timeframe.

Plan Kickoff Meeting Agenda



Office of Emergency Services
A Division of General Services
Tiffany Heyer, Deputy Director of General Services-
Emergency Operations

**San Joaquin County
Local Hazard Mitigation Plan
Planning Team Kick-off Meeting
October 18, 2022
2:00 p.m. – 3:00 p.m.
Virtual**

Microsoft Teams meeting

Join on your computer, mobile app or room device

[Click here to join the meeting](#)

Meeting ID: 232 909 667 131

Passcode: NfnQr3

[Download Teams](#) | [Join on the web](#)

Join with a video conferencing device

sjcisd@m.webex.com

Video Conference ID: 113 059 689 0

[Alternate VTC instructions](#)

Or call in (audio only)

[+1 209-645-4071,862041207#](#) United States, Stockton

Phone Conference ID: 862 041 207#

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Primary Objective: To conduct the initial kick-off meeting for the review of the San Joaquin County Local Hazard Mitigation Plan for the 2023 submission.

AGENDA

1. Welcome and Introductions
2. Review:
 - a. Current situation with 2017 LHMP
 - b. Projected schedule for 2023 re-submission
 - c. 2023 Plan Review
 - d. Hazard Survey
 - e. Project updates from 2017 Plan
3. Closing remarks and future meeting date
4. Adjourn

Core Planning Team

Department/Agency and Title	Contribution
Tiffany Heyer San Joaquin County OES- Deputy Director , and LHMP Project Manager	Served as the 2023 LHMP project manager. Led planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Lowell Allen San Joaquin County OES-Senior Planner, and LHMP Project Manager	Served as the 2023 LHMP project manager. Led planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Robert King San Joaquin County OES- Emergency Planner	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Jordan DeStefans San Joaquin County OES- Emergency Planner	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Lowell Barber San Joaquin County OES- Emergency Planner	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
David Tolliver San Joaquin County Department of Public Works-Deputy Director	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Troy Botts San Joaquin County Department of Public Works - Maintenance Superintendent	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Eric Ambriz San Joaquin County Department of Public Works - Channel Maintenance Superintendent	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Hope Paulin San Joaquin County Department of Public Works - Management Analyst II	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Judy Vasbinder San Joaquin County General Services/Parks & Recreation: -Park Administrator	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Michael Eastin San Joaquin County Sheriff's Office: Lieutenant (Operations)	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Gabriel Chan San Joaquin County Agricultural Commissioner's Office	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Nicholas Gutierrez Stockton Metropolitan Airport: -Airport Operations Supervisor	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Dave Bollinger, Mike Turn San Joaquin County Community Development:- (GIS) Geographic Info Systems Program Management	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.

Muniappa Naidu San Joaquin County Environmental Health-Assistant Director	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP
Gwendolyn Callaway San Joaquin County Public Health Services - Public Health Emergency Preparation Coordinator	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP

Extended Team

Department/Agency and Title	Contribution
Victoria LaMar Haas California Office of Emergency Services - Local Hazard Mitigation Planning Unit	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Reuben Armenta California Office of Emergency Services –Emergency Services Coordinator	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Dominique Romo City of Escalon - City Manager	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Steve Schwabauer City of Lodi – City Manager	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Michael Rogers City of Tracy –City Manager	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Harry Black City of Stockton –City Manager	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Michael Riddle American Red Cross- NGO	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Elizabeth Ramos, Joe Thomas, Barry O'Regan KSN Civil Engineers- Civil Engineers	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Michael Moncrief, MBK Engineers- Civil Engineers	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.
Brenna Howell, Pete Boyce, Rhett Kilgore, George Hartmann, Reclamation Districts- Authorized Representative	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.