



SAN JOAQUIN
— COUNTY —
Greatness grows here.

Local Hazard Mitigation Plan
Revised 2017

EXECUTIVE SUMMARY

Purpose

This Local Hazard Mitigation Plan is intended to provide strategies for the County and other local jurisdictions to identify and implement mitigation actions for reducing damages from various potential natural and technological disasters. This Local Hazardous Mitigation Plan (LHMP) meets the State and Federal requirement of the Disaster Mitigation Act of 2000, to develop an on-going process for mitigating disaster damages both prior to and following a disaster. Revisions of General Plan(s) will include new suggestions and planning guidance for hazard mitigation goals, objectives, actions, and implementation strategies.

Local Hazard Mitigation Plan Elements

The goals, actions, and strategies contained in this main document are *only* for the unincorporated areas of the County. Jurisdictions have the option of developing a local hazard mitigation plan for their own jurisdiction or participating in the County's plan. Jurisdictions participating with the County will provide their mitigation actions and strategies individually to be included in the County's plan and identified by jurisdiction.

- **Element A: Planning Process** - Documents formal governing body planning process for this plan by all participating jurisdictions as well as the County.
- **Element B: Hazard Identification and Risk Assessment** - Identifies hazards affecting the Operational Area and profiles each hazard with a list of past occurrences, threat analysis, and map or geographic description of the risk area.
- **Element C: Mitigation Strategy** - Documents County mitigation goals, mitigation strategies by hazard type, and a list of projects that would mitigate sites of past damages or potential future damages.
- **Element D: Plan Update, Evaluation, and Implantation** - Procedures to maintain this plan on an on-going basis. This element ensures the County will monitor the mitigation projects for modification, new projects to be added, and completion of mitigation actions.
- **Element E: Plan Adoption:** - Documentation of plan adoption including the County and other jurisdictions, level of participation, risk assessment, and mitigation actions.
- **Element F: Additional State Requirements** -

COMMUNITY PROFILE

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

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

Significant population and employment growth is expected to occur within the County over the time frame of the General Plan (i.e., 2035), and where this growth is planned will have an impact on many aspects of the County including agriculture, unincorporated communities, and employment opportunities. Shifting away from historically inefficient development patterns in the Central Valley will require development to take on new forms that make more 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 are preserved. Farms continue to produce a diverse array of the highest quality agricultural produce and products. Both traditional and innovative agricultural 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 strong in its global role as: a source of food and agricultural commodities; a destination for tourists (The Delta, Agritourism, 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, and pedestrian trails and sidewalks. County residents and farm equipment move together safely on well managed and maintained roads.

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Natural assets, such as air quality, the Delta, river corridors, and soils, are preserved and residents are aware of their importance. Aggregate resources supply the long-term development needs of the region and state. Energy efficiency and 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. Surface and groundwater resources are of high quality and available and sufficient to meet the County's water needs.

Agriculture, residents, and natural habitats receive a continuous, cost effective, and adequate supply of clean water. The groundwater basin is rejuvenated and maintained in a state of equilibrium. Groundwater recharge is in harmony with pumping and saltwater intrusion is an issue of the past.

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 occurs predominantly within and adjacent to existing communities and cities. New development is carefully planned, including the establishment of community services and facilities, in keeping with existing community character.

Every community is a desirable place to live 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.

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ELEMENT A
A 1 - PLANNING PROCESS

This is not the first hazard mitigation plan in the County. The county developed the original plan in 1986 in response to FEMA-758-DR. That plan was revised annually, and after each federally declared disaster. As such, San Joaquin County used the previous version as a baseline for developing the new Local Hazard Mitigation Plan. The most recent plan, approved and adopted in 2012, met the regulations outlined in the Disaster Mitigation Act of 2000.

The following is the updated version of the 2012 plan.

This section outlines the planning process used to update the plan including preparation methodology, participants in the process, and how the public was involved.

1. **Documentation of the Planning Process Planning Team Participation**

A list of planning team members is included on the following page. John Austin, Senior Emergency Planner with San Joaquin Office of Emergency Services was the project manager for this Local Hazard Mitigation Plan with the assistance of Wendy Boemecke and William Llewellyn.

Jessica Clark, SJC - OES Senior Office Assistant attended the town hall meetings, and edited and updated the Local Hazard Mitigation Plan.

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

- Types of hazards its impacts and vulnerabilities and the previous occurrences.
- Reviewed different types of plans, technical reports and studies.
- Developed mitigation goals
- Reviewed development trends
- Attended public meetings

San Joaquin County Office of Emergency Services also held various planning meetings within their working group.

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See Appendix A for agendas, sign-in sheets and meeting dates.

LHMP Planning Team Members

NAME	TITLE	JURISDICTION
Mike Borges	Chief of Police	City of Escalon
Gene Stoddart	Fire Chief	City of Lodi
Tim Pelican	Ag Commissioner	San Joaquin County
Linda Turkatte	Director	SJC Environ. Health
David Mendoza	Emerg. Svcs. Mgr.	SJC Public Works
Sheri Coburn	Director	SJC Ofc of Ed
Matt Duaiame	Chief	Stockton Fire
Kathy Pascoe	Regional DCA	American Red Cross
Luis Mejia	Lieutenant	City of Tracy
Kathleen Conley	Emerg Prep Coord	SJC Public Health
Terry Kitaguchi	Airport Ops	Stockton Airport
Bill Darsie	Project Manager	KSN Engineers
Nate Hershey	Principal	MBK Engineering
Frank Johnston	Section Chief	SJC - OES
Guy Mallery	Unit Leader	SJC - OES
	Principal GIS	
Mike Turn	Analyst	SJC GIS
Elsy Votino	ESC	Cal-OES
Wendy Boemecke	Sr. Planner	DL Management
William Llewellyn	Sr. Manager	DL Management
	Sr. Emergency	
John Austin	Planner	SJC - OES

2. **Plan Preparation**

Revision to this LHMP followed the process of past revisions. This process also was expanded to include additional elements based on Federal review guide procedures and requirements updated on October 1, 2011. The process for this current revision followed these steps:

- Coordinate with Purchasing Department to retain the services of a consultant to work with OES to update LHMP.
- Contact standing LHMP (County department) committee members and request review of current Local Hazard Mitigation Plan for revision comments.
- Review LHMP Review Guide for format and content requirements.
- Meet with part and full-time staff to discuss and assign tasks. This includes a contract company with past experience on multi-jurisdiction plans.
- Send participation request to planning team members.
- Update and revise LHMP.
- Post on-going drafts of the revised plan on Planning Team Dropbox 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 County Board of Supervisors for approval and adoption.

3. **Plan Development Participants**

The primary development team was made up of County departments, as Lead Agency that historically received disaster reimbursement and mitigation funds for measures impacted by a disaster. That LHMP team included:

- Department of Public Works
- Stockton Metropolitan Airport
- Parks & Recreation
- Sheriff's Office
- Government Buildings/Facilities Management
- Office of Emergency Services
- Community Development (GIS)
- Environmental Health
- Public Health
- Agricultural Commissioner
- California Office of Emergency Services
- City of Escalon
- City of Lodi
- City of Tracy
- City of Stockton
- American Red Cross
- Reclamation Districts

4. **Lead Organizers of Planning Team**

The San Joaquin County Office of Emergency Services developed the planning team structure, project timeline, and task assignments, and then guided the organization and work of the planning team.

5. **Contractors and Outside Assistance**

DLM Management LLC

This private contractor was used to review planning efforts to ensure that the documents incorporated State and federal LHMP elements. DLM staff worked with planning team members and participating jurisdictions to modify, enhance, or remove information to comply with document needs.

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6. **Planning Team Committee**

San Joaquin County OES held various planning team meetings and kept the planning team informed either by meeting, email or by a planning team drop box to obtain information. The sign-in sheets from the meetings listed below will be in Appendix A.

Meeting Titles	Date	
Initial Meeting of OES/DLM	3/30/2017	
Hazard Mitigation Training and Review Process	4/20/2017	
Planning Team meeting to discuss roles, tasks and timelines	5/01/2017	
Planning Team Meeting Review and Update	5/11/2017	
Review of Element "A"	5/15/2017	
First Community Meeting at County Establish Planning Team. PP presentation. Hazard Identification Process. Distribute Hazard Identification Forms	5/18/2017	
Update Planning Team	5/26, 6/13, 8/18	
Update portions of the plan	6/07/2017	
LHMP Review	6/08/2017	
Discuss Progress of LHMP	6/22/2017	
Review/Update Plan	7/05/2017	
Second Community Meeting at City of Tracy PP presentation. Hazard Identification Process. Distribute Hazard Identification Forms	7/13/2017	
Update portions of the plan	7/20/2017	
LHMP Review	7/25/2017	
Update portions of the plan	August 3, 8, 15, 17 September 6, 26 October 3, 6, 10, 11, 13, 17, 19	
Lathrop Town Hall meeting for plan review	10/11/2017	

7. **Draft Plan Review**

As Sections of the plan were reviewed and updated, the plan was posted on the Planning Team Dropbox for review and comment.

A 2 - PLANNING PARTICIPATION (NEIGHBORING JURISDICTIONS)

Jurisdictions were invited in writing (email) to participate in this LHMP project. Primary outreach efforts focused on Cities, Special Districts, and neighboring communities.

This outreach effort was accomplished in a series of steps:

- Formal “Invitation to Participate” email was sent to participants by the SJC - OES Senior Emergency Planner. See copy of email in Appendix A.

A 3 - PUBLIC INVOLVEMENT

County OES conducted three Town Hall meetings; one in Stockton, Tracy , and a final plan review in Lathrop. Planning staff met, provided information on the LHMP update process, and answered any questions. In addition, surveys were made available both hard copy and electronically for public input.

In addition to Town Hall meetings, an online survey was initiated May 2017 to gauge public interest and knowledge of mitigation planning. Methods of outreach included use of SJC – OES website as well as social media i.e. Facebook, Twitter, etc. See Appendix B.

A 4 - USE OF EXISTING PLANS IN THE LHMP PROCESS

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

San Joaquin County OES specifically reviewed certain plans and programs for inclusion into this update for planning consistency among documents. Relevant information from reviewed plans, studies, reports, and technical information incorporated into the mitigation plan includes:

State Hazard Mitigation Plan – The State Hazard Mitigation Plan was reviewed for recent updates on state-wide hazard events and hazard information for consistency.

San Joaquin County’s 2012 Local Hazard Mitigation Plan - Reviewed so the plan could be updated.

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. The General Plan and Specific Plans were also included as part

of the capability inventory for the County's capability assessment.

Emergency Operations Plan – The EOP was reviewed to gather hazard information as it relates to the assessed natural hazards.

THIRA – The THIRA was reviewed for Hazard Identification and Risk Assessments, updated in November 2016. Hazard maps from the THIRA was incorporated into the LHMP.

Emergency Preparedness Plans – Contains information on Agriculture, Medical/Health and Public Health.

Flood Plan – The Flood Plan was reviewed for consistency for use as reference in the “flood” section of the LHMP.

Emergency Action Plans – Were reviewed for Dam Inundation Data to ensure consistency with Cal OES dam inundation data.

A 5 - CONTINUED PUBLIC INVOLVEMENT

A completed copy of the plan will be kept at the San Joaquin County – Office of Emergency Services. The plan will be available for public review and comment.

A 6 - MONITORING, EVALUATING, AND UPDATING THE PLAN

This section describes the method that SJC - OES will use to monitor, evaluate, and update of the LHMP..

1. Monitor Method/Schedule

SJC - OES has assigned the Senior Emergency Planner to monitor the plan on an annual basis. This will be accomplished by convening the planning team and tracking mitigation projects.

2. Evaluation Method/Schedule

SJC - OES has assigned the Senior Emergency Planner to evaluate the plan on an annual basis. This can be accomplished by convening the planning team to assess the plan's effectiveness.

3. Update Method/Schedule

SJC - OES has assigned the Senior Emergency Planner to update the plan on an annual basis as necessary. If updates are made they will be submitted to the Board of Supervisors for approval and advertised through the local media.

The plan will be updated every five years, the update process will begin a year before the five year expiration date.

ELEMENT B

B 1 - HAZARD IDENTIFICATION AND RISK ASSESSMENT

Below is a list of hazard categories, hazard types and hazard definitions that the planning team reviewed and rank.

1. Hazard Categories

Using the following terminology organizes known hazards into local, state, and federal “commonly recognized” categories, especially weather-related hazards. This allows easier research into past events, and smoother discussions with other jurisdictions and agencies.

Animal Pests: In San Joaquin County, birds and small mammals that interfere, 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 carry from one species to another (zoonotic) or be unique only to the one species (vector).

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

Plant Pests: Insects that either destroy a plant or crop by consumption or use the plant as a receiver for larvae. Plant pests are closely monitored in San Joaquin County and abatement programs are in place by the County Agricultural Commissioner’s office.

Civil Disturbance: A general term that is used to describe some form of disturbance caused by a group of people. It is usually a form of protest, against political organizations or policy, 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.

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.”

Weapons of Mass Destruction (WMD): Weapons designed to kill or injure large numbers of people and/or create large amounts of damage to the physical infrastructure. Weapons of Mass Destruction may also be designed to cause environmental harm that would adversely affect people. Examples of WMDs include nuclear, biological and chemical (NBC) weapons. Radiological weapons can be included as well.

Earthquake: A movement in the crust of the earth that can be quantifiably measured by the seismic waves created. They are most commonly found on plate boundaries, but can also be associated with volcanic activity and can occur anywhere on the face of the earth. Earthquakes range from small and deep sub-surface events to large-scale near-surface events that have catastrophic effects on man-made structures and natural topography.

Expansive Soils: Clay soils (present in San Joaquin County) that expand when water is added and contracts when it dries out. The change in volume when in contact with buildings, roadways, underground utilities or levees can cause severe damage.

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.

Landslide: The downslope movement of rock and soil over a surface that can no longer maintain its stability (incompetence). Landslides are generally influenced by gravity but can be exacerbated by water flow, earthquakes, erosion and man-made disruptions such as excavation and construction.

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

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

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

Wildland Fires: Uncontrolled fires occurring in the rural environment, areas that can be sparsely populated and have 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.

Peat Fire: The burning of partially decayed vegetable matter known as peat. Peat is commonly associated with marshlands and can be found throughout the Delta. When peat does catch fire, it can be very difficult, if not impossible to put out. A peat fire will continue to burn until all of the fuel (peat) is exhausted or there is no longer a source of oxygen. Peat fires can burn under the surface of the earth.

Flood: An overflow of water that covers land. 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 in nature 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.

Dam Failure: An event where the dam or part of the dam itself fails or water otherwise overtops the dam without the dam failing. Dams are considered “installations containing dangerous forces” under International Humanitarian Law due to the massive impact on people and the environment if a dam fails.

Levee Break: Like a dam break, is where the levee can no longer control the water it is designed to. Generally, when levees do break they are under stress due to the large amount of water being retained between the levee banks. Levee breaks can be caused by water saturation (boils), overtopping and erosion, land subsidence, earthquake, burrowing animals, or general lack of maintenance.

Excessive Rain: A period of precipitation that can overcome the natural ability of the environment or man-made structures to control the runoff. This may lead to local or widespread flooding. Excessive rain in areas outside of the county such as the Sierra Nevada Mountains and foothills can still affect the county by having runoff exit through the rivers systems of the Central Valley and into the Delta.

Hazardous Material Emergencies: Events where the release of a hazardous material, substance or waste poses a threat to 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.

Air Pollution: Caused by the release of 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 duress on the respiratory system. Examples of chemical air pollution include air releases from a hazardous materials spill, industrial emissions, or air inversions trapping vehicle emissions. Physical material air pollution includes smoke from fires and dust storms. Foul odors can be created by the presence of excess or uncontrolled sewage or garbage.

Water pollution: A material that has an adverse effect on a waterbody. The most common type of water pollution is discharge of oil. However, almost any liquid or solid can be determined 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.

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.

Ground contamination: Caused by 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 soil can damage water supplies, make areas of land untenable for habitation or other human use, and require expensive long-term remediation.

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, its wheels, and collisions can cause derailment with obstructions on the track. Derailment can also occur as a secondary effect in the aftermath of a collision between two or more trains. The most significant hazard of a derailment is when a freight train with cars of LNG or LPG is involved. Derailed LNG and LPG cars involved in a fire can in the right circumstances create a catastrophic explosion and fire called a BLEVE (Boiling Liquid Expanding Vapor Explosion).

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. This could be a pandemic such as the H1N1 flu, an epidemic of West Nile Virus or a period of excessive temperatures.

Dense Fog: A fog that diminishes visibility to the point of creating a hazard, especially to transportation. San Joaquin County is subject to periods of localized dense 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, it is generally caused by a lack of precipitation. Drought conditions can have a significant impact on agriculture, cause damage to soils (salt intrusion), and lead to public water use limitation.

Extreme Temperature Heat: A period where the temperature either rises quickly to a higher than normal temperature and then drops (spike), or a prolonged period of hot days beyond what is normally experienced. For temperatures to be considered extreme they must have an adverse impact on human health or agriculture.

Extreme Temperature Cold: A period of time 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 can have a serious effect on crops such as fruit trees.

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

Tornadoes and Severe Thunderstorms: Associated as periods of severe weather that can cause catastrophic damage. Although relatively rare in San Joaquin County, they are not unknown.

Winter Storms: Periods of intense weather can include low temperatures, heavy rain, possibly 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.

2. **Omission of Natural Hazards:**

Wildland Fire Hazard – This hazard will not be addressed due to being a low fire hazard zone, see maps page 22-23.

Earthquake – This hazard will not be addressed due to no earthquakes in last 100 years on local fault lines.

B 2 - TABLE OF PREVIOUS OCCURRENCES

Previous Occurrences – Earth Movement		
Date:	Location:	Comments:
04/10/1881	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.
09/19 & 20/1940	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.
08/06/1979	Countywide	- Seismic shaking with unverified impacts in the Delta
01/24/1980	Countywide	- Seismic shaking with unverified impacts in the Delta.
05/02/1983	Countywide	- Seismic shaking with unverified impacts in the Delta.
06/05/1983	Countywide	- Seismic shaking with unverified impacts in the Delta.
04/24/1984	Countywide	- Seismic shaking with unverified impacts in the Delta.
10/17/1989	City of Tracy Countywide	-Localized damages occurred within the City. -Rolling seismic waves were felt throughout the County.
April 2006	Corral Hollow Rd	-Heavy rains caused a landslide along Corral Hollow Road at a Lawrence Livermore Labs site.
PREVIOUS OCCURRENCES – ENERGY SHORTAGE		
Date:	Location:	Comments:
1973-74	Countywide	Middle East Oil Embargo
1978-83	Countywide	Gasoline/Energy Shortage & Recession
12/90–02/91	Countywide	Iraq’s invasion of Kuwait resulting in U.S. military Action
2000-2001	Countywide	Statewide energy shortage causes rolling blackouts
PREVIOUS OCCURRENCES – FIRE		
Date:	Location:	Comments:
05/05/2002	Contiguous counties to Calaveras County	USDA Secretarial – winds, drought & fire
08/19/2002	Eligible contiguous County business owners	SBA – physical and economic injury disaster loans – Santana Row Fire – Santa Clara County

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PREVIOUS OCCURRENCES – FLOODS		
Date:	Location:	Comments:
01/80	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, Indv. Assistance \$1,454,800 TOTAL: \$2,059,200
09/80	Reclamation Districts: 2038 Lower Jones 2039 Upper Jones	FEMA Declaration 633, Public Assistance \$2,730,329 Indv. Assistance \$8,077,400 TOTAL: \$10,807,729
01/82	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 Indv. Assistance \$200,000 TOTAL: \$627,000

San Joaquin County
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PREVIOUS OCCURRENCES – FLOODS <i>CONTINUED</i>		
Date:	Location:	Comments:
08/82	2030 McDonald	FEMA Declaration 669, Public Assistance \$4,642,500 Indv. Assistance \$5,245,789 TOTAL: \$9,888,289
11/82	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 2113 Fay	FEMA Declaration 677, Public Assistance \$ 23,455,600 Indv. Assistance \$ 3,224,510 TOTAL: \$ 26,680,110
02/86	Countywide, including: Reclamation District: 348 New Hope	FEMA Declaration 758, Public Assistance \$ 8,239,000 Indv. Assistance \$ 11,500,000 TOTAL: \$19,739,000
08/94	2027 Mandeville	TOTAL: \$750,000

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PREVIOUS OCCURRENCES – FLOODS <i>CONTINUED</i>		
Date:	Location:	Comments:
12/96	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 Indv. Assistance \$ 84,937,350 TOTAL: \$99,662714
12/98	Countywide	FEMA Declaration 1203, Public Assistance \$ 1,437,000 Indv. Assistance \$ 1,666,000TOTAL: \$ 3,103,000
06/04	Reclamation Districts: 2038 Lower Jones 2039 Upper Jones	FEMA Declaration 1529, Public Assistance \$ 42,488,326 Indv. Assistance \$44,977,071 TOTAL: \$ 87,465,397
03/95	Countywide	State Proclamation
01/97	Countywide	State Proclamation
01/06	Countywide	State Proclamation
01/17	Countywide	Local Proclamation \$ unknown as of 9/2017
02/17	Countywide	Local Proclamation \$ unknown as of 9/2017
03/17	Countywide	FEMA Declaration 4308 , \$ unknown as of 9/2017

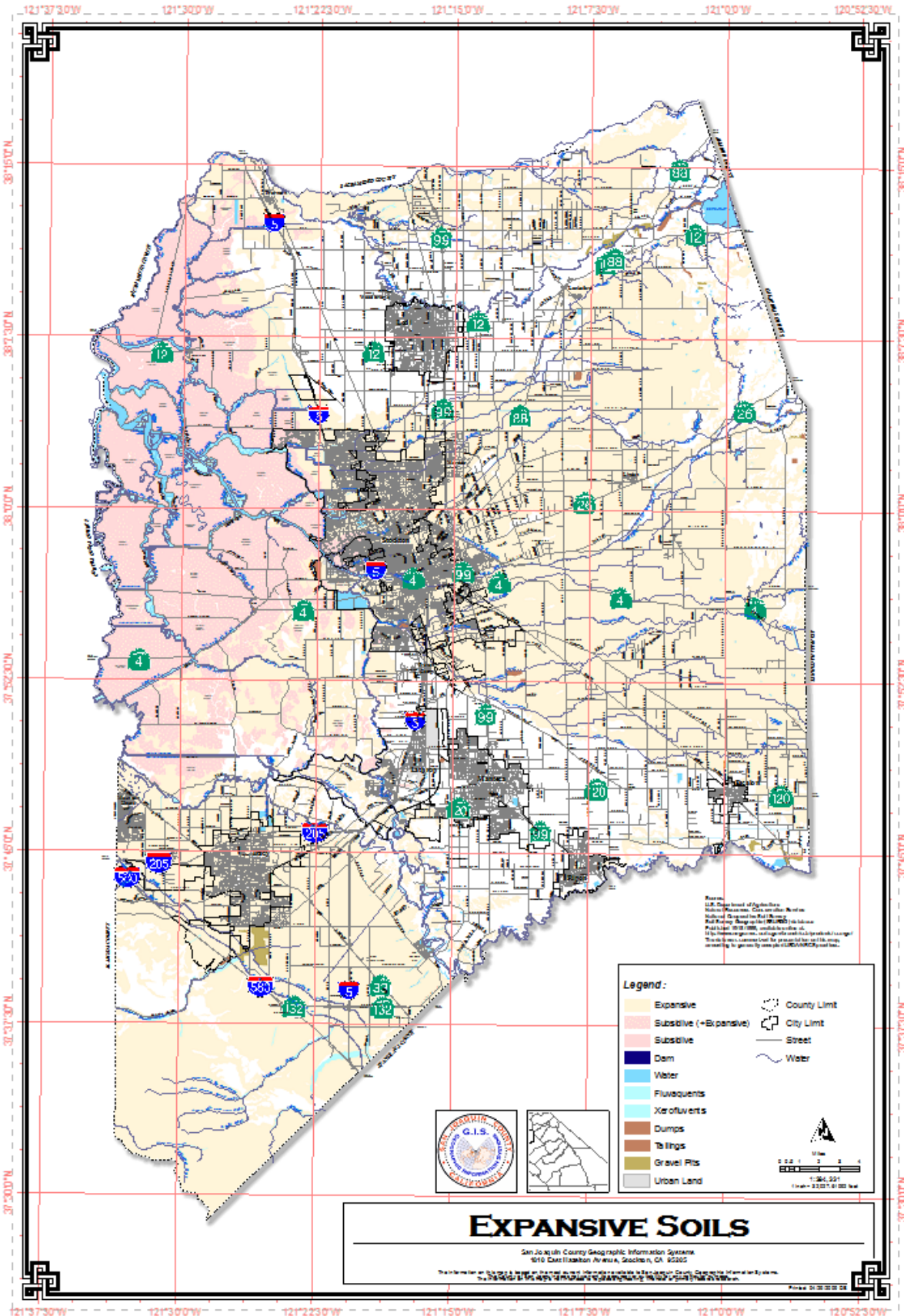
San Joaquin County
Local Hazard Mitigation Plan

Previous Occurrences – Hazardous Materials		
Date:	Location:	Comments:
1998	Tracy	Tracy Tire Fire
02/19/1989	Manteca	Freight train derailment
07/29/2006	Stockton	Freight train derailment
200 per year	Countywide	Hazardous Materials - County agencies respond to more than 200 spills/incidents per year
Previous Occurrences – Train Derailment		
Date:	Location:	Comments:
12-19-89	Mariposa Road	Amtrak derailment 53 injured
Previous Occurrences – Public Health Emergencies		
Date:	Location:	Comments:
7/23/2009	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
Previous Occurrences – Drought		
Date:	Location:	Comments:
03/1977	Countywide	Drought
10/31/1990	Countywide	Drought
11/22/2002	Countywide	Drought - USDA – Ag
January through March 2004	Countywide	Drought with associated agricultural losses
March 2008	Countywide, Central Valley Drought	Drought
2014-2017	Statewide	Drought
Previous Occurrences – Weather : Extreme Temperature		
Date:	Location:	Comments:
Jul-Aug 2003	Countywide	Extreme heat with agricultural and economic Losses
July 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

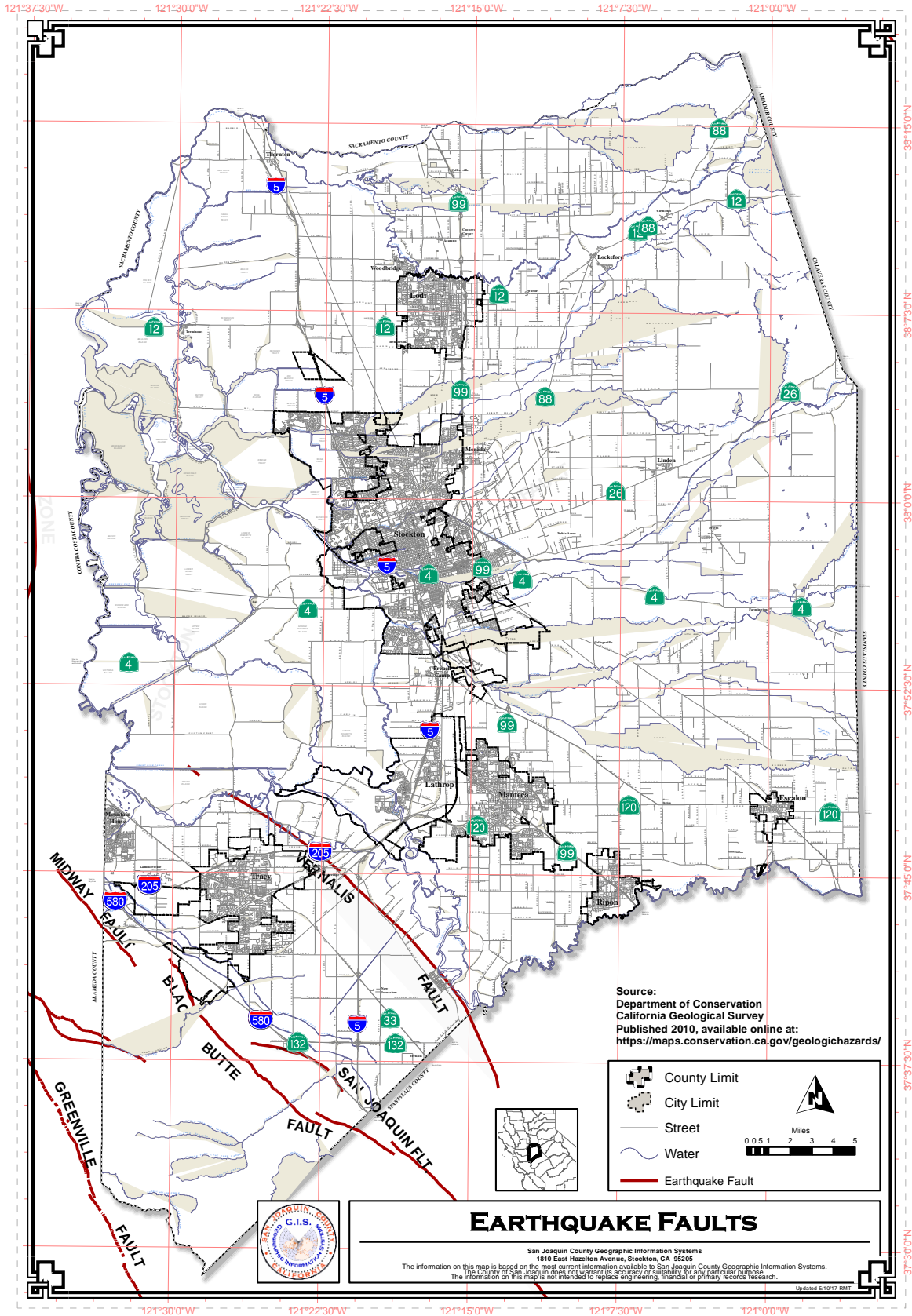
San Joaquin County
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Previous Occurrences – Weather : Severe Thunderstorms		
Date:	Location:	Comments:
09/23/1982	Countywide	Excessive Rain – USDA Cost- \$48,097,424
05/19/1990	Countywide	Excessive Rain – Local Disaster – Cherries Cost - \$35,000,000
01/05/1993	Countywide	Excessive Rain – FmHA Cost - \$10,250,000
01/1995	Countywide	Storm - FmHA – Crop damage Cost - \$6,020,000
02/13/1995	Countywide	Storm - FEMA-1046-DR-CA
04/28/1995	Countywide	Excessive Rain – Local Disaster - Cherry crop Damage Cost - \$11,050,000
05/05/2002	Contiguous counties to Calaveras County	Winds, drought & fire out of County – USDA Secretarial - ag losses
04/20/2005	Countywide	Hail and excessive rain
Apr 2006	Countywide	Heavy winds & excessive rain

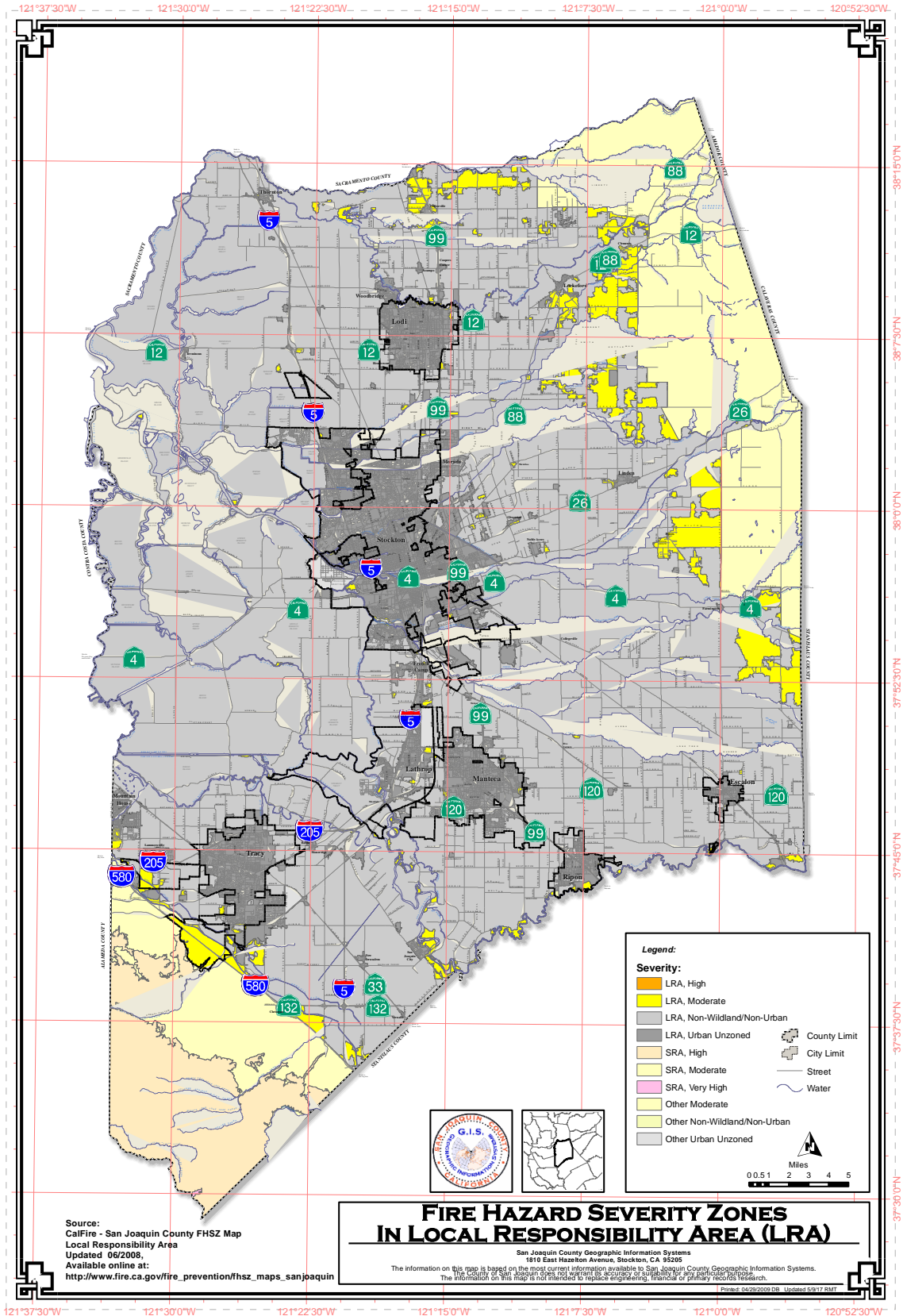
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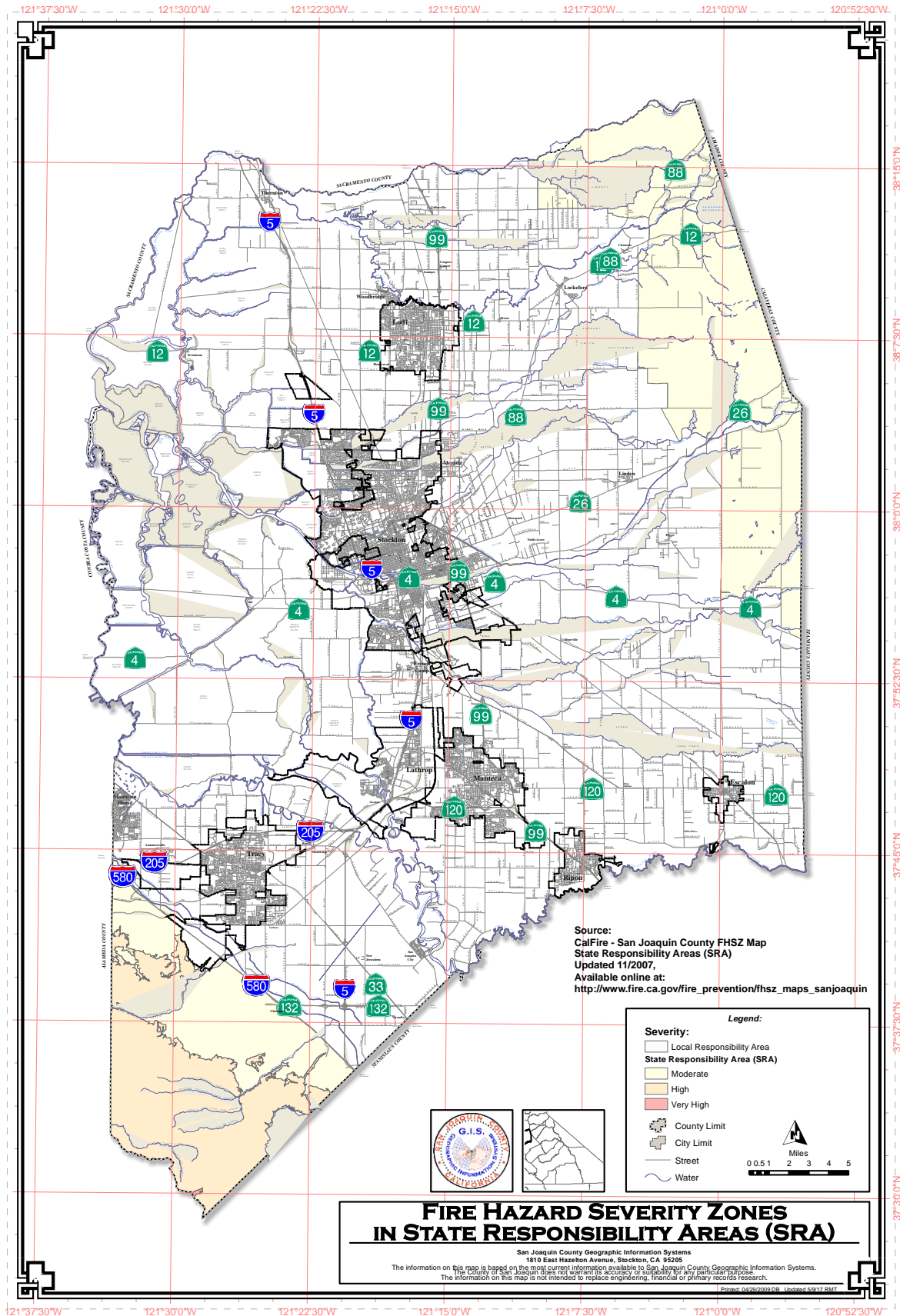
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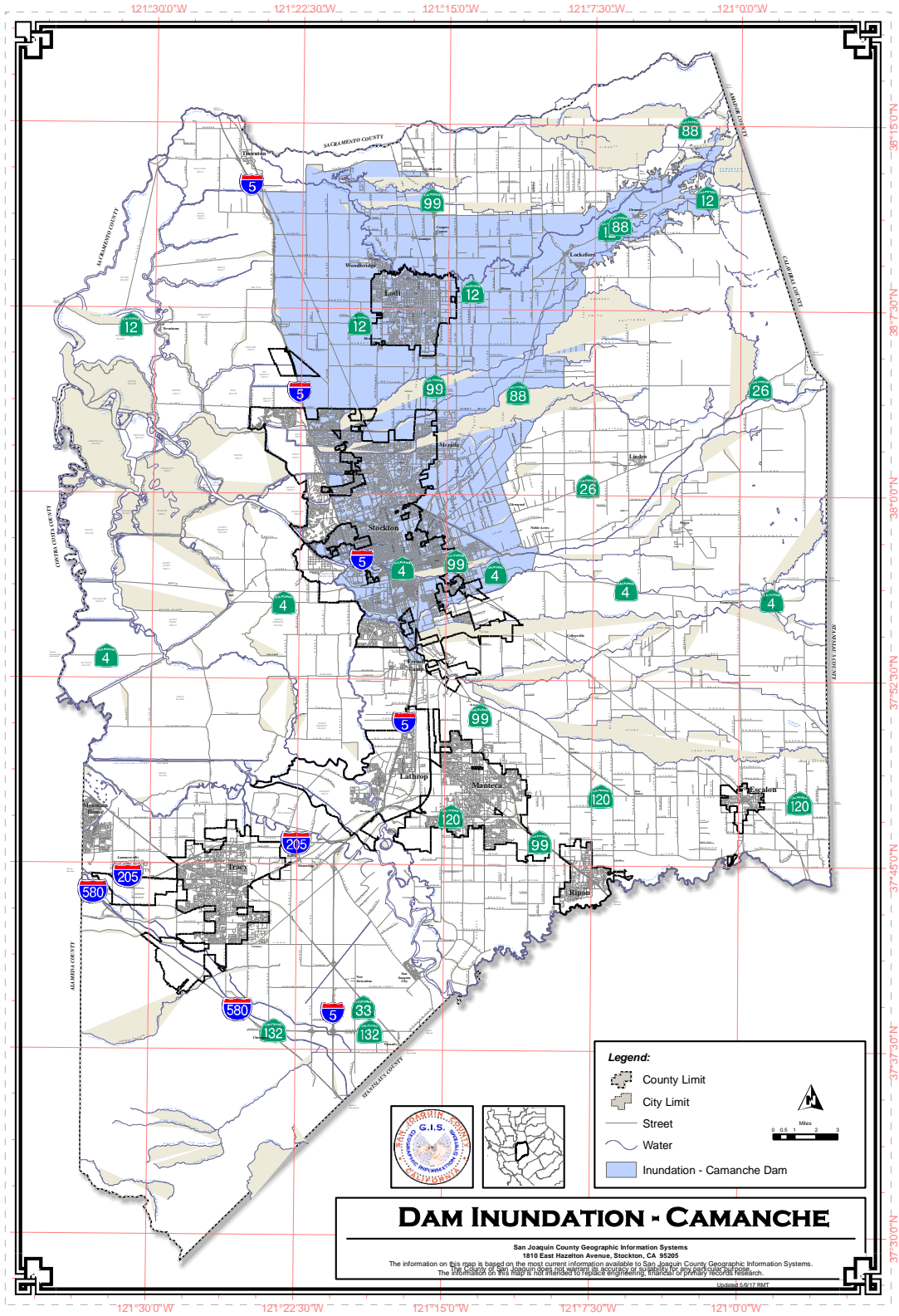
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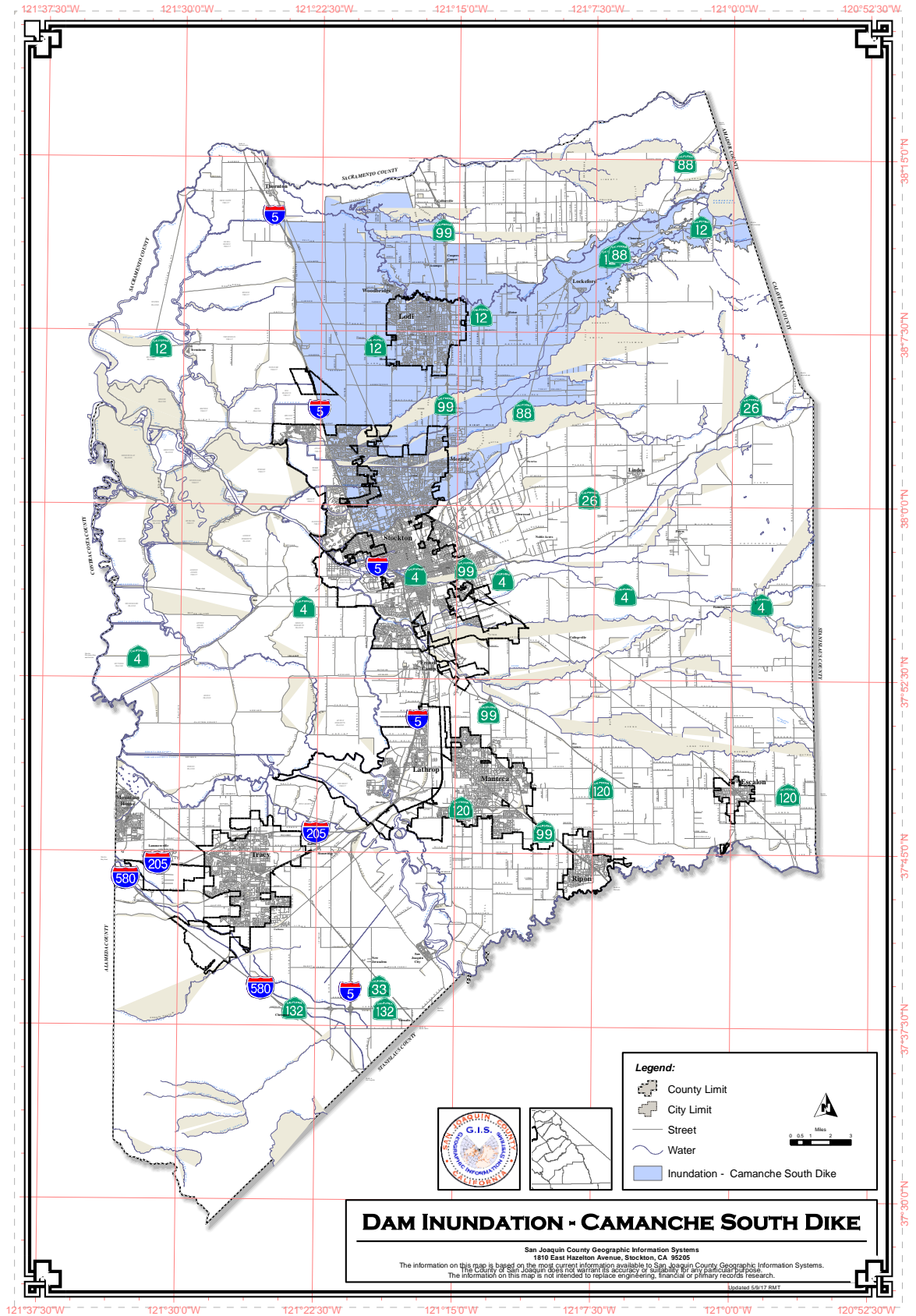
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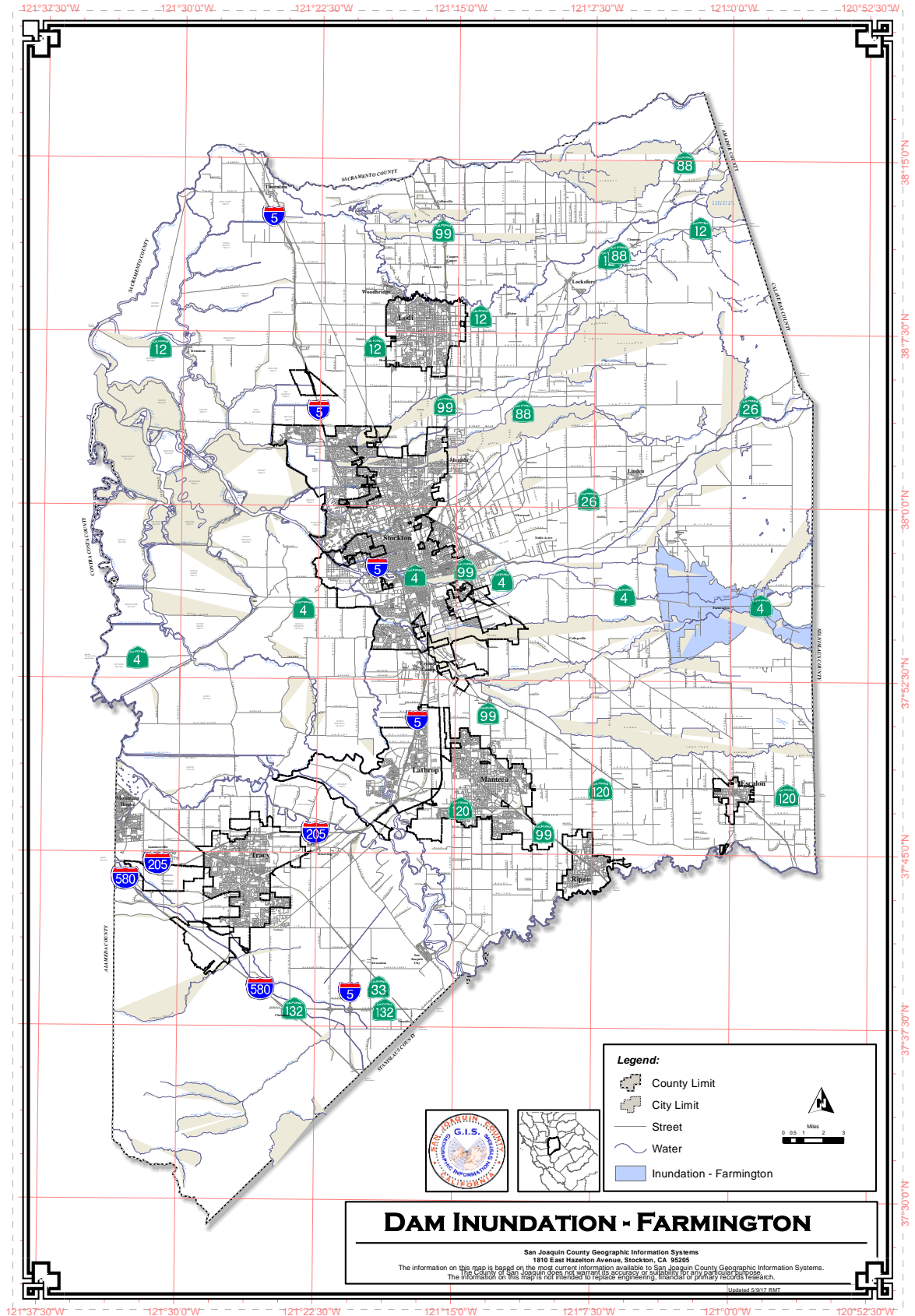
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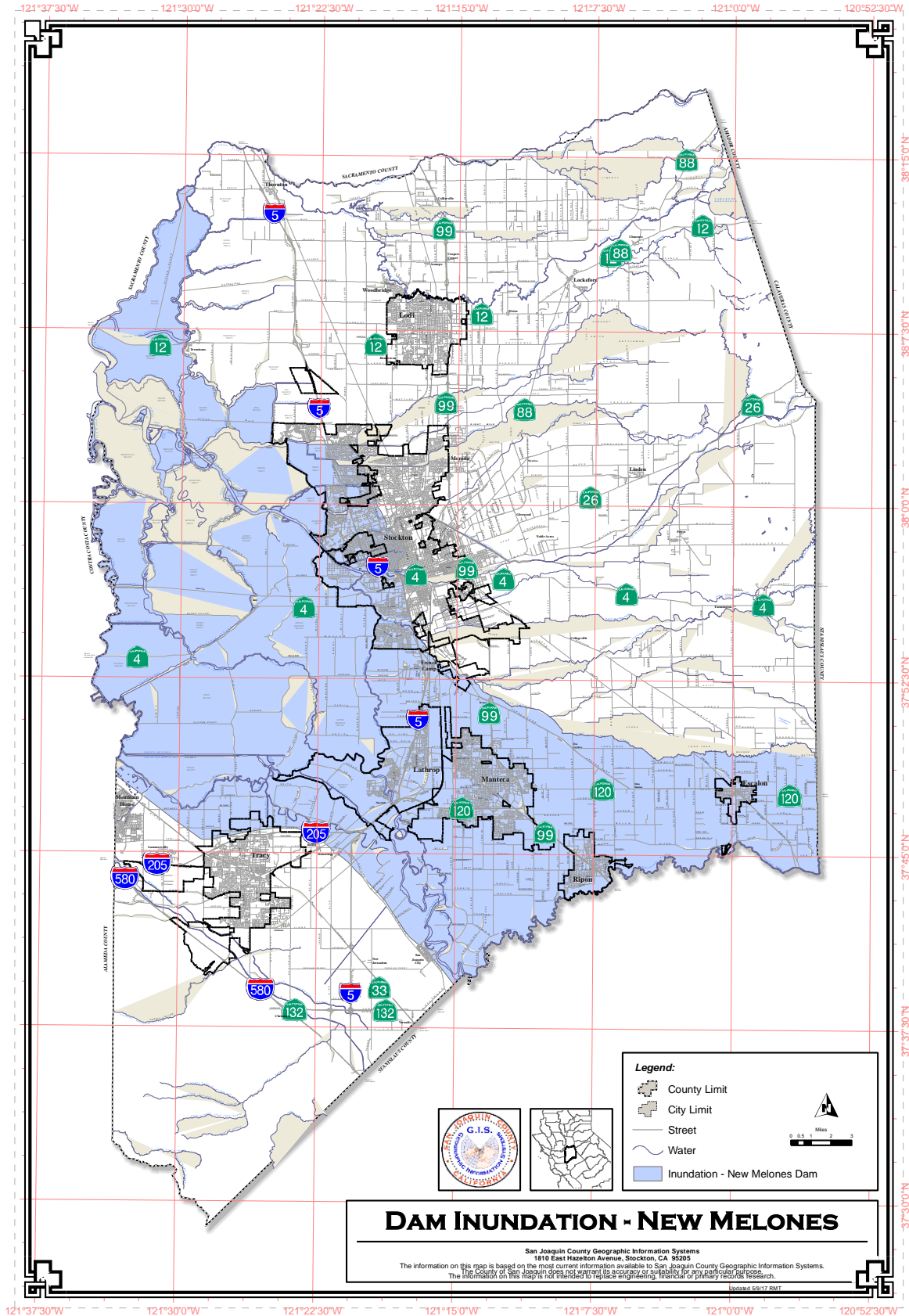
San Joaquin County Local Hazard Mitigation Plan



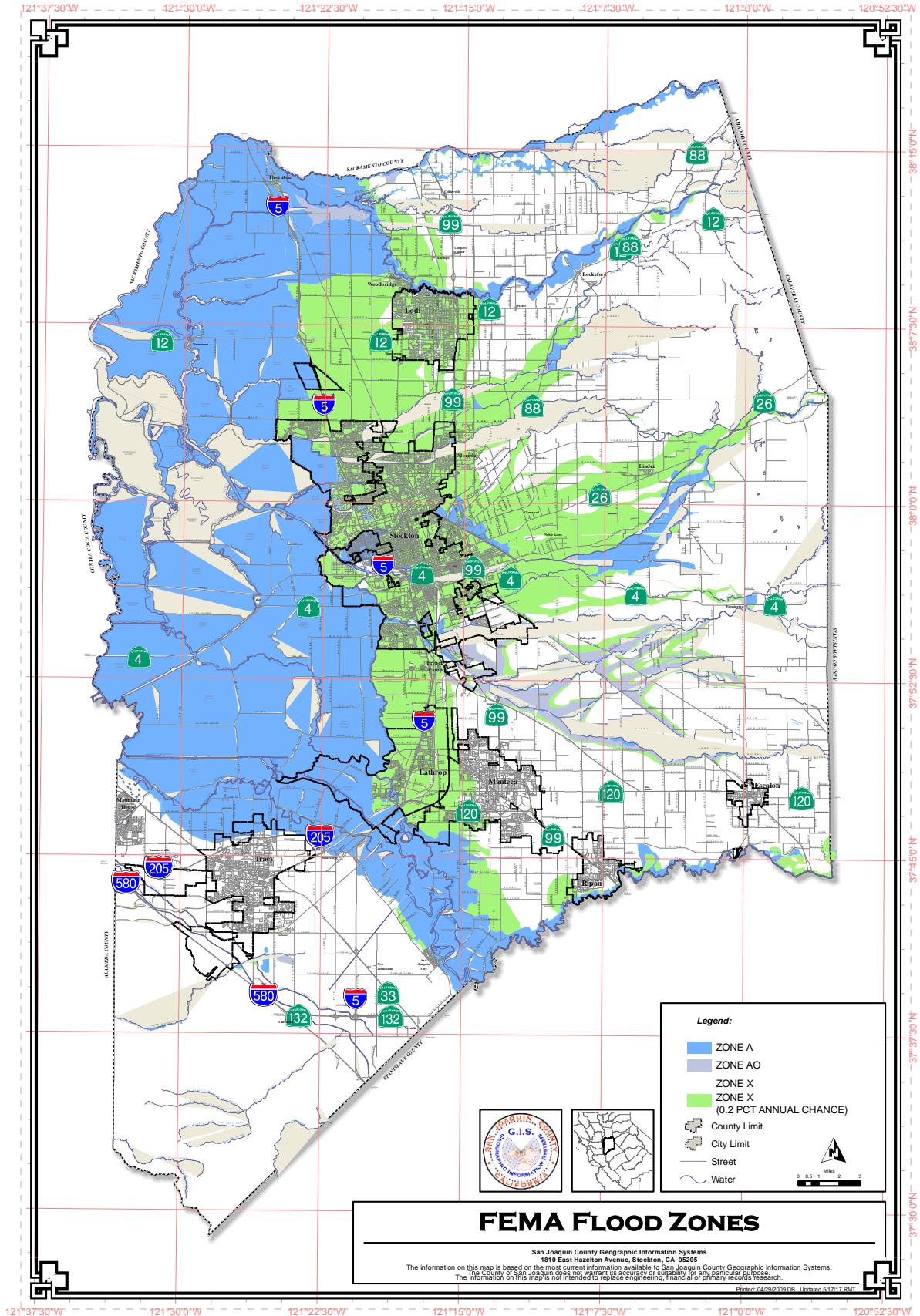
San Joaquin County Local Hazard Mitigation Plan



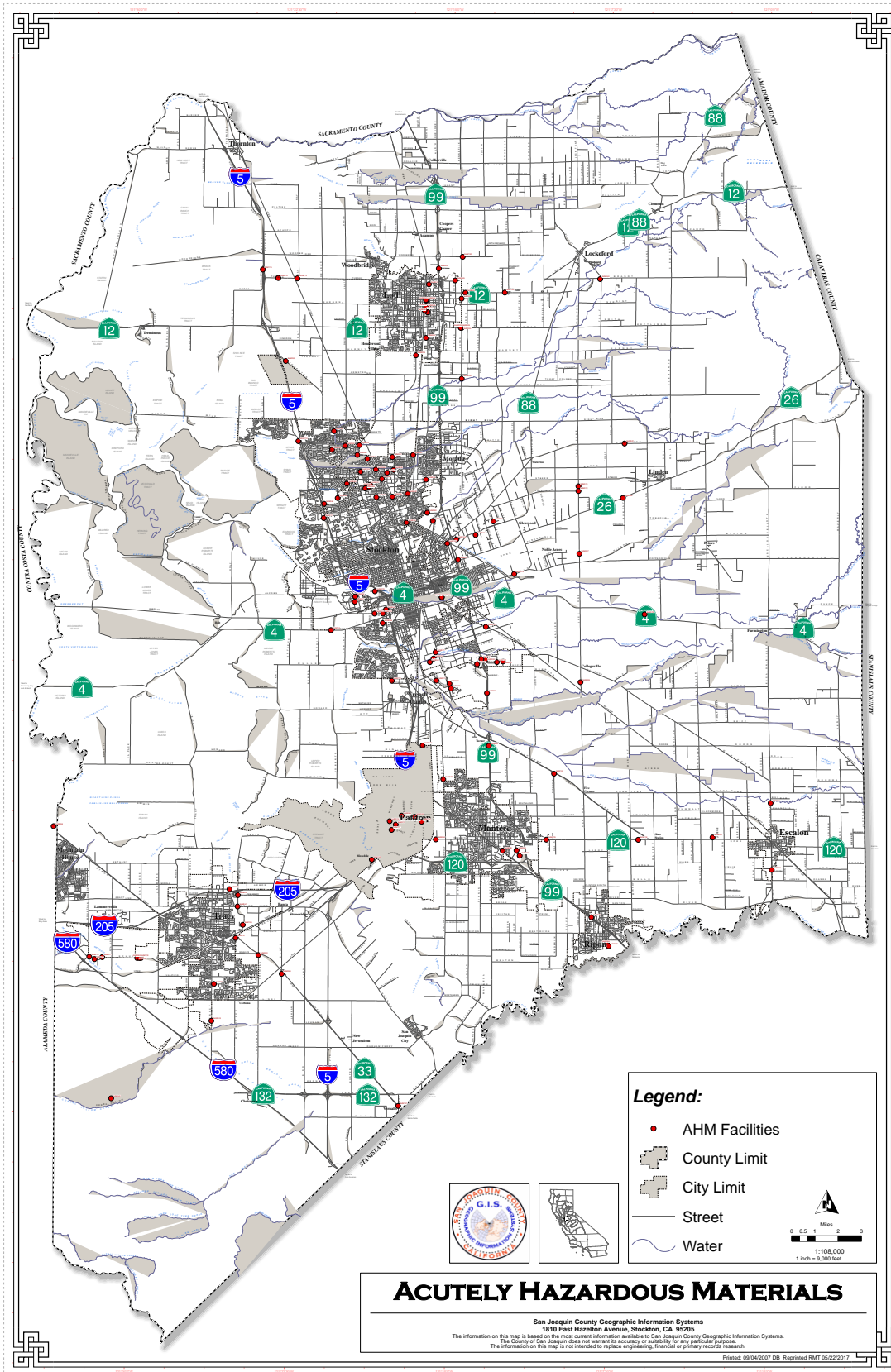
San Joaquin County Local Hazard Mitigation Plan



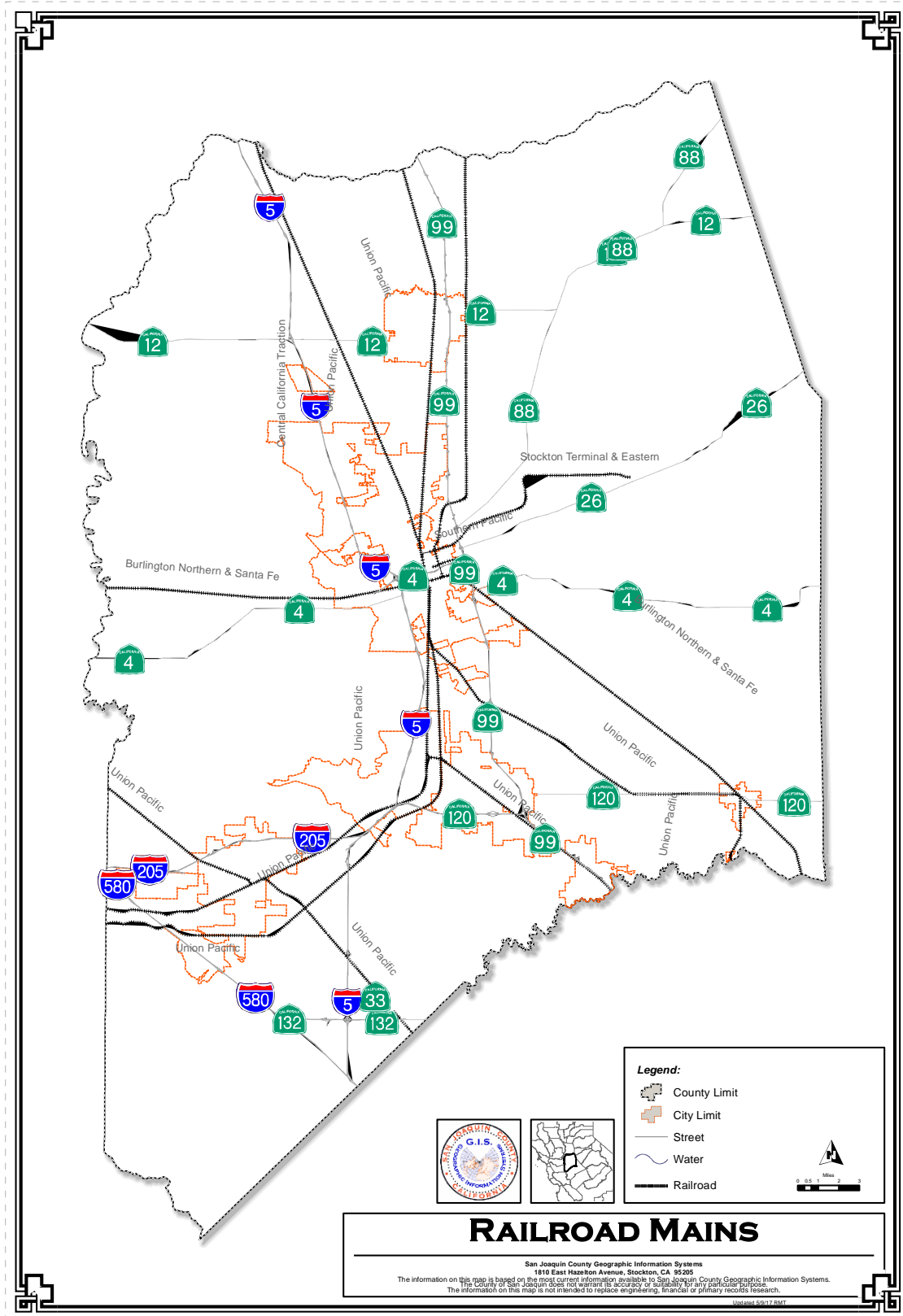
San Joaquin County Local Hazard Mitigation Plan



San Joaquin County Local Hazard Mitigation Plan



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Local Hazard Mitigation Plan

This table is an illustration of known hazards in San Joaquin County that have been ranked by the Planning Team. Though some of the hazards have been ranked as “highly likely” there will not be projects listed because they are not under the County’s jurisdiction/authority.

Hazard Descriptions	Highly Likely	Likely	Not Likely	Occasional
Animal Pests	3	1		1
Animal Diseases	2	2	1	
Plant Pathogens	1	2	1	
Plant Pest	2	1	2	
Civil Disturbance		1	3	2
Terrorism		1	4	1
Weapons of Mass Destruction (WMD)			4	2
Earth Movement				
Earthquake			2	2
Expansive Soils			3	1
Land Subsidence			4	
Landslides			4	
Energy Shortage				5
Fire				
Wildland Fire			3	3
Flood / Excessive Rain	2	4		
Dam Failure		1	3	1
Levee Break	3	1	1	
Hazardous Materials	3	1		
Water Pollution	2			2
Air pollution	4	1		
Movement/Transportation				
Public Health	2	2	1	
Weather				
Dense Fog	3			
Extreme Temperature				
Heat	3	1		
Cold		1	1	
Drought	2	2		
High Winds		2		2
Tornados/Thunderstorms		3	2	1
Noise Pollution			3	1
Ground Contamination		3		1
Train Derailment	2	1	1	1
Climate Change	1	3	1	1

B 3 - IMPACTS AND VULNERABILITIES

San Joaquin assets are located in Appendix C which includes buildings, hospitals, residential dwellings and critical facilities. San Joaquin County has an estimated population of 750,000 residents. Roughly 25 percent of the population can be affected by a disaster depending by the type and extent of the disaster.

1. **Flooding:**

Impact

Flooding in San Joaquin impacts many different areas such as people, road, buildings residential /commercial, parks/recreation areas, agriculture, and critical facilities.

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

Vulnerabilities

Acampo Road and State Route 99, known as "Cooper's Corner", historically floods during heavy rainfall. When this area floods there has been repeated damage to local elementary schools, residences, and businesses. There have been both road closures and evacuations due to the flooding in this area.

The undercrossing at State Route 99 continues to flood due to vandalism and poorly functioning backflow valve on the levee side of the Cosumnes 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, business, and residences in this area.

Culverts located at Kennefick Road just north of Liberty Road were washed away during heavy rains. Due to the damaged culverts over 100 feet of Kennefick Road was destroyed, eliminating access to properties north of Liberty Road, which is the only point of access for that area.

Embankment on Howard Road bridge located over San Joaquin River suffered a slip-out failure on upper most portion of the northeast side of the eastern approach to the bridge. This failure is approximately 100 feet long by 40 feet wide, which had compromised the integrity of the roadway/bridge. Failure of roadway in this area would limit access to key portions of both French Camp and Lathrop communities. This will effect local business and residences traveling on this road/bridge.

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Due to poor drainage and mix use properties on 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 had been reduced due to encroachments and undersized driveway culvert crossings. Overflow from these issues resulted in inundation of West Larch Road as well as properties (businesses/residences) in the drainage areas.

Oak Grove Regional Park a San Joaquin County Regional park is located east of Interstate 5 off of Eight Mile Road in the City of Stockton. Continuous rains have caused the outer banks of the lake located in the park to erode which has had effect on the park benches, picnic areas, rental of the recreational equipment and areas.

Crisman Road residential area continues to flood during heavy rain storms. Which cause homes in the area to retain water in residential buildings due to flooding.

Purdy culvert system located at end of Partridge Road in Acampo in mixed residential and agricultural use area, needs to be replaced and/or upgraded due to flooding causing the area to overflow.

2. **Drought:**

Impact

Drought cycles in San Joaquin impacts have fluctuated during the last 20 years. In 2016-2017 heavy rains ended the current 11 year drought conditions. If drought conditions were to return it would affect agricultural lands, wells, new construction, and the general welfare of the public.

Vulnerabilities

During a drought cycle the vulnerable areas could be County wide. This could affect the livelihood of those in the agricultural businesses; including farming, livestock grazing areas, and the people who live in drought prone areas. The County will prepare for the next drought by producing a “Drought Plan”.

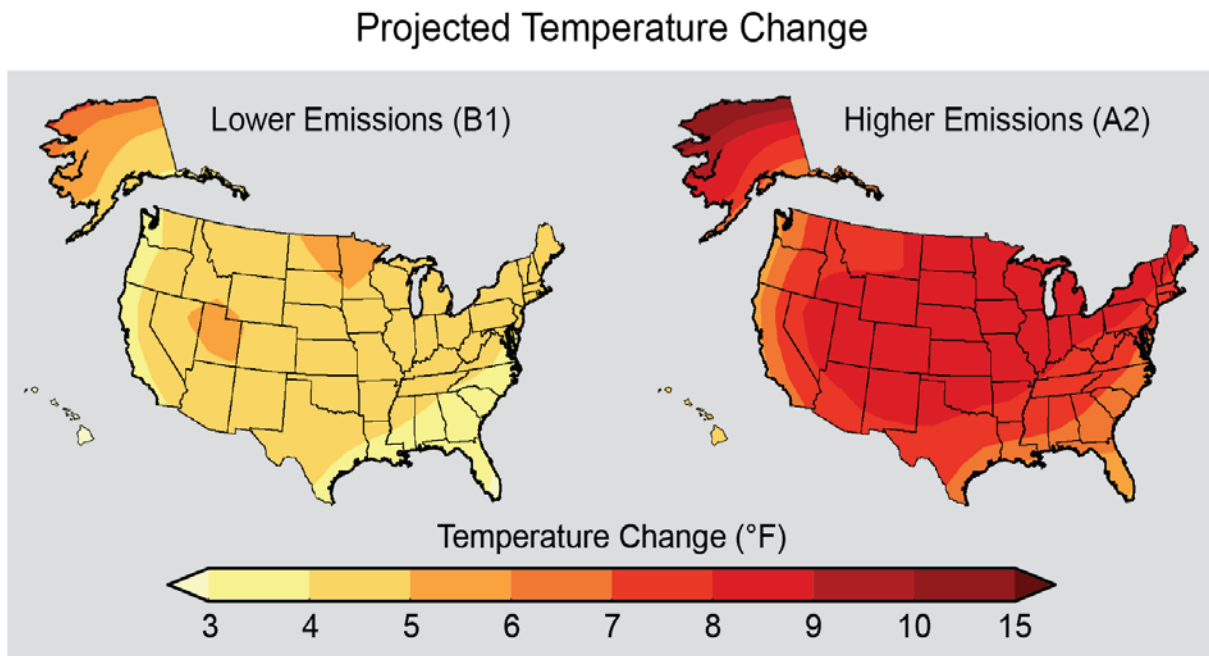
3. **Climate Change Vulnerability Assessment**

Climate change is a growing threat to California’s economy, environment, and to 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 gases 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 both flooding and drought, both high vulnerability risks for San Joaquin County. Among the initiatives being implemented in California was the passage of Senate Bill (SB) 379 (Jackson). This bill requires cities and counties to review and update their general plans’ safety elements to address climate adaptation and resiliency strategies applicable to the city or county. Local officials are given an option to enact the requirements of its bill, including within the update of their Local Hazard Mitigation Plans on, or after January 1, 2017. Accordingly, the following vulnerability assessment for climate change within the San Joaquin County region will discuss the risks climate change poses, as well as the impacts to existing vulnerabilities.

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According to the California Natural Resource Agency (CNRA), climate change has already had an effect on California. Projections are that the effects will continue and will be seen through changes that include increased temperatures, sea level rise, a reduced winter snowpack altered precipitation patterns, and more frequent storm events. San Joaquin County has seen impacts of this not only through increased temperatures throughout the Central Valley, but also through more severe storms, increased snow melt run-off, and drought. Over the long term, reducing greenhouse gases can help make these changes less severe, but the changes cannot be avoided entirely. Considering mitigation actions to help reduce the impacts of climate change will be noted in the mitigation actions section of this plan and will consider secondary consequences of climate change including the impacts on human health and safety, economic continuity, ecosystem integrity and provision of basic services.

Projected Temperature Change – Lower and Higher Emissions Scenario



Source: National Climate Assessment

The National Climate Assessment’s 2014 Climate Adaptation Strategy (CAS) provided vital information and projections on how climate change may impact and exacerbate natural hazards in the future, including increased temperature, decreased precipitation, reduced snowpack, reduced tourism, ecosystem change, sensitive species stress and increased wildfire.

Within the San Joaquin Valley region, climate change modeling forecasts an increase in the frequency, intensity, and duration of extreme heat events and heat waves, which are likely to increase the risk of mortality and morbidity due to heat-related illness and exacerbation of existing chronic health conditions. Those most at risk and vulnerable to climate-related illness are the elderly, individuals with chronic conditions such as heart and lung disease, diabetes, and mental illnesses, infants, the socially or economically disadvantaged, and those who work outdoors.

Additionally, the higher temperatures throughout the California will cause an earlier melting of the snowpack resulting in high water, stress on the Delta Levee system surrounding San Joaquin County and less drinking water available to citizens in non-rainfall months of the year. Although the probability of drought is expected to increase throughout the 21st century due to the impacts of climate change, the possibility of increased intense rainfall with historical runoff is also projected. With the current high flood risk throughout San Joaquin County, this could have widespread impacts throughout the county and the entire San Joaquin Valley region including floods, levee and dam failures, and issues with salt water intrusion into the Delta water supply.

Although fire was not identified by San Joaquin as a high vulnerability risk, it is important to note that within the climate change projections for the region, warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire risk due to increased fuel and ignition risks. These changes can also increase plant moisture stress and insect populations which could have long-term effects on agriculture within the County and region. According to the California Adaptation Planning Guide (APG), the risk of these possible future conditions will increase vulnerability extent and intensity, as well as increase public safety risks, property damage, and emergency response costs to government, watershed and water quality impacts, vegetation conversions and habitat fragmentation. The APG also outlined secondary risks from climate change related to above-noted vulnerabilities that include significant impacts on ocean and coastal resources, water management, forest and rangeland, biodiversity and habitat, agriculture, and infrastructure.

The California APG further provides input on adaptation considerations for the San Joaquin Valley Region. The specific regional impacts outlined in the APG include the following:

Ecosystems and Biodiversity: Exacerbated by new development in the region, climate change can cause habitats to shift, creating conditions that stress ecosystems and endemic species. Continued changes in hydrologic flow regimes and increased temperatures will further stress these systems regional habitats supporting many special-status species.

Snowpack and Flooding: Climate-related decrease in snowpack can have significant consequences on the areas that depend on this water. In addition, a decrease in snowpack can increase impacts from flooding, landslide, and loss of economic base related to a drop in tourism. Recreation and tourism are likely to suffer due to lower water levels in waterways and reservoirs and declining snowpack. This can result in fewer ski days and impacts to hotels, restaurants, and second home development. Increases in flood events can further stress the region and increase flood related impacts and damages.

Wildfire: Climate change is projected to result in large increases in wildfire frequency and size which will further compound the wildfire problem. In addition, potential impacts following fires, such as heavy rains causing landslide and erosion in post-burn areas can have significant consequences on waterways and entire watersheds.

Public Health, Socioeconomic, and Equity Impact: Increased temperatures throughout the San Joaquin Valley region can cause vulnerable populations to be at greater risk to these issues. In addition to the elderly population found in this region, people who work and play outdoors are also vulnerable.

Future Development: San Joaquin County as a whole could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to impact demand for housing and other development state and nationwide. For example, sea level rise may disrupt economic activity and housing in coastal communities, resulting in migration to inland urban areas. Other interior western states may experience an exodus of population due to challenges in adapting to heat even more extreme than that which is projected to occur here. While there are currently no formal studies of specific migration patterns expected to impact the San Joaquin County region, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2015 and is expected to be the focus of future studies.

Impact on Development: Research has shown the possibility for the increased demand for smaller homes that require fewer resources, use less energy, are easier to maintain and can be more readily adapted or moved in response to changing conditions related to climate change. Compact, mixed-use and infill developments that can help residents avoid long commutes and vulnerabilities associated with the transportation system will likely continue to grow in popularity. The value of open space and pressure to preserve it will likely increase, due in part to its restorative, recreational, environmental and habitat benefits but also for its ability to sequester carbon, help mitigate the accumulation of greenhouse gas in the atmosphere and slow down the global warming trend. Higher flood risks, especially if coupled with increased federal flood insurance rates, may decrease market demand for housing and other types of development in floodplains, while increased risk of wildfires may do the same for new developments in the urban-wildland interface. Flood risks may also inspire new development and building codes that elevate structures while maintaining streetscapes and neighborhood characteristics.

Stress on water resources: While the APG states that water is an issue in every region, it is particularly significant to the San Joaquin Valley, its agriculture and its economy. Drought, related to reduced precipitation, increased evaporation, and increased water loss from plants, is an important issue in many U.S. regions, especially in the West. Floods, water quality problems, and impacts on aquatic ecosystems and species are likely to be amplified by climate change. The ability to secure and provide water for new development requires on-going monitoring. It is recommended that the ability to provide a reliable water supply from the appropriate water purveyor, continue to be in the conditions for project approval, and such assurances shall be verified and in place prior to issuing building permits.

Protecting and enhancing water supply: California's Sustainable Groundwater Management Act (SGMA) will contribute to addressing groundwater and aquifer recharge needs. Good groundwater management will provide a buffer against drought and climate change, and contribute to reliable water supplies regardless of weather patterns. California depends on groundwater for a major portion of its annual water supply, and sustainable groundwater management is essential to a reliable and resilient water system. Protection of critical recharge areas should be addressed across the County in the respective Groundwater Management Plans. Further, these plans should include provisions that guide development or curtail development in areas that would harm or compromise recharge areas.

Effects on transportation: The transportation network is vital to San Joaquin County and the region's economy, safety, and quality of life. While it is widely recognized that emissions from transportation have impacts on climate change, climate will also likely have significant impacts on transportation infrastructure and operations. Examples of specific types of impacts include softening of asphalt roads and warping of railroad rails; damage to roads; flooding of roadways, rail routes, and airports from extreme events; and interruptions to flight plans due to severe weather. Climate change impacts considered in the plan include: extreme temperatures; increased precipitation, runoff and flooding; increased wildfires; and landslides. Although landslides are not a direct result of climate change, these events are expected to increase in frequency due to increased rainfall, runoff, and wildfire. These events have the potential to cause injuries or fatalities, environmental damage, property damage, infrastructure damage, and interruption of operations. During flood events, these trails serve as secondary transportation facilities when roadways are blocked or otherwise impassible. Including dual or multi-purpose facilities and amenities as part of all new development provides not just desirable community amenities but critical infrastructure for climate resiliency.

Effect on land uses and planning: Development could be impacted by climate change, shifting demographics and market conditions. Demand may increase for smaller dwellings that are less resource intensive, more energy efficient, easier to maintain and can be more readily adapted or even moved in response to changing conditions. Compact, mixed-use and infill developments that can help residents avoid long commutes and vulnerabilities associated with the transportation system will likely continue to grow in popularity. The value of open space, urban greening, green infrastructure, tree canopy expansion and pressure to preserve it will likely increase, due in part to its restorative, recreational, environmental, and habitat, and physical and mental health benefits but also for its ability to sequester carbon and cool the surrounding environment.

Effect on Utilities: Utility efforts to deal with the impacts from climate change range from emergency and risk management protocols, to new standards for infrastructure design and new resource management techniques. California is already experiencing impacts from climate change such as an increased number of wildfires, sea level rise and severe drought. Utilities are just beginning to build additional resilience and redundancy into their infrastructure investments from a climate adaptation perspective, but have been doing so from an overall safety and reliability perspective for decades. Significant efforts are also being made in those areas that overlap with climate change mitigation such as diversification of resources, specifically the addition of more renewables to the portfolio mix, as well as implementation of demand response efforts to curb peak demand. Efforts are also under way to upgrade the distribution grid infrastructure, which should add significant resilience to the grid as well. Next, they will issue a guidance document that expands upon the vulnerability assessments phase and includes plans for resilience solutions including cost/benefit analysis methodologies. The outcomes of this work will help to inform next steps on how infrastructure, the grid and other related operations will be modified to address climate change. New development will have to adapt and incorporate these new approaches as they evolve. Existing and new development will be affected from impacts that includes not only diminished capacity from all of the utility assets from generation to transmission and distribution, but also the cost consequences resulting from prevention, replacement, outage, and energy loss. These have the potential for greatly impacting not just residential development but commercial and industrial and all utility users.

Urban Heat Islands and Heat Events: New development will contribute to urban heat island (UHI) impacts and will need to incorporate urban greening methods into all aspects of development; interior and exterior of buildings, surrounding environment and beyond. New development will need to reduce its impacts to the overall UHI impacts affecting the county and surrounding region. On-going and expanding heat wave awareness and assistance will also affect new development. During heat waves in San Joaquin County, a heat alert is issued and news organizations are provided with tips on how vulnerable people can protect themselves. Programs used by health departments to engage with thousands of block captains to check on elderly and other vulnerable residents, along with public cooling places extending their hours, or local businesses welcoming residents into their businesses for purposes of staying cool are examples of programs and services that will be necessary. Other programs to consider that could further involve hospitals and clinics are operating a “heatline” with nurses or other healthcare professionals ready to assist callers with heat-related health problems. In addition, continued funding for weatherization, reduced utility rates and similar programs that offers assistance to elderly, low-income residents to install roof insulation, solar, trees and cool surfaces to save energy and lower indoor temperatures.

Cal Adapt Climate Projections Effect within Northern California

Effect	Ranges
Temperature Change, 1990-2100	January increase in average temperatures: 2.5 °F to 4°F by 2050 and 6°F to 7°F by 2100. The largest changes are observed in the southern part of the region. July increase in average temperatures: 4 °F to 5°F by 2050 and 10°F by the end of the century, with the greatest change in the northern part of the region. (Modeled average temperatures; high emissions scenario)
Precipitation	Precipitation decline is projected throughout the region. The amount of decrease varies from 3 to 5 inches by 2050 and 6 inches to more than 10 inches by 2100, with the larger rainfall reductions projected for the southern portions of the region. (CCSM3 climate model; high carbon emissions scenario)
Heat wave	Heat waves are defined as five consecutive days over 83 °F to 97°F depending on location. By 2050, the number of heat waves per year is expected to increase by two. A dramatic increase in annual heat waves is expected by 2100, eight to 10 more per year
Snowpack	Snowpack levels are projected to decline dramatically in many portions of the region. In southern portions of the region, a decline of nearly 15 inches in snowpack levels - a more than 60 percent drop - is projected by 2090. (CCSM3 climate model; high carbon emissions scenario)
Wildfire	Wildfire risk is projected to increase in a range of 1.1 to 1.5 times throughout the region, with the highest risks expected in the northern and southern parts of the region. (GFDL climate model; high carbon emissions scenario)

Source: Cal Adapt

Past Occurrences

Disaster Declaration History: Climate change has never been directly linked to any declared disasters.

Likelihood of Future Occurrence

Likely – Climate change is virtually certain to continue without immediate and effective global action. According to NASA, 2016 was on track to be the hottest year on record, and 15 of the 17 hottest years have occurred since 2000. Without significant global action to reduce greenhouse gas emissions, the Intergovernmental Panel on Climate Change (IPCC) concludes in its Fifth Assessment Synthesis Report (2014) that average global temperatures is likely to exceed 1.5 C by the end of the 21st century, with consequences for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges.

B 4-SEVERE OR REPETITIVE LOSS PROPERTIES

The list of repetitive loss properties maintained by FEMA identifies one repetitive loss property within the County of San Joaquin. This property is in the City of Lathrop which is a single-family dwelling.

ELEMENT C

C 1-EXISTING AUTHORITIES, POLICIES, PROGRAMS AND RESOURCES

Existing authorities, policies, programs and resources available to accomplish hazard mitigation is as follows:

Codes, Ordinances etc.

Building Codes

Zoning Codes

Storm water

Real Estate Disclosure

Public Health

Environmental Protection

Fire Codes

Planning Documents

General Plan

Capital Improvement Plan

Emergency Operations Plan

Fire Plan

Flood Plan

Drought Plan

Threat and Hazard Identification & Risk Assessment

Hazard Mitigation Plan

Continuity of Operations Plan

Delta Plan

Administrative and Technical Capability

Public Works Director

Engineers

Floodplain Manager

GIS personnel

Scientist

Director of Office of Emergency Services

Sr. Emergency Planners

Grant Writers

Building Official

Director of General Services

Agriculture Commissioner

San Joaquin County
Local Hazard Mitigation Plan

Fiscal Capabilities

Community Development Block Grants
Hazard Mitigation Grant Fund
Emergency Management Performance Grant
Various taxes
Various user fees
Various bonds
General Fund
Delta Flood Response Plan Grant

Training, Education and Outreach

Table top exercises
Dam Inundation exercises
Social media outreach (twitter, Face book, You Tube, etc.)

San Joaquin County Office of Emergency Services reviews and updates different types of plans on an annual basis (see above for list). County staff participate in a vast amount of emergency management training, exercises, and drills. Such as Emergency Action Planning exercises (Dam Inundation), Earthquake Preparedness, SEMS/NIMS along with other State and Federal training. If budget allows, San Joaquin County would have the ability to hire staff either permanently or limited term given the circumstances. The Office of Emergency Services is continuously researching grant opportunities for emergency management or hazard mitigation.

C 2 - NATIONAL FLOOD INSURANCE PLAN

1. National Flood Insurance Program (NFIP)

The County of San Joaquin will continue to comply and participate in the National Flood Insurance Program. To comply with program requirements, the County will continue to do the following:

- Regulate development in the 100-year floodplain area in accordance with NFIP Requirement
- Interpret flood zones 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 structures that have been constructed since 1992

C 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 determine prioritization of the mitigation actions. Each mitigation action were evaluated on the above listed goals.

C 4 - MITIGATION ACTIONS

Mitigation Action 1:

Acampo Area Drainage Innovation Project

Hazards Addressed:

Flooding

Project:

New storm drain system which includes the following:
Installation of drain inlets, pipelines, and a storm drain pump station.

Responsible office and Name or Title:

Matthew Ward, Engineer IV
Department of Public Works

Priority:

1

Cost Estimate:

2.4 million dollars

Potential Funding Source:

HMGP, PDM, Road Fund or General Fund

Time Frame:

36 months

San Joaquin County
Local Hazard Mitigation Plan

Mitigation Action 2:

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

Hazards Addressed:

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.

Project:

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

Mitigation Action 3:

Kenefick Road)

Hazards Addressed:

Flooding resulting from heavy rains washed away the culverts and destroyed over 100 feet of Kenefick Road eliminating access to properties north of Liberty Road

Project:

Project is to increase the drainage capacity beneath Kenefick Road with a larger diameter culverts or a box culvert

Responsible office and Name or Title:

Kris Balaji (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

San Joaquin County
Local Hazard Mitigation Plan

Mitigation Action 4:

North Frontage Road backflow valve (North 99 Frontage Road)

Hazards Addressed:

Flooding poses a safety risk for users of the roadway and has caused damaged to the structural section of the roadway.

Project:

Project is to reduce the flooding of the roadway section with the design and construction of n improved backflow prevention valve and theft proof enclosure. And repair of the roadway section that has been flooded.

Responsible office and Name or Title:

Kris Balaji (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

Mitigation Action 5:

Larch Road between South Corral Hollow Road North Tracy Boulevard.

It concerns the southern ditch that runs along the length of the project (approx. 5,200 feet).

Hazards Addressed:

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 located on the south side of West Larch Road. This runoff overwhelms the current capacity of this ditch that has been reduced by encroachment as well as undersized culvert crossings. The ditch is approximately 5,200 feet long and drains to a southerly flowing drainage along north Tracy Boulevard.

Project:

The project will include removal of the encroachments in the ditch, installation of larger drainage culverts at driveways that cross the ditch, and widening or lining of the ditch to increase capacity.

Responsible office and Name or Title:

Kris Balaji (Director of Public Works), Public Works

Priority:

4

Cost Estimate:

\$ 1,121,560.00

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

San Joaquin County
Local Hazard Mitigation Plan

Mitigation Action 6:

200 Year Flood Plain Code

Hazards Addressed:

Flooding

Project:

Develop 200 Year Flood Plain code for new construction in County.

Responsible office and Name or Title:

Department of Community Development

Priority:

4

Cost Estimate:

\$ 100,000

Potential Funding Source:

Hazard Mitigation Grant Program

Pre-disaster Mitigation Grant

General Fund

Time Frame:

12 months

San Joaquin County
Local Hazard Mitigation Plan

Mitigation Action 7:

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:

6

Cost Estimate:

\$10,000.00

Potential Funding Source:

HMGP, PDM, Road Fund or General Fund

Time Frame:

18 months

San Joaquin County
Local Hazard Mitigation Plan

Mitigation 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:

7

Cost Estimate:

\$300,000.00

Potential Funding Source:

HMGP, PDM, Road Fund or General Fund

Time Frame:

36 months

Mitigation Action 9:

Oak Grove Regional Park Lake Bank Erosion Mitigation

Hazards Addressed:

Erosion of the Oak Grove Lake's embankment has created safety concerns for the public to be in severe danger of harm or loss of life.

Project:

Re-stabilization of the bank of the levee will be restored

Responsible office and Name or Title:

General Services/Regional Parks

Michael Cockrell, SJC - OES Director

Charles Ruiz, Parks Maintenance Supervisor

Priority:

8

Cost Estimate:

\$ 369,895

Potential Funding Source:

Hazard Mitigation Grant Program

Pre-disaster Mitigation Grant

Time Frame:

20 months

San Joaquin County
Local Hazard Mitigation Plan

Mitigation Action 10:

San Joaquin County Drought Plan

Hazards Addressed:

Drought

Project:

Develop a county wide drought plan

Responsible office and Name or Title:

Office of Emergency Services

John Austin, Senior Emergency Planner

Priority:

10

Cost Estimate:

\$50,000

Potential Funding Source:

EMPG, HMPG, PDM, or General Fund

Time Frame:

24 months

San Joaquin County
Local Hazard Mitigation Plan

Mitigation Action 11:

San Joaquin County Climate Change Plan

Hazards Addressed:

Climate Change

Project:

Develop a county wide climate change plan

Responsible office and Name or Title:

Office of Emergency Services

Emergency Planner

Priority:

11

Cost Estimate:

\$100,000

Potential Funding Source:

EMPG, HMPG, PDM, or General Fund

Time Frame:

24 months

C 5 - ACTION PLAN FOR PRIORITIZING MITIGATION ACTIONS

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

San Joaquin County
Local Hazard Mitigation Plan

San Joaquin County

STAPLEE Criteria		S		T			A			P			L			E				E				PT	
		(Social)		(Technical)			(Administrative)			(Political)			(Legal)			(Economic)				(Environmental)					
Considerations for Alternative Actions	Estimated Cost to Accomplish Action	Community Acceptance	Effect on Segment of Population	Technical Feasibility	Long-term Solution	Secondary Impacts	Staffing	Funding Allocated	Maintenance/ Operations	Political Support	Local Champion	Public Support	State Authority	Existing Local Authority	Potential Legal Challenge	Benefit of Action	Cost of Action	Contributes to Economic Goals	Outside Funding Required	Effect on Land/ Water	Effect on Endangered Species	Effect on HAZMAT/Waste Sites Consistent with Community Environmental Goals	Consistent with Federal Laws	Priority Total	
		Embankment repairs/Howard Rd	\$ 1,424,099.00	5	3	5	5	3	5	5	5	5	5	5	3	5	1	5	5	5	5	3	1	1	5
Kenefick Rd culverts	\$ 587,191.00	5	3	5	5	2	5	5	5	5	5	5	2	5	1	5	5	5	5	3	1	1	5	5	93
North Frontage Rd backflow valve	\$ 226,092.00	5	3	5	5	2	5	5	5	5	5	5	2	5	1	5	5	5	5	2	1	1	5	5	92
Larch Rd flooding	\$ 1,121,560.00	5	3	5	5	2	5	5	5	5	5	5	2	5	1	5	5	5	5	2	1	1	5	5	92
Oak Grove Park erosion	\$ 369,895.00	5	3	5	4	2	5	5	5	5	4	4	2	5	1	5	5	2	5	2	1	1	5	5	86
Acampo area Drainage	\$ 2,400,000.00	5	3	5	5	5	5	5	5	5	5	5	3	5	1	5	5	5	5	3	1	1	5	5	97
Corral Hollow/Chrisman Residence Elevation	\$ 300,000.00	5	4	5	5	2	4	5	5	4	4	4	3	5	1	5	5	3	5	2	1	1	5	5	88
Purdy Culvert Repl.	\$ 10,000.00	5	2	5	5	3	5	5	5	5	5	5	3	5	1	5	5	3	5	2	1	1	5	5	91
200 Flood Plain Code	\$ 100,000.00	5	4	5	5	3	5	5	5	5	4	5	5	5	1	3	5	5	3	3	3	2	1	5	92
Drought Plan	\$ 50,000.00	5	3	3	2	1	2	4	3	4	4	4	2	4	4	1	4	2	2	4	5	3	1	4	71
Climate Change	\$ 100,000.00	3	3	2	3	4	3	3	3	2	2	3	3	3	4	1	2	2	2	4	4	1	2	3	62
																									0
Total =	\$ 6,688,837.00																								

San Joaquin County
Local Hazard Mitigation Plan

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
Oak Grove Park: Erosion Mitigation	SJC General Services/Regional Parks	HMGP; PDMG	20 months	- Stabilize bank - Provide erosion control measures
Acampo Area: Drainage	SJC Public works	HMGP, PDMG, Road Fund; General Fund	36 months	-New storm drain system which includes the following: -Installation of drain inlets, pipelines, and a storm drain pump station.
Purdy Culvert Replacement	SJC Public Works	Measure K; HMGP; PDMG; Highway User Tax Account	18 months	- Installation of an additional storm drain culvert
Countywide Drought Plan	Office of Emergency Services	EMPG, HMGP, PDMG, General Fund	24 months	- Develop a County wide Drought plan
Corral Hollow/Chrisman Rd: Residence Elevation	SJC Public Works	HMGP; PDMG; Road Fund; General Fund	36 months	- Elevation of homes
200 Year Flood Plain	Community Development	HMGP; PDMG; Road Fund; General Fund	months	-Develop 200 Year Flood Plain code for new construction in County.

C 6 - NTEGRATION OF LOCAL HAZARD MITIGATION PLAN

When the county updates the above plans they review the Local Hazard Mitigation Plan to see what information can be pulled from the plan and integrated into other planning mechanisms. They also review the LHMP to help with the development of other plans. For instance when updated the flood plan they can look at the vulnerable areas from flooding.

Emergency Evacuation Plans - maps from LHMP were used to help with evacuation routes
County Flood Plan – Hazard Flood Maps were compared and evaluated to help develop the County Flood Plan.

Fire Plan – Fire Hazard Maps were used to determine high fire hazard zones in the County
General Plan – AB2140 Hazard mitigation plan will be adopted into the Safety element of the General plan.

Delta Flood Protection Plan – Hazard analysis section of LMHP can be used to develop the Delta flood protection strategy.

ELEMENT D

D 1 - CHANGES IN DEVELOPMENT

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

D 2 - PROGRESS IN MITIGATION EFFORTS

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

Status of Prior and New Mitigation Actions

Project Name	New	Completed	On-going	Deferred	Cancelled
Elevation of structures			X		
Alternate pump power at low underpass					
Improve public drainage system			X		
Seismic retrofit essential facilities			X		
Provide alternate EOC resources					X
Storm drainage facilities			X		
Master drainage plans					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				

D 3 - CHANGES IN PRIORITIES

Priorities have changed since the last plan update. This has occurred because of several storms in 2016/2017. There have been many flood projects that have been identified as priority projects.

ELEMENT E PLAN ADOPTION

The Board of Supervisors will adopt this document as the Local Hazard Mitigation Plan, following receipt of FEMA approval letter.



FEMA

March 22, 2018

John Austin
Senior Emergency Planner
San Joaquin County Office of Emergency Services
2101 East Earhart Avenue, Suite 300
Stockton, CA 95206

Dear Mr. Austin:

We have completed our final review of the *San Joaquin County Local Hazard Mitigation Plan* officially adopted by San Joaquin County on March 20, 2018 and found the plan to be in conformance with Title 44 Code of Federal Regulations (CFR) Part 201.6 *Local Mitigation Plans*.

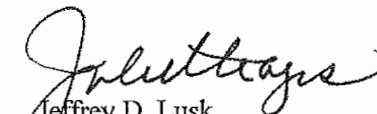
The approval of this plan ensures San Joaquin County's continued eligibility for project grants under FEMA's Hazard Mitigation Assistance programs, including the Hazard Mitigation Grant Program, Pre-Disaster Mitigation Program, and Flood Mitigation Assistance Program. All requests for funding, however, will be evaluated individually according to the specific eligibility, and other requirements of the particular program under which applications are submitted.

Also, approved hazard mitigation plans may be eligible for points under the National Flood Insurance Program's Community Rating System (CRS). Additional information regarding the CRS can be found at <https://www.fema.gov/national-flood-insurance-program-community-rating-system> or through your local floodplain manager.

FEMA's approval of the *San Joaquin County Local Hazard Mitigation Plan* is for a period of five years, effective starting the date of this letter. Prior to March 22, 2023, San Joaquin County is required to review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval in order to continue to be eligible for mitigation project grant funding. The enclosed plan review tool provides additional recommendations to incorporate into the plan when San Joaquin County undertakes its identified plan maintenance process.

If you have any questions regarding the planning or review processes, please contact Alison Kearns, Senior Community Planner, at (510) 627-7125 or by email at alison.kearns@fema.dhs.gov.

Sincerely,


Jeffrey D. Lusk
Division Director
Mitigation Division
FEMA Region IX

Enclosure

cc: Julie Norris, Mitigation and Dam Safety Branch Chief, California Governor's Office of Emergency Services
Jennifer Hogan, State Hazard Mitigation Officer, California Governor's Office of Emergency Services

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

RESOLUTION

R-18-25

Adoption and Approval of the San Joaquin Operational Area 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 multi-hazard mitigation plan, hereby known as San Joaquin County Operational Area Local Hazard Mitigation Plan March 2017 in accordance with the Disaster Mitigation Act of 2000; and,

WHEREAS, San Joaquin County Operational Area Local Hazard Mitigation Plan March 2017 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 San Joaquin County Operational Area Local Hazard Mitigation Plan March 2017

NOW, THEREFORE, BE IT RESOLVED THIS BOARD OF SUPERVISORS DOES HEREBY adopt the San Joaquin County Operational Area Local Hazard Mitigation Plan March 2017.

PASSED AND ADOPTED 03/20/2018, by the following vote of the Board of Supervisors, to wit:

AYES: **Villapudua, Miller, Patti, Winn, Elliott**

NOES: **None**

ABSENT: **None**

ABSTAIN: **None**

Robert V. Elliott

ATTEST: MIMI DUZENSKI
Clerk of the Board of Supervisors
Of the County of San Joaquin,
State of California

Robert V. Elliott
Chair, Board of Supervisors
County of San Joaquin
State of California

By **Mimi Duzenski**

