

2024

Fresno County, California

Hazard Mitigation Plan





Fresno County Hazard Mitigation Plan

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Executive Summary:





EXECUTIVE SUMMARY

The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards. Fresno County and the other participating jurisdictions developed this multi-jurisdictional hazard mitigation plan to make the County and its residents less vulnerable to future hazard events. This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 so that Fresno County would be eligible for the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance Grants, including Pre-Disaster Mitigation and Hazard Mitigation Grant programs as well as lower flood insurance premiums (in jurisdictions that participate in the National Flood Insurance Program's Community Rating System).

The plan was originally developed in 2007-2008 and FEMA approved in 2009. The plan was comprehensively updated in 2017-2018. The County followed a planning process in alignment with FEMA guidance during its original development and update, which began with the formation of a hazard mitigation planning committee (HMPC) comprised of key county, city, and district representatives and other stakeholders. The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to Fresno County, assessed the County's vulnerability to these hazards, and examined the capabilities in place to mitigate them. The County is vulnerable to several hazards that are identified, profiled, and analyzed in this plan. Floods, wildfires, severe weather, drought, and agricultural hazards are among the hazards that can have a significant impact on the County.

Based on the risk assessment, the HMPC identified goals and objectives for reducing the County's vulnerability to hazards. To meet identified goals and objectives, the plan recommends a number of mitigation actions that include actions specific to each participating jurisdiction. This plan has been formally adopted by the County and the participating jurisdictions and will be updated every five years at a minimum.

PLANNING PROCESS

Mitigation planning is critical to lessen impacts from hazards to the whole community. In order to achieve this, mitigation planning must encourage whole community involvement, assessing risk and using a range of resources to reduce risk to people, economies, and natural environments. The updated LHMP complies with Federal Emergency Management Agency (FEMA) guidance and California Office of Emergency Services guidelines for Local Hazard Mitigation Plans. The update followed the requirements noted in the Disaster Mitigation Act (DMA) of 2000 and the 2023 Local Hazard Mitigation Planning Handbook.

A wide variety of participants and stakeholders were involved in the update of this plan, which took place between August 2023 and May 2024. The following jurisdictions participated in the planning process and will be adopting the updated plan following FEMA approval.

- Fresno County
- City of Clovis
- City of Coalinga



- City of Firebaugh
- City of Fowler
- City of Fresno
- City of Kerman
- City of Kingsburg
- City of Mendota
- City of Reedley
- City of San Joaquin
- City of Sanger
- City of Selma
- Fresno Metropolitan Flood Control District
- Lower San Joaquin Levee District
- Sierra Resource Conservation District/Highway 168 Fire Safe Council
- Kings River Conservation District
- Westlands Water District

In addition to the jurisdictions adopting the plan, the HMPC included a wide variety of other stakeholders, including:

- American Red Cross of the Central Valley
- California State University, Fresno
- Cargill
- Central Valley Flood Protection Board
- City of Huron
- City of Orange Cove
- City of Parlier
- Clovis Community College
- Fresno Chamber of Commerce
- Fresno City College
- Fresno Madera Continuum Of Care (FMCoC)
- Inyo County Office of Emergency Services



- Kern County Fire
- Kings County Emergency Management
- Madera County Emergency Management
- Mariposa County Emergency Management
- Merced County Emergency Management
- Mono County
- Monterey County Emergency Management
- PG&E
- Pilot Power Group
- Reedley College
- San Benito County Emergency Management
- San Joaquin College of Law
- San Joaquin River Exchange Contractors Water Authority
- Southern California Edison
- Sun-Maid
- Tulare County OES
- United Way of Tulare County
- West Hill College Coalinga

A complete list of the participants in the HMPC is included in Appendix B: Participation Documentation.

RISK ASSESSMENT

The Fresno County HMPC conducted a hazard identification study to determine the hazards that threaten the planning area. Using existing hazards data and input gained through planning meetings during the 2024 plan update, the HMPC agreed to continue to profile the same 19 hazards identified in the 2018 plan. In order to update the profiled hazards, data from the California Governor's Office of Emergency Services (CA-OES), FEMA, the National Oceanic and Atmospheric Administration, and many other sources were examined to assess the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries and property, economic, and crop damage as the county is one of the largest agricultural producers in the state. The hazards evaluated as part of this



plan include those that occurred in the past or have the potential to cause significant human and/or monetary losses in the future. The profiled hazards are:

- Agricultural Hazards
- Avalanche
- Dam Failures
- Drought
- Earthquake
- Flood
- Wildfire
- Volcano
- Epidemic/Pandemic
- West Nile Virus
- Landslide
- Extreme Temperatures
- Extreme Cold/Freeze
- Extreme Heat
- Fog
- Heavy Rain/Thunderstorm/Hail/Lightning/Wind
- Winter Storm
- Tornado
- Erosion
- Expansion Soils
- Land Subsidence
- Landslide

MITIGATION STRATEGY

Based on a review of the risk assessment and a conversation about changes in the last five years, the HMPC identified the following goals and objectives, which provide the direction for reducing future hazard-related losses within the Fresno County planning area. These are the same goals and objectives as were listed in the previous plan, with a small change to reflect FEMA's transition from the PDM to BRIC program.



- **Goal 1: Provide Protection for People’s Lives from Hazards**
 - Objective 1.1: Provide timely notification and direction to the public of imminent and potential hazards
 - Objective 1.2: Protect public health and safety by preparing for, responding to, and recovering from the effects of natural or technological disasters
 - Objective 1.3: Improve community transportation corridors to allow for better evacuation routes for the public and better access for emergency responders
- **Goal 2: Improve All Communities’ Resilience and Capabilities to Mitigate Hazards and Reduce Exposure to Hazard-Related Losses**
 - Objective 2.1: Reduce wildfires/protect life, property, and natural resources from damaging wildfires
 - Objective 2.2: Reduce flood and storm-related losses
 - Objective 2.3: Reduce hazards that adversely impact the agricultural industry
 - Objective 2.4: Minimize the impact to the communities due to recurring drought conditions that impact both ground water supply and the agricultural industry
 - Objective 2.5: Minimize the risk/loss to endangered species, native plants, land (erosion), and native wildlife
- **Goal 3: Improve Community and Agency Awareness about Hazards and Associated Vulnerabilities that Threaten Fresno County Planning Area Communities**
 - Objective 3.1: Increase public awareness about the nature and extent of hazards they are exposed to, where they occur, what is vulnerable, and recommended mitigation and preparedness for identified hazards
- **Goal 4: Provide Protection for Critical Facilities, Utilities, and Services from Hazard Impacts**
- **Goal 5: Maintain Coordination of Disaster Planning**
 - Objective 5.1: Coordinate with changing U.S. Department of Homeland Security/FEMA needs
 - Objective 5.2: Coordinate with other community plans
 - Objective 5.3: Maximize the use of shared resources between jurisdictions and special districts for mitigation/communication
 - Objective 5.4: Standardize systems among agencies to provide for better interoperability
- **Goal 6: Maintain/Provide for FEMA Eligibility and Work to Position Jurisdictions for Grant Funding**



- Objective 6.1: Provide County departments and other jurisdictions with information regarding mitigation opportunities
- Objective 6.2: As part of plan implementation, review actions in this plan on an annual basis to be considered for annual FEMA Building Infrastructure and Resilient Communities (BRIC) grant allocations or after a presidential disaster declaration in California for Hazard Mitigation Grant Program funding as well as for other local, state, and federal funding opportunities.

Based on these goals and objectives, each participating community identified specific mitigation actions they could take to reduce hazard related risk. These actions are detailed in Chapter 5 and in the community annexes.

PLAN ADOPTION

The purpose of formally adopting this plan is to secure buy-in from Fresno County and participating jurisdictions, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of DMA 2000. This adoption also establishes compliance with AB 2140 requiring adoption by reference or incorporation into the safety element of the general plan. The governing board for each participating jurisdiction has adopted this multi-hazard mitigation plan by passing a resolution. A copy of the generic resolution and the executed copies are included in Appendix A: Adoption Resolutions.

PLAN IMPLEMENTATION

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to each program and the Fresno County community and its stakeholders. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities. Further information about how the mitigation plan will be implemented, and incorporated into other planning mechanisms, is available in Chapter 6.

1. Introduction





PURPOSE

Fresno County, along with 17 participating jurisdictions, prepared this local multi-jurisdictional hazard mitigation plan to better protect the people and property of the County from the effects of hazard events. This plan underwent a comprehensive update in 2023-2024 building upon the plan that was originally developed in 2009. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Fresno County and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, and Flood Mitigation Assistance (FMA), and Building Resilient Infrastructure and Communities (BRIC). This plan also meets the planning requirements of the National Flood Insurance Program's Community Rating System (CRS).



BACKGROUND AND SCOPE

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated through planned mitigation.

Hazard mitigation is defined by FEMA as “any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event.” The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provide evidence that mitigation activities are highly cost-effective. Natural hazard mitigation saves \$6 on average for every \$1 spent on federal mitigation grants, according to an analysis by the National Institute of Building Sciences. An earlier (2005) study by NIBS found a benefit-cost ratio (BCR) of 4:1.¹

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. This plan documents Fresno County’s hazard mitigation planning process identifies relevant hazards and vulnerabilities and provides strategies the County and participating jurisdictions will use to decrease vulnerability and increase resiliency and sustainability in Fresno County.

The Fresno County Multi-Jurisdictional Hazard Mitigation Plan is a multi-jurisdictional plan that geographically covers everything within Fresno County’s jurisdictional boundaries (hereinafter referred to as the planning area). Unincorporated Fresno County and the following communities and special districts participated in the planning process:

- City of Clovis
- City of Coalinga
- City of Firebaugh
- City of Fowler
- City of Fresno
- City of Kerman
- City of Kingsburg
- City of Mendota
- City of Reedley
- City of San Joaquin
- City of Sanger
- City of Selma
- Fresno Metropolitan Flood Control District
- Kings River Conservation District
- Lower San Joaquin Levee District
- Sierra Resource Conservation District/Highway 168 Fire Safe Council
- Westlands Water District



This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the *Federal Register* on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements, and regulations will be referred to collectively as the Disaster Mitigation Act.) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Fresno County planning area is subject to many kinds of hazards, access to these programs is vital.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. The Fresno County planning area has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.



PLAN ORGANIZATION

The Fresno County Multi-Jurisdictional Hazard Mitigation Plan is organized as follows:

- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Implementation and Maintenance
- Jurisdictional Annexes
- Appendices



JURISDICTIONAL ANNEXES

Each jurisdiction participating in this plan developed its own annex, which provides a more detailed assessment of the jurisdiction's unique risks as well as their mitigation strategy to reduce long-term losses. Each jurisdictional annex contains the following:

- Community profile summarizing geography and climate, history, economy, and population.
- Hazard risk information for geographically specific hazards or unique vulnerabilities.
- Hazard map(s) at an appropriate scale for the jurisdiction, if available.
- Number and value of buildings, critical facilities, and other community assets located in hazard areas, if available.
- Vulnerability information in terms of future growth and development in hazard areas.
- A capability assessment describing existing regulatory, administrative, technical, and fiscal resources and tools as well as outreach efforts and partnerships and past mitigation projects; and
- Mitigation actions specific to the jurisdiction.

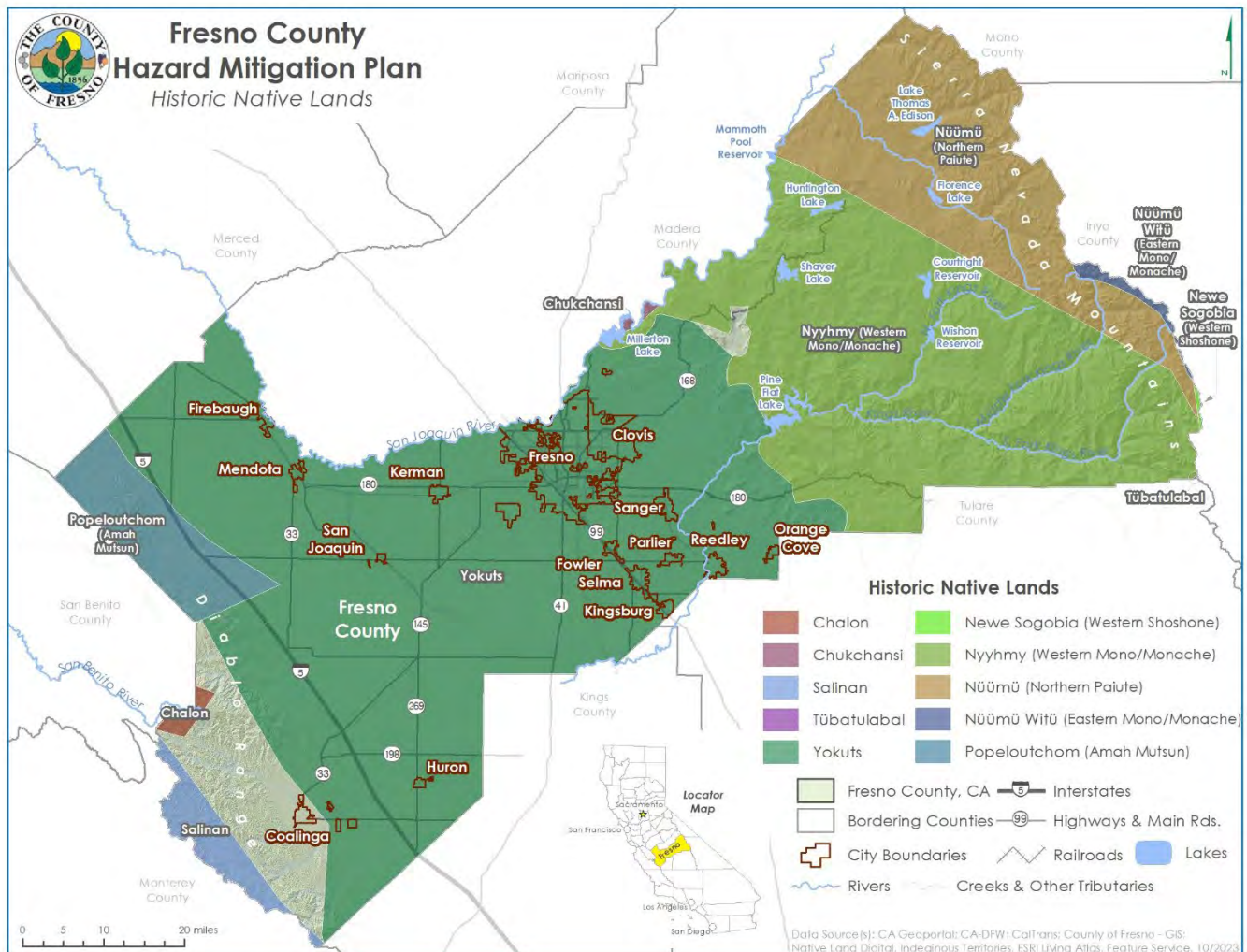
2. Community Profile



HISTORY

When the first European settlers came to the Fresno area in the early 1800s, the Yokuts tribe was living on the valley floor and in the foothills along the San Joaquin and the Kings Rivers. The Monache tribe lived further up the rivers. **Map 1. Historic Tribal Map of Fresno County** provides a map of the historic location of these tribes in Fresno County.

Map 1. Historic Tribal Map of Fresno County



Source: Native Land Digital Indigenous Territories

After the initial Spanish explorers came, others began to arrive, including trappers, hunters, and miners. Kit Carson, the famous mountain man, explored the area during the 1840s. Named for the Spanish word for ash or ash tree, Fresno County was created in 1856, yet its present-day boundaries were not established until 1909. The County was a part of the mining boom of California from its early years until the mid-1860s. Once gold fever subsided, the County turned to livestock and general farming, which

2. Community Profile

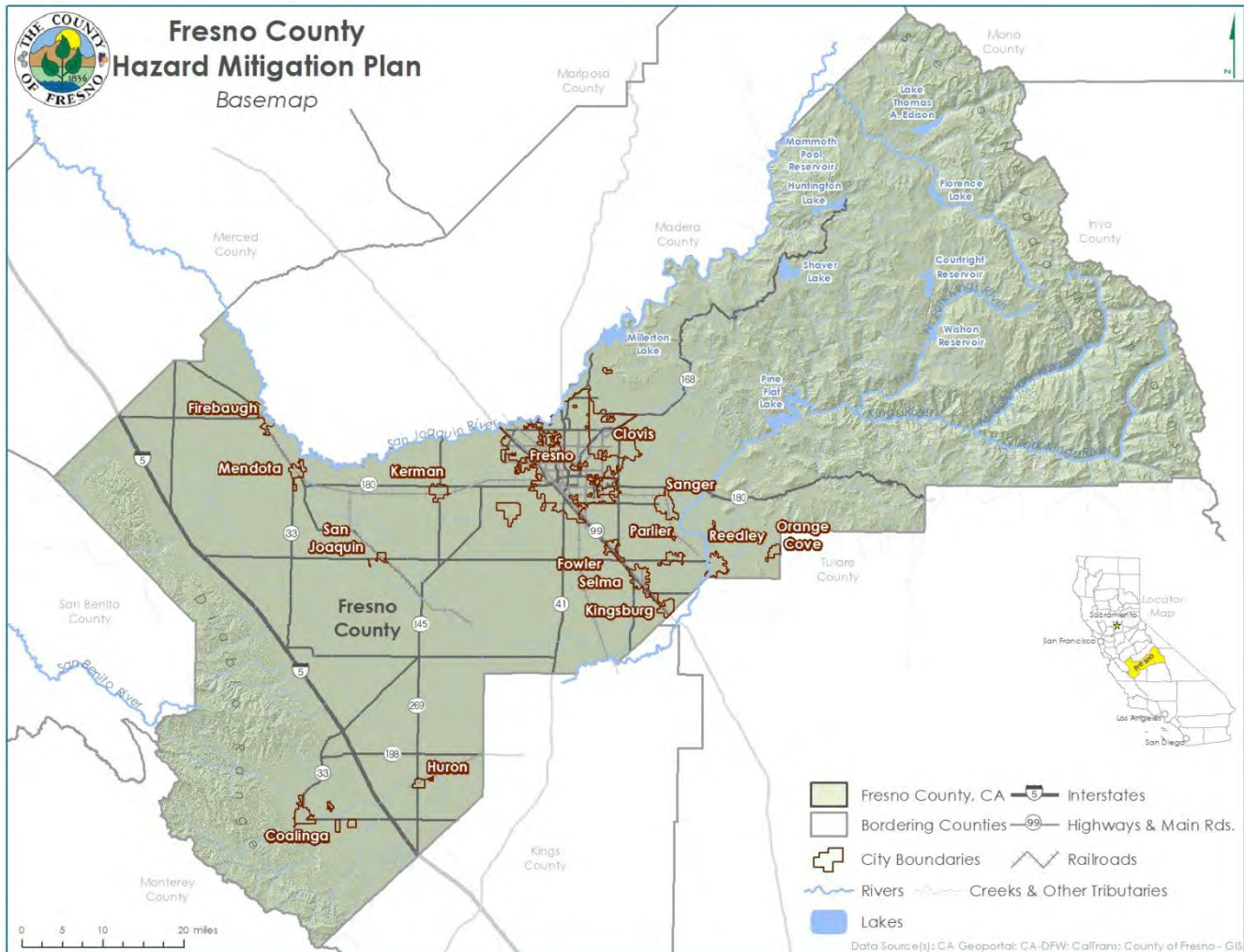


received its impetus from the arrival of the Central Pacific Railroad in 1872. As more water became available, the County shifted from general farming to orchards and vineyards.

GEOGRAPHY AND CLIMATE

One of California's largest counties, Fresno County covers an area of over 6,000 square miles in central California. A map of the county is shown in **Map 2. Fresno County Base Map**. It is approximately 200 miles north-northwest of Los Angeles and approximately 160 miles southeast of San Francisco. The county is home to 15 cities and approximately 35 unincorporated communities.

Map 2. Fresno County Base Map



Source: CA Geoportal; CA-DFW; Cal Trans; County of Fresno – GIS

Fresno County is large and geographically diverse. The County is located near the center of California's San Joaquin Valley and is part of the Great Central Valley, one of the state's distinct physical regions. The County's topography is characterized by broad, flat valley floors that generally slope from southeast to northwest; foothills and moderately high mountains (Coast Ranges) in the west; and foothills and high mountains (Sierra Nevada) in the east. Approximately 55 percent of the County is mountainous, and 45 percent is valley land. Elevations range from 100 to 400 feet on the valley floor to 4,000 feet in the Coast Ranges and more than 14,000 feet in the Sierra Nevada. There are two major

rivers in Fresno County, both which originate in the Sierra Nevada: the San Joaquin and Kings rivers. Additionally, Fresno County is home to a variety of conifer and hardwood forests and woodlands. These tree-dominated habitats can support diverse wildlife populations as well as timber production.

The climate varies among the County's three regions. Summers are long, hot, and dry in the valley; moderate to hot in the Coast Ranges; and relatively cool in the high elevations of the Sierra Nevada. There is little precipitation in the County during the summer. Winters in the valley and Coast Ranges are short and mild with light rain in the valley and moderate rainfall in the Coast Ranges. In the Sierra Nevada, winters vary from short and mild with frequent rain and some snow to moderately severe with frequent snow. Most of the seasonal precipitation occurs between October and April. More specific information about Fresno County's climate can be found in Chapter 4 Risk Assessment.

The mountainous eastern region of the county receives on average up to 70 inches of precipitation annually, mostly in snowfall. Many small mountain lakes and streams in this region are tributaries to the San Joaquin and Kings Rivers which flow into the Central Valley. The valley and western portions of the county, by contrast, are extremely arid, receiving, on average, less than 10 inches of annual rainfall.

The Southern Central Valley Region is projected to increase in temperatures, decline in precipitation along with snowpack in the mountainous area, annual heat waves are projected to increase, and wildfire risk along the eastern edge is projected to experience an increase of 4 to 6 times current conditions according to the Cal-Adapt Climate projections. Detailed information on future climate projections is described in **Table 1. Climate Change Projections for Climate-Related Hazards.**

Table 1. Climate Change Projections for Climate-Related Hazards

Ranges	
Temperature Change (1990-2100)	January increases in average temperatures of 3 to 4 degrees Fahrenheit by 2050 and 7 to 10 degrees Fahrenheit by 2100. July increases in average temperatures of 5 degrees to 6 degrees in 2050 and 9 to 11 degrees Fahrenheit by 2100, with larger temperature increases in the mountainous regions to the east. (modeled high temperatures – average of all models; high carbon emissions scenario)
Precipitation	Low areas are projected to experience declines in annual precipitation of 1 or 2 inches by 2050 and up to 2.5 inches by 2100, while more elevated areas are projected to decline up to 10 inches (CCSM3 climate model; high carbon emissions scenario)
Heat Wave	The threshold temperature that defines a heat wave is over 100 degrees Fahrenheit in most of the region. In the mountains, a heat wave is defined by lower temperatures, 70 degrees to 90 degrees Fahrenheit. By 2050, the number of annual heat waves is projected to increase by three to five. An increase of seven to 10 heat waves is expected by 2100 in most of the region, with an increase of up to 14 expected in the mountain areas.
Snowpack	Snowpack in the eastern elevated regions is projected to decrease by approximately 9 inches, resulting in snowpack that is less than 4 inches by March 2090 (CCSM3 climate model; high emissions scenario)
Wildfire Risk	The eastern edge of the region is projected to experience an increase in wildfire risk of 4 to 6 times current conditions (GFDL model, high carbon emissions scenario)

Source: Public Interest Energy Research, 2011. Cal-Adapt



ECONOMY

Since the early 1950s, Fresno County has been one of the leading agriculture counties in the United States. Therefore, the agricultural industry is critical to protect and grow as it is an economic powerhouse and major source of employment for the county. Agriculture is Fresno County's primary industry and is a driving force in the County's economy. The County's farmland accounts for nearly half of the land base at 1.88 million acres. More than 300 different crops are grown in the jurisdiction supporting 20 percent of all jobs in the Fresno area. In 2021, Fresno County was the second ranking agricultural county in the state, with a total gross production value of over \$8 billion. The leading county for gross production was Tulare County at \$8.6 billion. However, over the years, Fresno, Kern, and Tulare, all in the San Joaquin Valley, tend to be the leading counties for produce production. The leading commodities in Fresno County include grapes, pistachios, milk, oranges, peaches, cattle, garlic, tomatoes, tangerines, and mandarins, as well as nectarines.¹

The 2022 Fresno County Crop and Livestock Report ranks the top 10 crops as:²

1. Grapes
2. Almonds
3. Pistachios
4. Milk
5. Poultry
6. Cattle and calves
7. Tomatoes
8. Peaches
9. Garlic
10. Mandarins

Agriculture accounts for the largest portion of jobs in Fresno County; However, since 1990, the percentage of agriculture-related jobs has continuously fallen. In 1990 agriculture-related jobs accounted for over 50 percent of the total jobs within the top ten ranking industries. By 2000, there was a decrease, with agriculture-related jobs falling to approximately 47 percent of those total jobs. By 2013, the percentage had decreased to approximately 36 percent and has continuously decreased to date. While the agricultural economy is improving, the industry struggles with labor shortages during peak harvest periods, increased production expenses, and climate hazard-related losses such as extreme heat and warm nights, drought, and wildfires. Additionally, climate and weather-related hazards pose a risk to the health and safety outdoor and farm workers within the industry.³ Beyond agriculture and

¹ California Agriculture Statistics Review 2021-2022 https://www.cdfa.ca.gov/Statistics/PDFs/2022_Ag_Stats_Review.pdf

² AG Crop Report_1ST HALF OF BOOK (fresnocountyca.gov)
<https://www.fresnocountyca.gov/files/sharedassets/county/v/1/agricultural-commissioner/ag-crop-reports/2022-ag-crop-report-optimized.pdf>

³ fcgpr_general-plan_prd-county_redline_2024-01-12_1.pdf (fresnocountyca.gov)
https://www.fresnocountyca.gov/files/sharedassets/county/v/1/public-works-and-planning/development-services/planning-and-land-use/general-plan-review-comments/fcgpr_general-plan_prd-county_redline_2024-01-12_1.pdf



farming, construction is additional sector of employment for the county as well as the healthcare field, showing robust growth in Fresno County.

Despite the success of the booming agriculture and construction industries, the unemployment rate in the county has remained high and the average minimum wage, while above the state's, remains low. As of November 2023, the unemployment rate in Fresno County was 7.6 percent up from 6.9 percent in October 2023 and above the 2022 rate of 6.3 percent. Compared to other San Joaquin Valley Counties, Fresno County's unemployment rate is average. San Joaquin and Stanislaus has an unemployment rate of 6.4 percent, Merced 8.5 percent, Kings 8 percent, Tulare 10.2 percent, Kern 7.8 percent. Between October and November 2023, total industry employment decreased by 1,600 jobs and farm employment down 9.7 percent. In fact, farm employment recorded the largest month-over decline with a drop of 3,900 jobs. Areas with seasonal economies, such as the County's agriculture industry, tend to have higher unemployment. Annual Employment by Industry compares the distribution of employment in Fresno County to the State of California. **Table 2. Employment in Fresno County and California, 2023** describes the employment statistics for Fresno County.

Table 2. Employment in Fresno County and California, 2023

	Fresno County		California	
	Nov 23 Prelim	Percent Change Year	Nov 23 Prelim	Percent Change Year
Civilian Labor Force (1)	461,000	0.7%	19,360,500	0.2%
Civilian Employment	426,200	-6%	18,436,6000	-0.2%
Civilian Unemployment	34,800	20.0%	946,300	21.4%
Civilian Unemployment Rate	7.6%	Unavailable	4.9%	Unavailable
Civilian Unemployment	4.9%	Unavailable	Unavailable	Unavailable
(CA Unemployment Rate)	4.9%	Unavailable	4.9%	Unavailable
(U.S. Unemployment Rate)	3.5%	Unavailable	3.5%	Unavailable
Total, All Industries (2)	435,100	1.5%	18,769,300	1.5%
Total Farm	36,300	-2.4%	438,200	3.2%
Total Nonfarm	398,800	1.9%	18,331,100	1.4%
Total Private	317,900	1.4%	15,705,400	1.5%
Goods Producing	50,300	1.4%	2,306,900	1.1%
Mining, Logging, and Construction	23,000	2.7%	968,400	3.9%
Mining and Logging	200	0.0%	20,100	1.0%
Construction	22,800	2.7%	948,300	4.0%
Specialty Trade Contractors	15,500	4.0%	630,400	4.7%
Manufacturing	27,300	0.4%	1,338,500	-0.8%
Durable Goods	9,500	-1.0%	869,000	-1.1%
Non-Durable Goods	17,800	1.1%	469,500	-0.3%
Food Manufacturing	13,400	3.1%	171,600	2.9%
Service-Providing	348,500	2.0%	16,024,200	1.5%
Private Service Providing	267,600	1.4%	13,398,500	1.5%
Construction – Residual	7,300	0.0%	Unavailable	Unavailable

2. Community Profile



	Fresno County		California	
	Nov 23 Prelim	Percent Change Year	Nov 23 Prelim	Percent Change Year
Trade, Transportation, and Utilities	79,100	0.5%	3,221,300	0.5%
Wholesale Trade	15,900	-1.2%	654,300	-2.5%
Retail Trade	41,600	0.5%	1,675,600	1.2%
Food and Beverage Retailers	8,500	2.4%	382,800	1.8%
General Merchandise Retailers	10,400	5.1%	331,300	2.2%
Transportation, Warehousing, and Utilities	21,600	1.9%	891,400	1.4%
Transportation and Warehousing	18,500	0.5%	827,400	1.4%
Information	3,400	3.0%	580,200	-5.4%
Financial and Insurance	8,300	2.5%	532,300	-1.2%
Insurance Carriers and Related Activities	4,200	0.0%	202,600	-0.4%
Real Estate and Rental and Leasing	5,300	2.5%	313,800	-0.1%
Professional and Business Services	36,000	1.1%	2,902,200	-1.1%
Professional, Scientific, and Technical Service	11,600	-4.1%	1,473,000	1.3%
Management of Companies and Enterprises	2,900	3.6%	251,900	0.3%
Administrative and Support and Waste Management	21,500	3.9%	1,177,300	-4.2%
Administrative and Support Services	19,900	3.6%	1,121,000	-4.4%
Waste Management and Remediation Services	1,600	6.7%	56,300	-1.1%
Private Education and Health Services	4,200	-0.1%	3,169,800	4.6%
Private Educational Services	4,200	-10.6%	419,200	2.6%
Health Care and Social Assistance	78,200	0.5%	2,750,600	4.9%
Ambulatory Health Care Services	22,600	-2.2%	988,400	3.3%
Hospitals	15,500	-0.6%	414,300	2.1%
Nursing and Residential Care Facilities	8,300	1.2%	320,800	7.2%
Social Assistance	31,800	2.9%	1,027,100	7.0%
Leisure and Hospitality	39,500	5.9%	2,081,600	4.9%
Accommodation and Food Services	35,000	6.4%	1,732,200	4.5%
Food Services and Drinking Places	33,000	7.1%	1,515,200	4.5%
Other Services	13,600	3.0%	597,300	4.0%
Government	80,900	3.9%	2,625,700	1.2%
Federal Government	9,600	-2.0%	250,500	1.0%

2. Community Profile



	Fresno County		California	
	Nov 23 Prelim	Percent Change Year	Nov 23 Prelim	Percent Change Year
Total State and Local Government	71,300	4.7%	2,375,200	1.2%
State Government	13,200	2.3%	550,200	-0.4%
State Government Educational Services	4,200	2.4%	251,900	-1.4%
Local Government	58,100	5.3%	1,825,000	1.7%

Source: California Employment Development Department, *Employment by Industry Data*, 2023

1) Civilian labor force data are by place of residence; include self-employed

individuals, unpaid family workers, household domestic workers, & workers on strike.

Data may not add due to rounding. The unemployment rate is calculated using unrounded data.

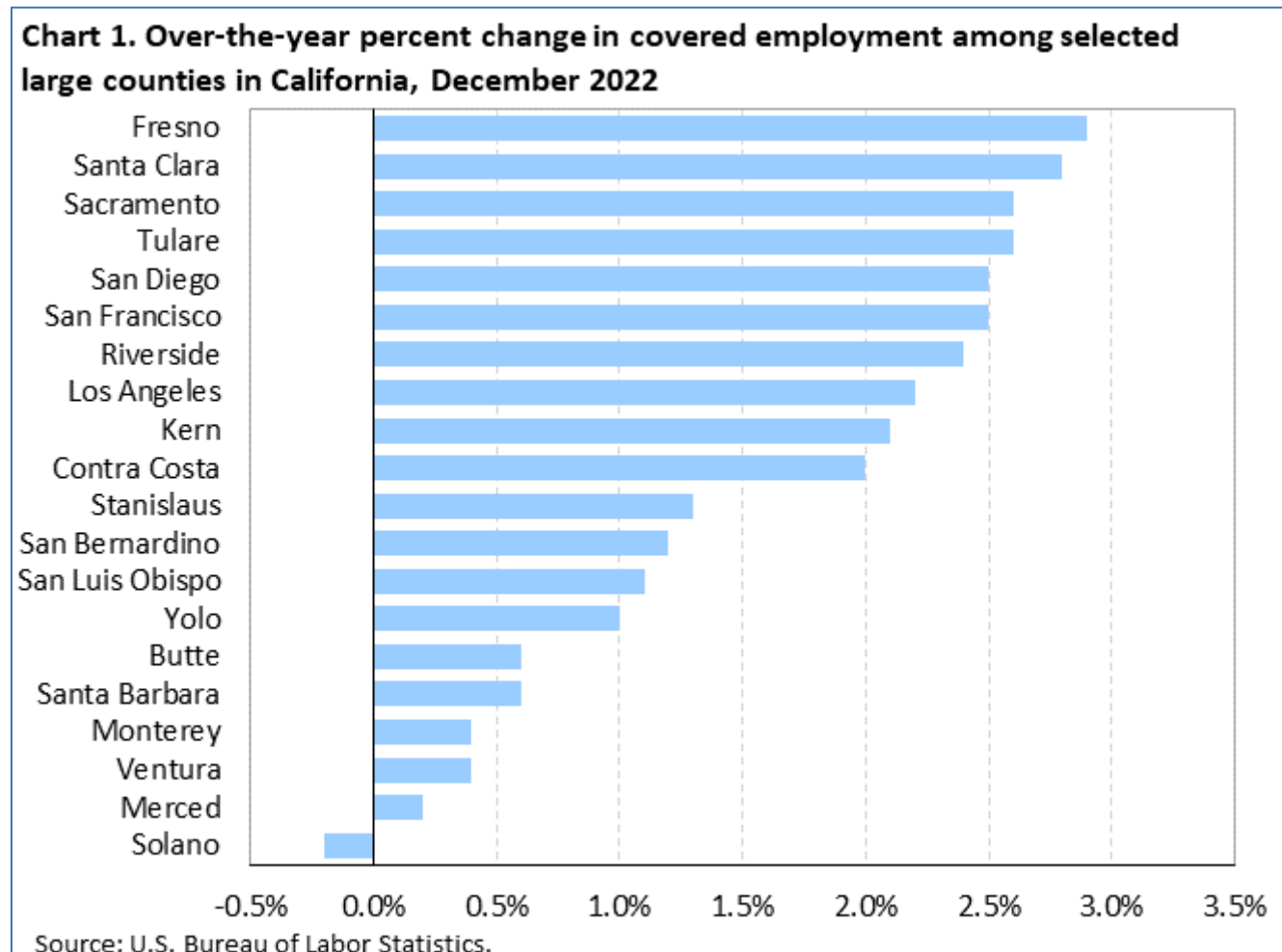
(2) Industry employment is by place of work; excludes self-employed individuals,

unpaid family workers, household domes



In 2022, Fresno County's employment rose and was the largest over-the-year percent change in covered employment among selected large counties in California at 2.9 percent shown in **Figure 1. Percent Change in Employment Among Large Counties in California, 2022**. Nationally, employment increased 2.6 percent over the year.⁴

Figure 1. Percent Change in Employment Among Large Counties in California, 2022



Source: U.S. Bureau of Labor Statistics

Comprehensive economic data available for Fresno County comes from the U.S. Census Bureau by way of the American Community Survey. Select estimates of economic characteristics for Fresno County are shown in **Table 3. Fresno County Economic Characteristics** and **Table 4. Fresno County Employment by Industry**.

⁴ County Employment and Wages in California — Fourth Quarter 2022 : Western Information Office : U.S. Bureau of Labor Statistics (bls.gov) https://www.bls.gov/regions/west/news-release/countyemploymentandwages_california.htm

**Table 3. Fresno County Economic Characteristics**

Characteristic	Fresno County
In civilian labor force, total, percent of population age 16 years+	62.7
In civilian labor force, female, percent of population age 16 years+	383,402
Total accommodation and food services sales, 2017 (\$1,000)	\$1,783,383
Total health care and social assistance receipts/revenue, 2017 (\$1,000)	\$6,660,486
Total retail sales, 2017 (\$1,000) (c)	11,346,970
Median household income (in 2022 dollars), 2018-2022	\$67,756
Per capita income in past 12 months (in 2015 dollars), 2018-2022	\$30,130
Persons in poverty, percent	18.6%
Total employer establishments, 2021	18,199
Total employment 2021	276,218
Total annual payroll (\$1,000), 2021	14,367,074
Total employment, percent change 2020-2021	-2.8%

Source: U.S. Census Bureau, 2018-2022 American Community Survey 5-Year Estimates

Table 4. Fresno County Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care, and Social Assistance	105,214	23.5%
Retail Trade	44,105	9.9%
Agriculture, Forestry, Fishing and Hunting, and Mining	33,444	7.5%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	41,873	9.4%
Professional, Scientific, and Management, and Administrative and Waste Management Services	41,376	9.2%
Manufacturing	29,670	6.6%
Public Administration	22,473	5%
Construction	29,222	6.5%
Other Services, Except Public Administration	22,473	5.0%
Transportation and Warehousing, and Utilities	33,307	7.4%
Finance and Insurance, and Real Estate and Rental and Leasing	20,222	4.5%
Wholesale Trade	12,255	2.7%

2. Community Profile



Industry	# Employed	% Employed
Information	4,844	1.1%
Total	440,478	100.0

Source: U.S. Census Bureau American Community Survey, 2023 Estimates, www.census.gov/

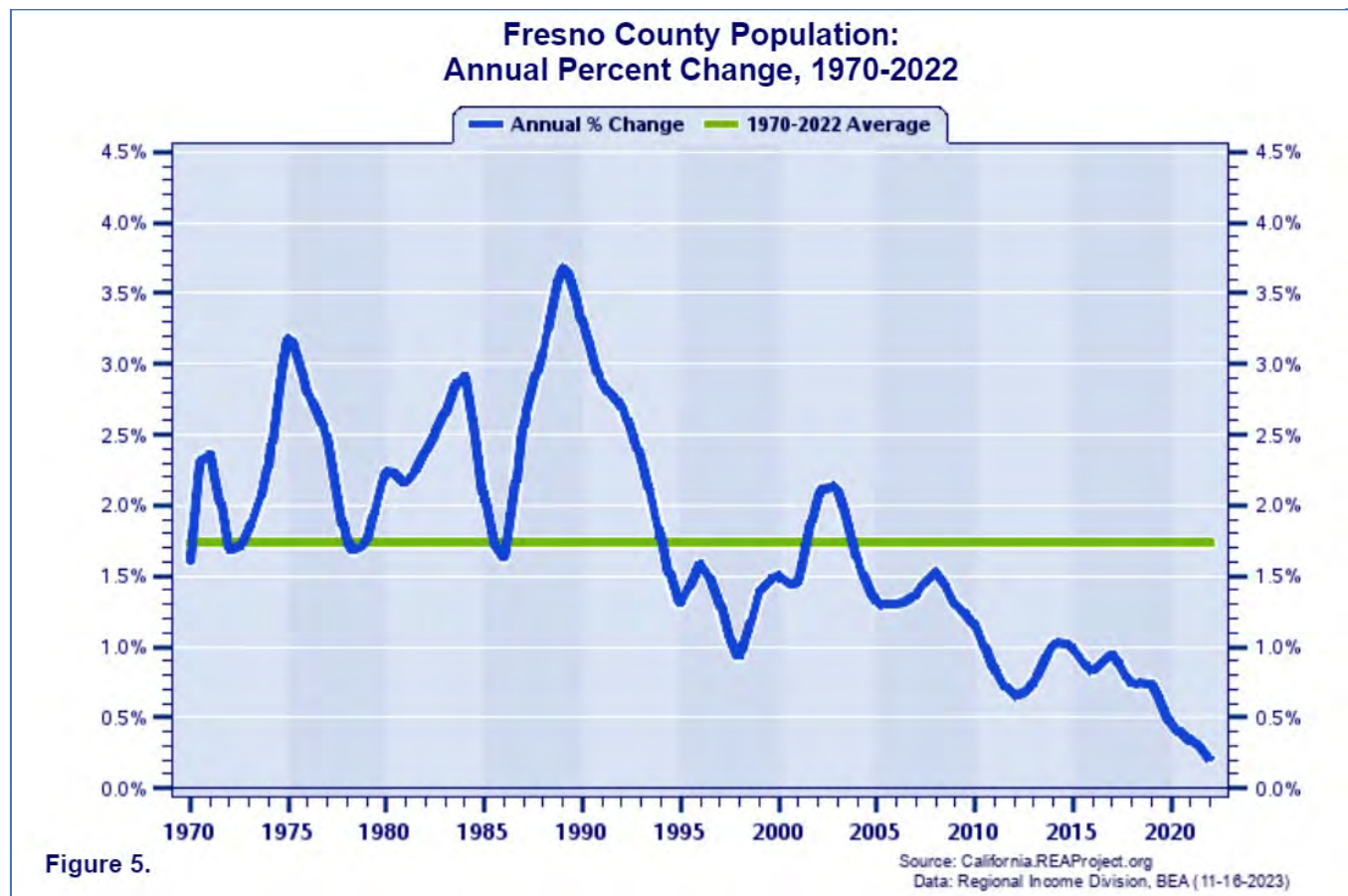
The median household income for Fresno County has increased over the past nine years, from about \$41,900 in 2005 to \$45,233 in 2015 and \$69,571 in 2023. In comparison with other San Joaquin Valley counties, the median household income is somewhat low. The County falls significantly short of the state median household income \$91,905, as well as other counties in the San Joaquin Valley \$82,837 in San Joaquin County and \$74,872 in Stanislaus County.

To address unemployment rates and loss of jobs, the county is working to expand, diversify, and strengthen the job base. New industrial sectors for the county include service and technology as well as light manufacturing. Business opportunities in areas such as information processing, water, energy, and health care have gained traction in the county and are projected to be pillars in the future regional economy.

POPULATION

Fresno County is one of the largest, fastest growing, and most diverse counties in California. It is the state's 10th most populous county according to the California Department of Finance. Based on the 2020 census, Fresno County has a population of 1,008,654. **Figure 2. Fresno County Population: Annual Percent Change (1970-2022)** displays the short-run pattern of Fresno County's population growth by tracking the year-to-year percent change over 1970-2022. The average annual percent change for the entire 53-year period is also traced to this chart to provide a benchmark for gauging periods of relatively high--and relatively low--growth against the backdrop of the long-term average.⁵ **Table 5. Fresno County Population by Jurisdiction** displays the population among Fresno County and its municipalities. The City of Fresno encompasses most of the population while the City of San Joaquin is home is the least number of residents in the County.

Figure 2. Fresno County Population: Annual Percent Change (1970-2022)



Source: California REA Project

⁵ Fresno County vs. California | Population Trends Report over 1969-2022 (reaproject.org)
<https://california.reaproject.org/analysis/comparative-trends-analysis/population/reports/60019/60000/>

**Table 5. Fresno County Population by Jurisdiction**

Jurisdiction	Population 2020
Fresno County	1,008,654
Fresno	542,107
Clovis	120,124
Coalinga	17,590
Firebaugh	8,096
Fowler	6,700
Huron	6,206
Kerman	16,016
Kingsburg	12,380
Mendota	12,595
Reedley	25,227
San Joaquin	3,700
Sanger	26,617
Selma	24,674

Source: U.S. Census Bureau, 2020

Fresno County residents have completed less formal education than residents of California as a whole, with 78.3 percent of the population in Fresno County attaining education levels beyond a high school diploma, compared with 84.4 percent of the population in California. Select demographic and social characteristics for Fresno County from the 2023 estimates American Community Survey are shown in **Table 6. Fresno County Demographics.**

Table 6. Fresno County Demographics

Fresno County	
Population	
Population, 2022 estimate	1,015,190
Population, percent change-2020 (estimates base) to 2022	0.6%
Population, Census, 2020	1,008,654
Age and Sex	
Persons under 5 years, percent	6.9%
Persons under 18 years, percent	27.6%
Persons 65 years and over, percent	12.9%
Female persons, percent	49.7%
Race and Hispanic Origin	
White alone, percent	34.7%
Black or African American alone, percent	5.4%
American Indian and Alaska Native alone, percent	0.4%
Asian alone, percent	15.1%



Fresno County	
Native Hawaiian and Other Pacific Islander alone, percent	0.3%
Two or More Races, percent	4.1%
Hispanic or Latino, percent	39.4%
White alone, not Hispanic, or Latino percent	34.7%
Education	
High school graduate or higher, percent of persons aged 25 years+ (2018-2022)	78.3%
Bachelor's degree or higher, percent of persons aged 25 years+ (2018-2022)	23.4%

Source: U.S. Census Bureau, 2022 5-Year American Community Survey (ACS)

VISITING POPULATION

Every year, millions of people visit Fresno County, more of half of which visit for leisure activities. Fresno County is the gateway to many recreational activities including national and state parks. The Yosemite, Kings Canyon, and Sequoia National Parks and other High Sierra sights attract visitors from all over the world. The Fresno/Clovis Convention and Visitors Bureau found that in 2022 travelers to Fresno County spent a combined \$1.3 billion up 31.4 percent from 2021 which is very similar to the state's average at 31.7 percent. The boom in tourism added more than 15,000 jobs to the region. ⁶

FARMWORKERS

Fresno County is one of the leading counties in agricultural production and provides produce and goods to nearly 100 countries across the world. As such, the level of production would not be possible without the labor of farmworkers. Disasters, such as the recent atmospheric rivers and subsequent flooding, have devastated communities in Fresno County, especially farmworkers. Flooded roads and farms for example, significantly impact farm workers due to lack of paychecks which can lead to or exacerbate financial hardships. Lost wages brought on by inequitable extreme weather events can increase the disparity within the farmworker community. It is important that mitigation goals and actions are working towards reducing risk to protect the agricultural industry, specifically the farm workers as the county's economy and success depends on the labor of these workers.

SOCIAL VULNERABILITY

Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in the preparedness, response, recovery, and mitigation stages. For instance, the COVID-19 pandemic shed light on pre-existing disparities such as limited healthcare access, leading to higher rates of emergency department visits, hospitalizations, and mortality among vulnerable groups. It is essential to recognize and understand these community-specific limitations and barriers to ensure equitable preparedness and response strategies for future incidents.

⁶ Visitors to Fresno County spent big bucks last year; see how much tourism brings - The Business Journal
<https://thebusinessjournal.com/visitors-to-fresno-county-spent-big-bucks-last-year-see-how-much-tourism-brings/>



SOCIAL VULNERABILITY INDEX

To aid in this, the Centers for Disease Control and Prevention (CDC) developed the Social Vulnerability Index (SVI), a comprehensive tool designed for emergency management planners and practitioners at state, local, and tribal levels. The SVI helps identify communities with high social vulnerability, potentially facing greater impacts during emergencies and disasters. This tool is instrumental in guiding targeted efforts in preparedness, response, and recovery, and in understanding the unique challenges certain communities may face, such as evacuation difficulties due to lack of transportation.

The SVI utilizes 16 variables, including factors like education level, presence of disabilities, and access to transportation, to calculate a community's vulnerability score. This score ranges from 0 to 1, where higher scores indicate increased vulnerability. The evaluation is percentile-based, with communities in the top 10 percent (above the 90th percentile) for a variable scoring a 1, denoting high vulnerability, and those in the bottom 10 percent scoring a 0. Additionally, the SVI categorizes these 16 variables into four distinct themes, providing deeper insights into specific vulnerability aspects. These themes and their constituent variables offer a nuanced understanding of a community's resilience and ability to handle disasters, both in terms of human impact and financial consequences. In Fresno County, the SVI index is .9649 which indicates a high level of social vulnerability, shown in **Map 3. Fresno County Social Vulnerability Index**.

Fresno County
Hazard Mitigation Plan
Social Vulnerability Index

Social Vulnerability Index
Overall Summary Ranking

- 75.1% - 100%
- 50.1% - 75%
- 25.1% - 50%
- 0% - 25%

Percentile Ranking by Census Tracts

- Fresno County, CA
- Bordering Counties
- City Boundaries
- Rivers
- Lakes
- Interstates
- Highways & Main Rds.
- Railroads
- Creeks & Other Tributaries

Locator Map

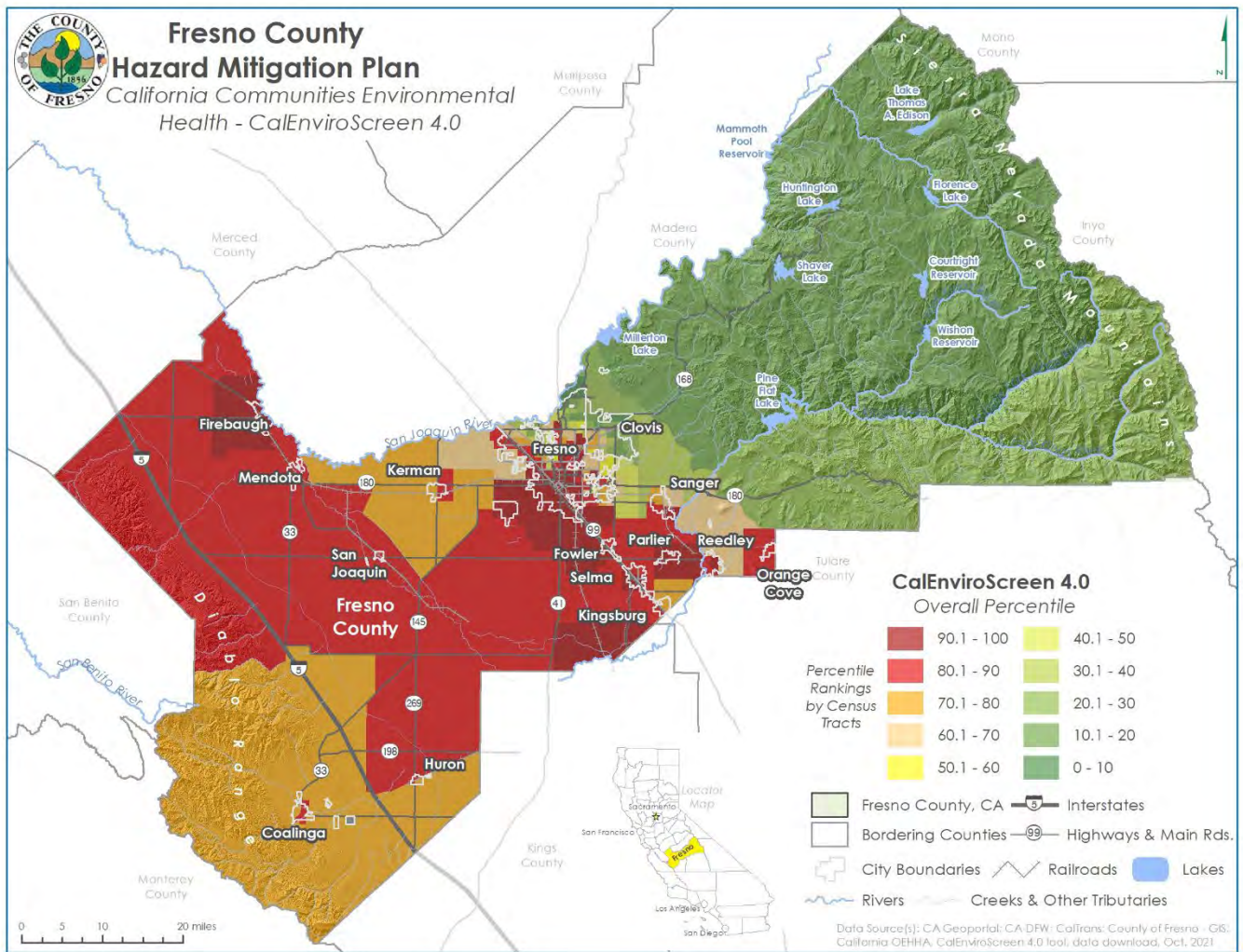
Data Source(s): CA Geoportal; CA-DFW; Caltrans; County of Fresno - GIS Centers for Disease Control and Prevention/Agency for Toxic Substances & Disease Registry/Geospatial Research, Analysis, & Services Program. CDC/ATSDR Social Vulnerability Index 2020 Database California

2024 Fresno County Hazard Mitigation Plan
May 2024

DISADVANTAGED COMMUNITIES

The California Environmental Protection Agency developed a tool called CalEnviroScreen to identify communities most impacted by poverty and pollution. The Senate Bill 535 Disadvantaged Communities map identifies census tracts that have an overall CalEnviroScreen score of 75 or above, meaning they are among the top 25 percent most vulnerable and burdened by pollution in the state. In Fresno County, nearly all the census tracts in the eastern part of the county are identified as disadvantaged communities, shown in **Map 4. Fresno County Disadvantaged Communities**.

Map 4. Fresno County Disadvantaged Communities



Source: California OEHHA, CalEnviroScreen 4.0 Tool



DEVELOPMENT AND INFRASTRUCTURE

POPULATION

California has long been known for its significant population growth and has sustained its growth for a long period of time. Additionally, the state of California is home to many diverse populations and communities including immigrants from more than 60 nations. While growth rates have recently slowed, the state is still growing faster than the country. The state's growth and changing population will put pressure on infrastructure, service needs, future planning efforts should incorporate population changes to account for increased population growth. Fresno County has a projected population growth of about 88,000 people in the next 40 years. Population projections for the San Joaquin Valley counties are described in **Table 7. San Joaquin Valley Future Population Estimates**.

Table 7. San Joaquin Valley Future Population Estimates

Geography	Estimates 2020	Estimates 2030	Estimates 2040	Estimates 2050	Estimates 2060
Fresno County	1,007,344	1,047,382	1,083,901	1,098,206	1,095,205
Stanislaus County	553,706	558,565	577,523	593,396	609,615
Merced County	280,909	311,578	329,168	336,170	338,247
Madera County	156,141	161,980	163,345	161,937	159,048
Kings County	152,200	157,531	161,190	160,446	156,194
Tulare County	472,597	487,378	487,888	472,966	446,588
Kern County	905,241	940,257	966,310	969,968	954,655

Source: State of California Department of Finance

Since 1960, Fresno County's population has shifted from the county's unincorporated area to the county's cities. Fresno County's population and anticipated growth is mostly concentrated in and around the county's cities. The Fresno metropolitan area has absorbed much of the county's population growth, either through annexations or new development. On average, Fresno County's population grew at an annual rate of 1.74 percent over 1970-2022. The county posted its highest growth in 1989 (3.68 percent) and recorded its lowest growth in 2022 (0.22 percent). In 2022, Fresno County's population grew by 0.22 percent.

HOUSING

As the population increases, additional demand on infrastructure and services will follow including education, transportation corrections, water, health, welfare, and especially housing. The state of California struggles to house its growing population and as a result has a large, unhoused population. Fresno County faces similar struggles as the state and is working to address the ongoing housing crisis, which has recently been exacerbated by the COVID-19 pandemic. As of 2022, there are an estimated 4,200 individuals that are without housing in the Fresno-Madera region. Since the COVID-19

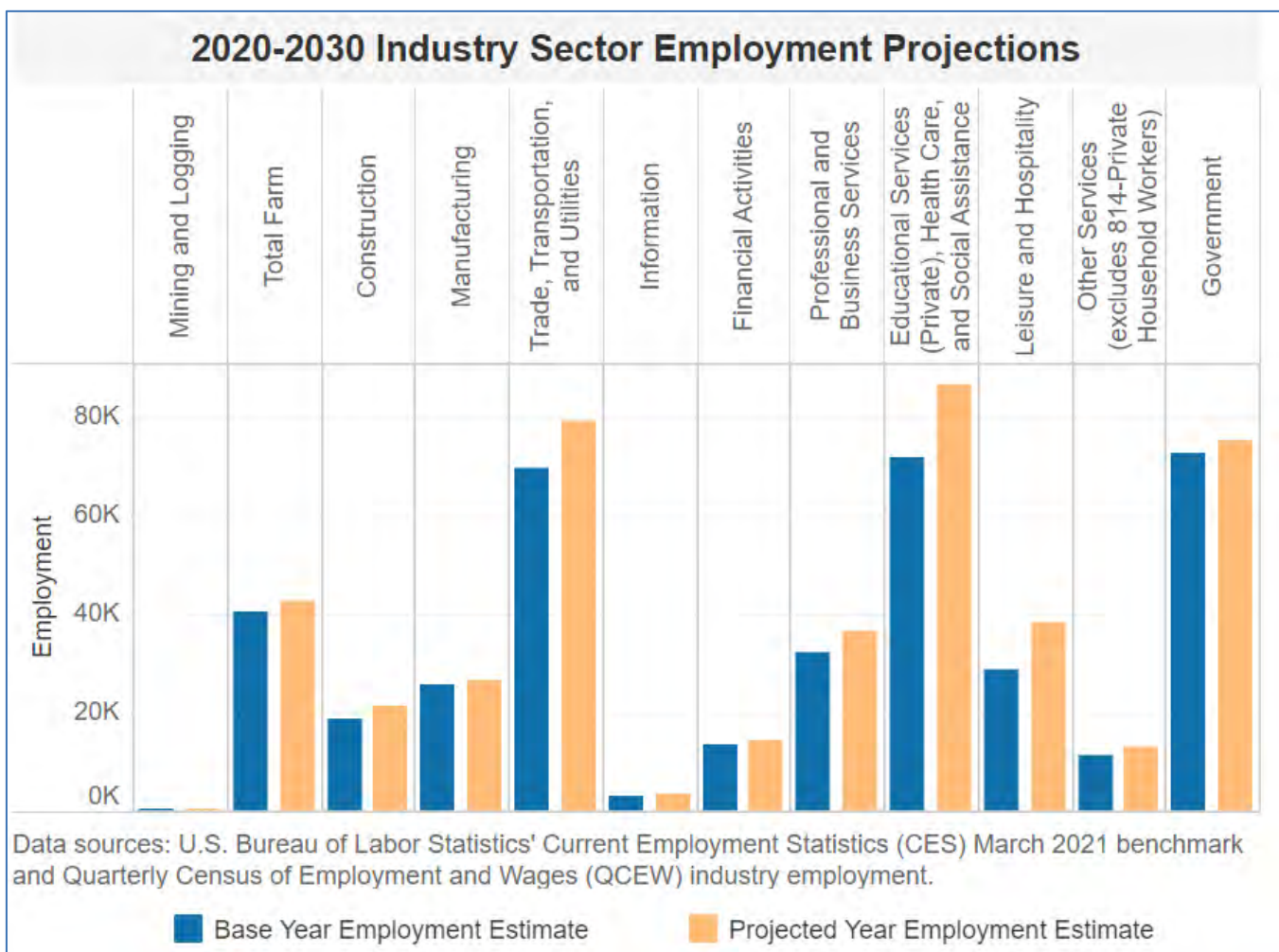


pandemic, there has been a 43 percent increase in the homeless population from the pre-pandemic estimated of 3,641 in the Fresno-Madera region. ⁷

EMPLOYMENT

Employment projections according to the California Employment Development Department, are estimated to increase across all industries including Trade, Transportation, and Utilities, as well as Educational Services (private), Health Care, and Social Assistance, shown in **Figure 3. 2020-2030 Industry Sector Employment Projections**.

Figure 3. 2020-2030 Industry Sector Employment Projections



Source: U.S. Bureau of Labor Statistics' Current Employment Statistics (CES) March 2021 benchmark and Quarterly Census of Employment and Wages (QCEW) industry employment.

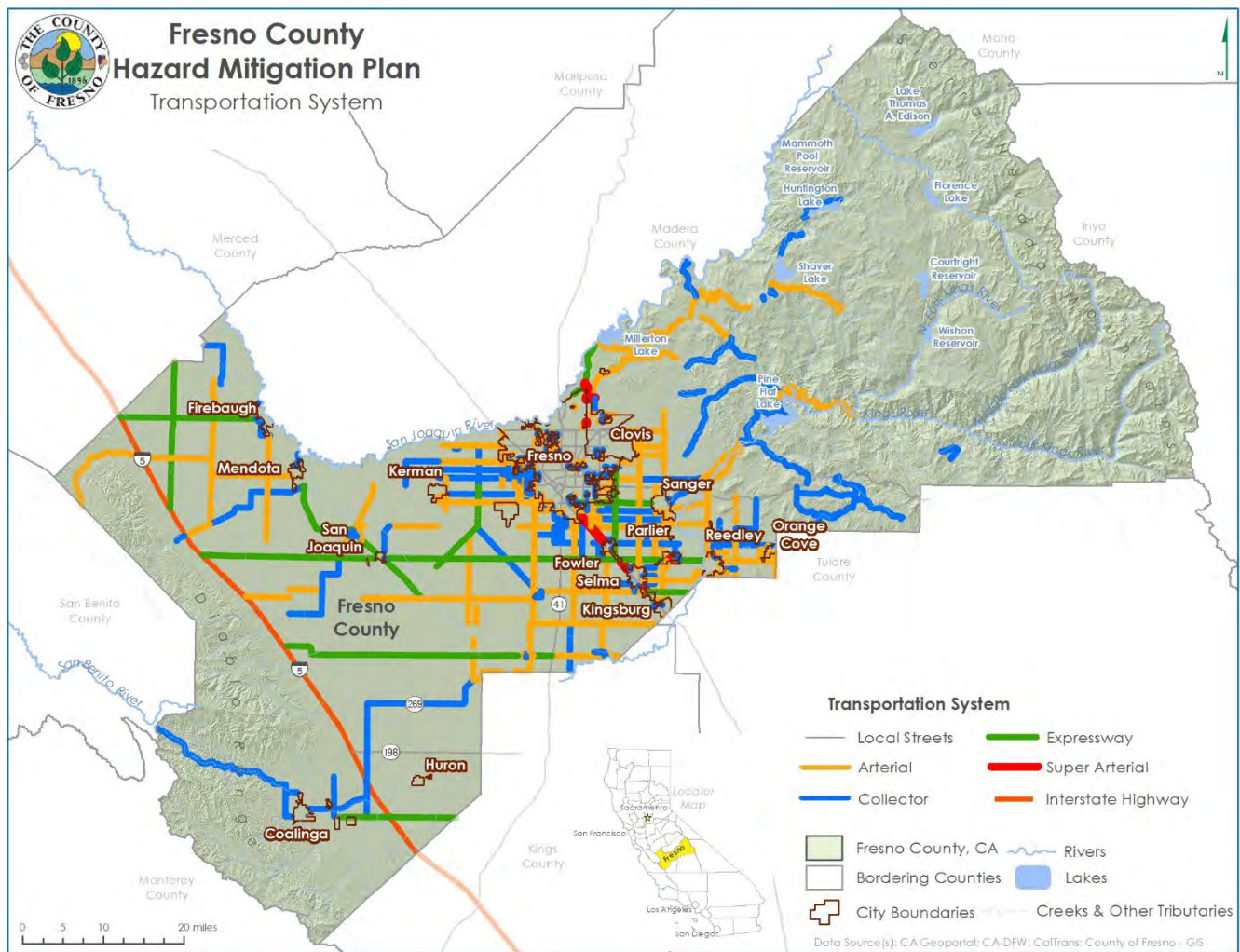
⁷ Fresno leaders share plans to address homelessness - CalMatters <https://calmatters.org/california-divide/2022/01/fresno-homelessness/>



TRANSPORTATION

Fresno County is situated mostly west of Interstate 5, which is the major highway stretching across the West Coast from Southern California to Northern Washington State. Interstate 5 experiences heavy traffic due to local, regional, and national travel of people and goods. **Map 5. Fresno County Transportation System** shows the Fresno County transportation system.

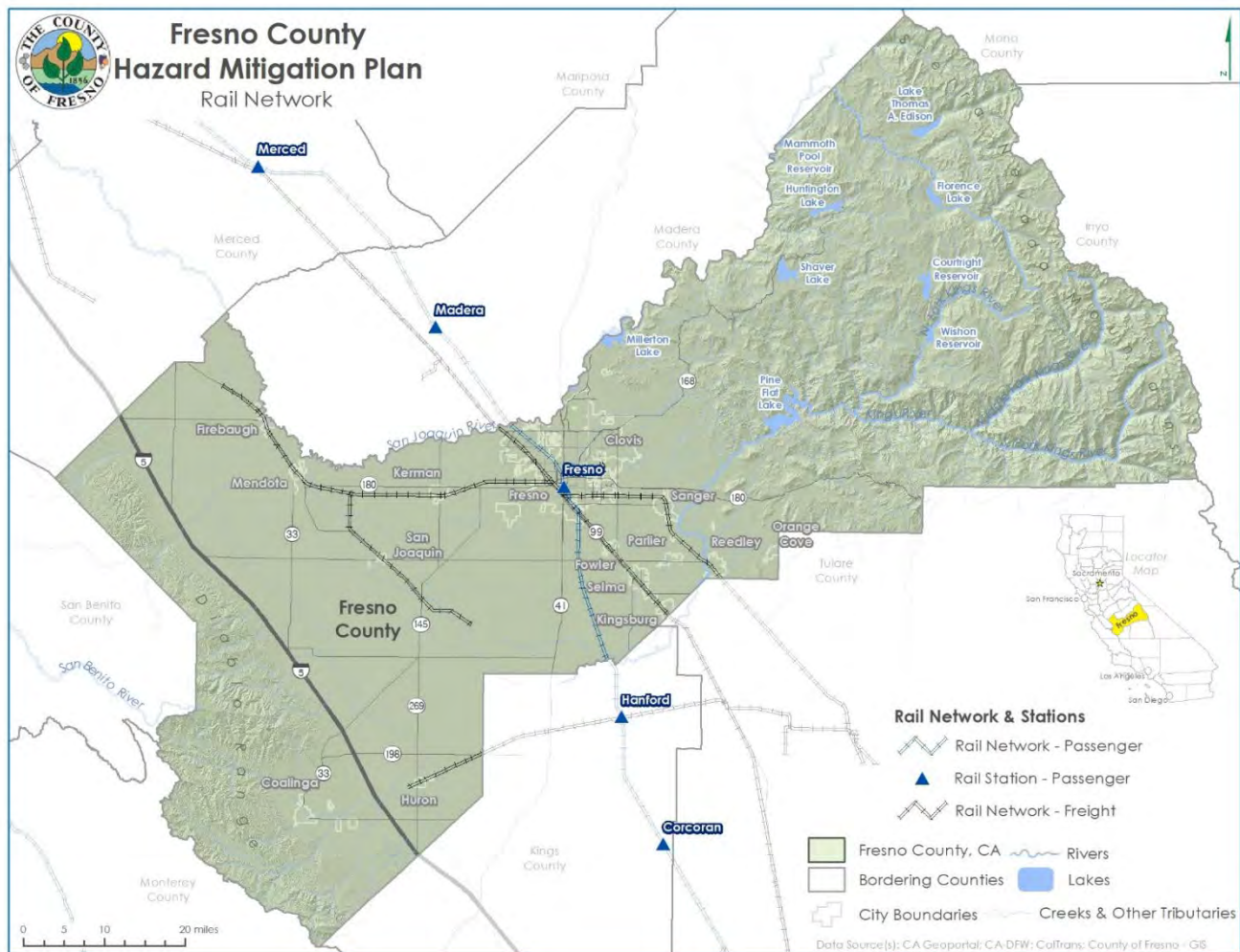
Map 5. Fresno County Transportation System



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS

The rail network, shown in **Map 6. Fresno County Rail Network**, within Fresno County includes passengers and freight rail across the region and state. New additions to the rail network are set to change by the next hazard mitigation plan update. In about five years, Fresno's core will be transformed into the first major hub on America's most ambitious active infrastructure project: a 500-mile bullet train shuttling people 200-plus mph from San Francisco to Los Angeles in under three hours. The high-speed rail will span 119 miles across Madera, Fresno, Kings, Tulare and Kern counties. The Authority plans to extend this 119-mile segment into Merced and Bakersfield. Unlike Interstate 5, the state's north-south connector, it'll run through the heart of the Central Valley. The infrastructure project could support the increase in population over the next several decades as the Central Valley population is growing.⁸ A map of the project is shown in Map 7. High Speed Rail: Central Valley.⁹

Map 6. Fresno County Rail Network



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS

⁸ From 'train to nowhere' to Fresno's dream: What high-speed rail means for the Central Valley - The Business Journal <https://thebusinessjournal.com/from-train-to-nowhere-to-fresnos-dream-what-high-speed-rail-means-for-the-central-valley/>

⁹ High-Speed Rail: Central Valley at a Glance (ca.gov) https://www.hsr.ca.gov/wp-content/uploads/docs/communication/info_center/factsheets/Central-Valley-Factsheet.pdf

MADERA **AVE 19**

CP 1: 32 miles
Design-Build:
Tutor-Perini/Zachry/Parsons

FRESNO

1,000 FEET SOUTH OF EAST AMERICAN AVE

KINGS/TULARE

CP 2-3: 65 miles
Design-Build: Dragados-Flatiron Joint Venture

ONE MILE NORTH OF COUNTY LINE

CP 4: 22 miles
Design-Build:
California Rail Builders

POPLAR AVE

BAKERSFIELD

0 5 10 15 30 Miles

2-23

3. Planning Process





Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:

An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;

An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and

Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.

[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

BACKGROUND

Mitigation planning is critical to lessen impacts from hazards to the whole community. In order to achieve this, mitigation planning must encourage whole community involvement, assessing risk and using a range of resources to reduce risk to people, economies, and natural environments.

The primary purpose of the Fresno County Multi-Jurisdictional Hazard Mitigation Plan (LHMP) update is to reduce or eliminate long-term risk to people and property from natural hazards and their effects on the Fresno County, California planning area. Fresno County recognized the need for and importance of a Local Hazard Mitigation Plan (LHMP) and initiated its development in 2007 after receiving a grant from the Federal Emergency Management Agency (FEMA), which served as the primary funding source for this plan. The original LHMP was developed in 2007-2008 and received FEMA approval in 2009. Additional details on the original planning effort can be referenced in the 2009 Plan. The plan underwent a comprehensive update in 2017-2018 and was approved in 2018.

The most recent hazard mitigation plan update occurred in 2023-2024 and was approved in 2024. The planning process followed a similar update to that used in the last plan update, utilizing input from the Hazard Mitigation Planning Committee (HMPC). Mitigation priorities of jurisdictions participating in the 2024 plan update remain consistent with those from 2018. Witt O'Brien's was procured to support the update in 2023.



CHANGES SINCE PREVIOUS PLAN

Requirements §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.

The updated LHMP complies with Federal Emergency Management Agency (FEMA) guidance and California Office of Emergency Services guidelines for Local Hazard Mitigation Plans. The update followed the requirements noted in the Disaster Mitigation Act (DMA) of 2000 and the 2023 Local Hazard Mitigation Planning Handbook.

This HMP update involved a comprehensive review and update of each section of the 2018 plan and includes an assessment of the progress of the participating communities in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan. Only the information and data still valid from the 2018 plan was carried forward as applicable into this HMP update.

EQUITY

Additionally, the latest Local Mitigation Planning Handbook includes guidance on ensuring equity is embedded throughout the planning process and within the hazard mitigation plan itself. While disasters themselves do not discriminate, impacts from disasters can be disproportionately experienced across different communities and populations based on existing inequities. It is critical to involve all communities or organizations that represent such unserved and socially vulnerable communities to ensure that the plan is aware and works to reduce risk to the whole community. For example, the public survey was translated into Spanish to ensure that Spanish speaking residents were able to participate in the public survey and provide input as there is a large Spanish speaking population within the county. The steps to ensure equity into the planning process described in the FEMA Local Mitigation Planning Handbook are outlined below.

Procedural Equity: is committing to equity within the planning process.

- Making clear, fair and inclusive processes. Work with partners who represent underserved groups and socially vulnerable populations to design and implement outreach and engagement methods that will reach the most marginalized and/or vulnerable members of the community.
- Giving chances for meaningful input. Underserved groups should have a true voice in planning and prioritizing mitigation. Invite nonprofit and community-based organizations that support these groups to join the local mitigation planning team. Invite other representatives as well. Welcome them to share their input throughout the planning process.

Structural Equity: builds on the need for accountability. It supports learning the history that led to privilege. It also supports working to correct past harms. Plans can address this by:

- Talking about equity early and often with the planning team. Use the principles of equity in all decision-making processes, from initial outreach to publication of the plan.
- Recognizing and dealing with the societal systems that cause inequity.



3. Planning Process

- Forming organizational infrastructure to address inequities. This should happen both at the staff and leadership levels. If inequities are raised during the planning process, make sure there are tools and paths to fix them. Think about working with consultants who have expertise in diversity, equity, and inclusion.

Distributional Equity: ensures that communities that are disproportionately at risk of hazards and their impacts are benefitted by mitigation actions that work to reduce their risk. Communities disproportionately at risk the hazard impacts include:

- High poverty
- Limited access to a vehicle
- Age (very old or very young)
- Limited English proficiency
- Disability status
- Race
- Ethnicity

The HMPC is committed to working to address and remove physical, social, temporal, language, accessibility, and historically institutional barriers through the planning process to ensure that the plan works for the whole community. The hazard mitigation public survey and communications sent out to the community were translated into Spanish as the Spanish is the second most spoken language within in Fresno County. Additionally, the HMPC worked to engage disproportionately impacted communities into the planning process. The planning team attended a committee meeting held by the Access and Functional Needs (AFN) Emergency Planning and Preparedness Committee meeting to seek input in the plan update and a member from the AFN committee attended subsequent HMPC meetings. The AFN works to bring emergency management personnel, representatives from organizations who serve individuals with disabilities, and community stakeholders to strengthen community preparedness and enhance resiliency and recovery efforts. The Committee meets internally on a quarterly basis and engages with committee members to engage them for local events (preparedness fairs), exercises, emergency plans, and Voluntary Organizations Active in Disaster (VOADs). Participants include but are not limited to the following entities:

- | | |
|---|---|
| • Fresno Madera Area Agency on Aging | • Fresno County Office of Emergency Services |
| • Fresno EOC | • City of Fresno, Airports Department |
| • Madera County Department of Public Health | • Fresno County Department of Social Services |
| • National Weather Service, Hanford | • Cal OES |
| • Fresno Area Express | • Central Valley Regional Center |
| • Deaf & Hard of hearing Service Center | • Sierra Resource Conservation District |
| • United Cerebral Palsy of Central California | • Fresno County Department of Public Health |
| • Loyd's Liberty Homes (Intermediate Care Facility) | • Central California Animal Disaster Team |



3. Planning Process

- Central California Legal Services
- Fresno City Fire Department
- Centra Valley Children's Network
- Fresno Pacific University
- City of Fresno
- Tulare County Public Health
- Tulare County Office of Emergency Services

Through meetings with the AFN, the HMPC was able to secure access to resources and information which would help ensure that underserved and vulnerable populations were properly considered throughout plan development.

Public feedback was utilized by the HMPC to develop the 2024 Fresno County Hazard Mitigation Plan. Information provided by community members helped ensure that concerns about hazards were thoroughly evaluated, capability gaps were identified, and mitigation strategies aligned with the public's interests and needs. Further information on engagement is documented in Appendix B.

FUTURE PLANNING UPDATES

Chapter 6 (Plan Implementation) identifies key requirements for updating future plans including:

- Ensure that the plan's mitigation strategy complies with all applicable legal requirements related to civil rights.
- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Document hazard events and impacts that occurred within the five-year period;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate documentation of continued public involvement;
- Incorporate documentation to update the planning process that may include new or additional stakeholder involvement;
- Incorporate growth and development-related changes to building inventories;
- Incorporate new project recommendations or changes in project prioritization;
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to Cal OES/FEMA; and
- Include re-adoption by all participating entities following FEMA approval.

These requirements and others as detailed throughout this plan were addressed during the plan update process.

PLAN SECTION REVIEW AND ANALYSIS – 2024 UPDATE

During the 2024 plan update, the Hazard Mitigation Planning Committee (HMPC) updated each of the sections of the previously approved plan to include new information. Witt O'Brien's developed a power point presentation during the kick-off meeting to describe each step of the planning process and



relevant updates based on the FEMA's local plan update guidance (2023) to ensure that the plan met the latest requirements. A summary of the changes in this plan update is highlighted in **Table 8. Fresno County Hazard Mitigation Plan Update Highlights**.

Table 8. Fresno County Hazard Mitigation Plan Update Highlights

Plan Section	Summary of Plan Review, Analysis, and Updates
Introduction	Updated relevant dates and data
Community Profile	Updated with recent census data and current economy description
Planning Process	Updated relevant dates, data, and planning process pertaining the 2024 plan update
Risk Assessments	<p>Revisited former hazards list for possible modifications. Reviewed the County and City of Fresno's CRS participation Updated list of disaster declarations to include recent data.</p> <p>Updated tables to include recent National Center for Environmental Information data. Updated past occurrences for each hazard to include recent data.</p> <p>Updated critical facilities list.</p> <p>Updated growth and development trends to include recent Census and local data sources.</p> <p>Updated historic and cultural resources using local/state/national sources.</p> <p>Updated property values for vulnerability and exposure analysis, using updated building information based on assessor's data.</p> <p>Updated estimate flood losses using the latest Fresno County Digital Flood Insurance Rate Map (DFIRM) and assessor's data.</p> <p>Updated National Flood Insurance Program (NFIP) data and Repetitive Loss structure data from the previous plan.</p> <p>Incorporated new hazard loss estimates since 2018, as applicable. Used updated GIS inventory data to assess wildfire threat to the County Updated HAZUS-MH Level I earthquake vulnerability analysis data</p> <p>Updated information regarding specific vulnerabilities to hazards, including maps and tables of specific assets at risk, specific critical facilities at risk, and specific populations at risk.</p> <p>Updated maps in plan where appropriate.</p> <p>Reviewed mitigation capabilities and update to reflect current capabilities</p>
Mitigation Strategy	<p>Indicated what projects have been implemented that may reduce previously identified vulnerabilities.</p> <p>Updated Chapter 5 based on the results of the updated risk assessment, completed mitigation actions, and implementation obstacles and opportunities since the completion of the 2018 plan.</p> <p>Reviewed and updated goals and objectives based on HMPC input.</p> <p>Revised to include more information on the Community Rating System (CRS) categories of mitigation measures (structural projects, natural resource protection, emergency services, etc.) and how they are reviewed when considering the options for mitigation.</p> <p>Included updated information on how actions are prioritized.</p> <p>Reviewed mitigation actions from the 2018 plan and develop a status report for each; identified if actions have been completed, deleted, or deferred/carried forward. Updated priorities on actions.</p> <p>Identified and detailed new mitigation actions proposed by the HMPC.</p>
Plan Section	Summary of Plan Review, Analysis, and Updates
Plan Adoption	Plan will be re-adopted as part of the update process
Plan Maintenance	<p>Reviewed and updated procedures for monitoring, evaluating, and updating the plan. Revised to reflect current methods.</p> <p>Updated the system for monitoring progress of mitigation activities by identifying additional criteria for plan monitoring and maintenance.</p>
Jurisdictional Annexes	<p>Updated previous participants' annexes with recent Census data.</p> <p>Updated past event history and hazard loss estimates. Added new maps and updated old maps as needed.</p> <p>Updated mitigation actions from 2018 and added new mitigation actions.</p>



Plan Section	Summary of Plan Review, Analysis, and Updates
Appendices	<p>Updated references.</p> <p>Updated planning process documentation.</p> <p>Updated mitigation alternatives analyzed in the process. Public participation plan updated</p> <p>Plan Adoption.</p>



INCORPORATION OF EXISTING PLANS, STUDIES, AND DATA

The HMPC used technical data, reports, and studies from the following agencies and groups in the development and update of this plan:

- Bureau of Land Management
- California Department of Forestry and Fire Protection
- California Department of Parks and Recreation Office of Historic Preservation
- California Department of Transportation
- California Geological Survey
- Fresno County Agricultural Department
- Fresno County Health Department
- Fresno County Information Technology/Geographic Information Systems Department
- Fresno County Internal Services Department
- Fresno County Land Use Department
- Fresno County Public Works and Planning Department
- National Oceanic and Atmospheric Administration National Climatic Data Center
- National Register of Historic Places
- Natural Resource Conservation Service
- National Weather Service
- U.S. Fish and Wildlife Service
- U.S. Geological Survey
- US Sierra National Forest
- Western Regional Climate Center



PLAN PARTICIPATION

In the 2024 plan update, the following jurisdictions participated in the planning process and will be adopting the updated plan following FEMA approval.

- Fresno County
- City of Clovis
- City of Coalinga
- City of Firebaugh
- City of Fowler
- City of Fresno
- City of Kerman
- City of Kingsburg
- City of Mendota
- City of Reedley
- City of San Joaquin
- City of Sanger
- City of Selma
- Fresno Metropolitan Flood Control District
- Lower San Joaquin Levee District
- Sierra Resource Conservation District/Highway 168 Fire Safe Council
- Kings River Conservation District
- Westlands Water District

The DMA planning regulations and guidance stress that each local government seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC
- Detail areas within the planning area where the risk differs from that facing the entire area
- Identify potential mitigation actions
- Formally adopt the plan

For the Fresno County planning area's HMPC, "participation" meant the following:

- Attending and participating in the HMPC meetings
- Completing and returning worksheets or reviewing jurisdictional annexes
- Collecting and providing other requested data (as available)
- Identifying mitigation actions for the plan
- Reviewing and providing comments on plan drafts



3. Planning Process

- Informing the public, local officials, and other interested parties about the planning process and providing opportunity for them to comment on the plan
- Coordinating, and participating in, the public input process
- Coordinating the formal adoption of the plan by the governing boards

The County and all jurisdictions with annexes to this plan and seeking FEMA approval met all of the participation requirements mentioned in the previous paragraph. In most cases one or more representatives for each jurisdiction attended the multi-jurisdictional meetings Schedule of Planning Meetings and brought together a local planning team to help collect data, identify mitigation actions and implementation strategies, and review and provide data on annex drafts. In some cases, the jurisdictions had limited capacity to attend or had conflicts with HMPC meetings; in these cases, side-bar phone calls and emails were used to provide input into the process. Appendix B provides additional information and documentation of the planning process.

In addition to the jurisdictions adopting the plan, the HMPC included a wide variety of other stakeholders, including:

- Access and Functional Needs (AFN) Emergency Planning and Preparedness Committee
- American Red Cross of the Central Valley
- California State University, Fresno
- Cargill
- Central Valley Flood Protection Board
- City of Huron
- City of Orange Cove
- City of Parlier
- Clovis Community College
- Fresno Chamber of Commerce
- Fresno City College
- Fresno Madera Continuum Of Care (FMCoC)
- Inyo County Office of Emergency Services
- Kern County Fire
- Kings County Emergency Management
- Madera County Emergency Management
- Mariposa County Emergency Management
- Merced County Emergency Management
- Mono County
- Monterey County Emergency Management
- PG&E
- Pilot Power Group



3. Planning Process

- Reedley College
- San Benito County Emergency Management
- San Joaquin College of Law
- San Joaquin River Exchange Contractors Water Authority
- Southern California Edison
- Sun-Maid
- Tulare County OES
- United Way of Tulare County
- West Hill College Coalinga

A complete list of the participants in the HMPC is included in Appendix B: Participation Documentation.

JURISDICTIONAL ANNEXES

Each participating jurisdiction within Fresno County was provided several opportunities to review and update their jurisdictional annex. Opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy worksheets), reviewing and providing feedback on the draft jurisdictional annexes, comments and recommendations provided in planning team meetings, and edits provided through emails or phone calls. To update each jurisdictional annex, each jurisdiction had the opportunity to consult and engage additional local stakeholders and partners during the planning process to ensure that the annex is effective and up to date as needed.



PLAN TIMELINE

The planning team met formally three times to discuss the planning process, share information, review draft plan components, and identify strategies and actions to include in the new plan. A timeline of the planning process is as follows:

- August 2023:
 - Fresno County contracted with Witt O'Brien's to complete this plan update
- October 2023:
 - Fresno County and Witt O'Brien's conducted a project kickoff meeting to discuss timeline, participation, and goals for the update.
 - Fresno County worked with participating jurisdictions to solicit participation and identify planning team members
 - Witt O'Brien's began conducting hazard analysis and mapping for inclusion in the HIRA
- November 2023:
 - **November 17, 2023: Fresno County Multi-Jurisdictional Hazard Mitigation Plan Kickoff Meeting** – Virtual meeting, via Microsoft Teams. Discussion topics included:
 - Planning team introductions
 - Hazard mitigation overview
 - The mitigation planning process
 - Hazard identification data gathering exercises
 - Questions and next steps
 - Critical facilities list was finalized
- December 2023:
 - Capability Assessment and Hazard Identification Exercise worksheets shared with planning team members
 - Participating jurisdictions provided feedback on the hazards causing the greatest challenges for their communities by completing Hazard Identification Exercise worksheets



- Fresno County works with the planning team to identify critical facilities and assets to use in the plan update.
- January 2023:
 - Participating jurisdictions began cataloguing their capabilities and resources, as outlined in the Capability Assessment Worksheet
 - The public was given the opportunity to provide input on the plan via the “Fresno County Hazard Mitigation Plan – Public Opinion Survey”, which was open from January 10, 2024, to January 30, 2024.
 - **January 16, 2024: Fresno County Multi-Jurisdictional Hazard Mitigation Plan – Public Meeting** – First of two virtual and in-person hybrid meetings open to the public. Discussion topics included:
 - Hazard mitigation and mitigation planning overview
 - Availability of public survey
 - Opportunity for input and open discussion
 - **January 17, 2024: Fresno County Multi-Jurisdictional Hazard Mitigation Plan – Public Meeting** – Second of two virtual and in-person hybrid meetings open to the public. Discussion topics included:
 - Hazard mitigation and mitigation planning overview
 - Availability of public survey
 - Opportunity for input and open discussion
- February 2023:
 - Mapping and modeling for the HIRA was substantively completed
- March 2023:
 - A wide variety of stakeholders (including non-government organizations, businesses, and neighboring communities) were invited to join the planning team, participate in future meetings, and comment on the draft plan.
 - **March 6, 2024: Fresno County Multi-Jurisdictional Hazard Mitigation Plan - HIRA Meeting** – Virtual meeting, via Microsoft Teams. Discussion topics included:
 - Plan process review



- HIRA progress
- Hazard maps developed to date
- Results of the public survey
- Brainstorming hazard mitigation actions
- Strategy worksheets were shared with plan participants
- Plan participants provided feedback on the goals and objectives for the plan, reviewed their actions from the previous plan, determined which to keep in the new plan, and identified new actions (via the Strategy Worksheet).
- **March 28, 2024: Fresno County Multi-Jurisdictional Hazard Mitigation Plan – Strategy Meeting** – Virtual meeting, via Microsoft Teams. Discussion topics included:
 - Plan status
 - Review and discussion of the proposed goals for the plan
 - Mitigation action development updates, discussion, brainstorming, and problem-solving
 - Discussion of aligning mitigation actions with grant opportunities
 - Timeline, Next Steps, and Questions
- April 2023:
 - The Planning Team continued to provide input, worksheets, and data as the provided all remaining input, worksheets, and data.
- May 2023:
 - The Planning Team continued to provide input, worksheets, and data as the provided all remaining input, worksheets, and data.
 - The draft plan was made available for public review online on **May 17, 2024**, and remained available for public comment through **May 31, 2024**. An online form allowed plan participants to provide feedback on the draft, and on risk reduction in Fresno County in general.
- June 2023:

3. Planning Process



- The Planning Team provided all remaining input, worksheets, and data, and the plan draft was finalized.

Documentation of the planning process (including presentations, meeting participation, surveys and results, and relevant communications) is available in Appendix B: Process and Participation Documentation.

4. Risk Assessment





Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. Risk is the estimated impact that a hazard would have on people, services, facilities, and structures in a community. It refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage.

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.

This risk assessment followed the methodology described in the 2023 FEMA publication Local Mitigation Planning Handbook:

1. Describe hazards
2. Identify community assets
3. Analysis risks
4. Summarize vulnerability

Data collected through this process has been incorporated into the following sections of this chapter:

- **Hazard Identification Natural Hazards Section:** identifies the natural hazards that threaten the planning area and describes why some hazards have been omitted from further consideration.
- **Hazard Profiles Section:** discusses the threat to the planning area and describes previous occurrences of hazard events and the likelihood of future occurrences.
- **Vulnerability Assessment Section:** assesses the County's total exposure to natural hazards, considering assets at risk, critical facilities, and future development trends.
- **Human-Caused Hazards Section:** identifies the areas most susceptible to potential human-caused hazard events by evaluating the locations of hazardous materials facilities and transportation routes.
- **Capability Assessment Section:** inventories existing mitigation activities and policies, regulations, and plans that pertain to mitigation and can affect net vulnerability.

This risk assessment covers the entire geographical extent of Fresno County. Since this plan is a multi-jurisdictional plan, the HMPC was required to evaluate how the hazards and risks vary from jurisdiction to jurisdiction. While these differences are noted in this chapter, they are expanded upon in the annexes of the participating jurisdictions. If no additional data is provided in an annex, it should be assumed that the risk and potential impacts to the affected jurisdiction are similar to those described here for the entire Fresno County planning area.



HAZARD IDENTIFICATION

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type of all natural hazards that can affect the jurisdiction.

The Fresno County HMPC conducted a hazard identification study to determine the hazards that threaten the planning area.

METHODOLOGY AND RESULTS

Using existing hazards data and input gained through planning meetings during the 2024 plan update, the HMPC agreed to continue to profile the same 19 identified hazards in the 2018 plan, into the 2024 plan update. In order to update the profiled hazards, data from the California Governor's Office of Emergency Services (CA-OES), FEMA, the National Oceanic and Atmospheric Administration, and many other sources were examined to assess the significance of these hazards to the planning area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries and property, economic, and crop damage as the county is one of the largest agricultural producers in the state. The hazards evaluated as part of this plan include those that occurred in the past or have the potential to cause significant human and/or monetary losses in the future. The potential for loss and impacts from the hazards are analyzed further in the Vulnerability Assessment section.

In alphabetical order, the natural hazards identified and investigated for the Fresno County Multi-Jurisdictional Hazard Mitigation Plan include:

- Agricultural Hazards
- Avalanche
- Dam Failures
- Drought
 - Tree Mortality
- Earthquake
- Flood
- Wildfire
- Volcano

Human Health Hazards

- Epidemic/Pandemic
- West Nile Virus

Severe Weather

- Extreme Temperatures

- Extreme Cold/Freeze
- Extreme Heat
- Fog
- Heavy Rain/Thunderstorm/Hail/Lightning/Wind
- Winter Storm
- Tornado

Soil Hazards

- Erosion
- Expansion Soils
- Land Subsidence
- Landslide

OVERALL HAZARD SIGNIFICANT SUMMARY

Overall hazard significance was based on a combination of Geographic Extent, Probability and Potential Magnitude/Severity as defined in **Table 9. Fresno County Hazard Significance**. The individual ratings are based on or interpolated from the analysis of the hazards in the sections that follow. During the 2024 Fresno County LHMP update, the individual ratings and significance of the hazards were revisited and updated. Subsidence, as a subset of soil hazards, has become more of an issue due to heavy groundwater withdrawal during the severe multi-year drought 2012-2017 and 2020-2023. It may also be exacerbating flood hazards by lowering levee heights in some areas. This hazard's significance was changed from low to medium during the 2017 update.

Table 9. Fresno County Hazard Significance

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Negligible	Limited	More than 24 hours	Less than 24 hours	3.5
Avalanche	Likely	Limited	Limited	Less than 6 hours	Less than 6 hours	2.4
Dam Failure	Occasional	Critical	Extensive	More than 24 hours	Less than 24 hours	2.6
Drought	Likely	Limited	Significant	More than 24 hours	More than 1 week	2.5
Earthquake	Occasional	Catastrophic	Significant	Less than 6 hours	Less than 6 hours	2.5
Flood/Levee Failure	Likely	Critical	Extensive	More than 24 hours	Less than 1 week	2.6
Human Health Hazards						
Epidemic/Pandemic	Occasional	Negligible	Extensive	More than 24 hours	More than 1 week	3.1

4. Risk Assessment



Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Hazardous Materials	Highly Likely	Limited	Significant	Unavailable	Unavailable	Unavailable
West Nile Virus	Occasional	Negligible	Limited	More than 24 hours	Less than 1 week	2.7
Severe Weather						
Extreme temperatures	Highly Likely	Negligible	Significant	More than 24 hours	Less than 1 week	3.3
Fog	Highly Likely	Limited	Extensive	More than 24 hours	Less than 24 hours	2.4
Heavy Rain/Thunderstorm/Hail/Lightning	Highly Likely	Limited	Extensive	More than 24 hours	Less than 24 hours	2.4
Winter Storm	Highly Likely	Negligible	Limited	More than 24 hours	Less than 24 hours	2.2
Tornado	Occasional	Negligible	Extensive	More than 24 hours	Less than 6 hours	2.2
Soil Hazards						
Erosion	Likely	No Data	No Data	No Data	No Data	1.9
Expansive Soils	Occasional	No Data	No Data	No Data	No Data	1.3
Landslide	Occasional	Limited	Limited	12 to 24 hours	Less than 6 hours	2.0
Land Subsidence	Highly Likely	No data	Extensive	No Data	No Data	2.0
Volcano	Unlikely	Negligible	Extensive	Less than 6 hours	Less than 1 week	2.0
Wildfire	Highly Likely	Critical	Extensive	12 to 24 hours	Less than 1 week	3.65
Geographic Extent Limited: Less than 10% of planning area Significant: 10-50% of planning area Extensive: 50-100% of planning area		Probability of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 11 to 100 years Unlikely: Less than 1% chance of occurrence in the next 100 years, or has a recurrence interval of greater than every 100 years				
Magnitude/Severity Catastrophic-More than 50 percent of property severely damage; shutdown of facilities for more than 30 days; and/or multiple deaths Critical-25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries/or illnesses result in permanent disability Limited-10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible-Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid						
Significance Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact						



DISASTER DECLARATION HISTORY

Federal and/or 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.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/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. The quantity and types of damage are the determining factors.

A USDA declaration will result in the implementation of the Emergency Loan Program through the Farm Services Agency. This program enables eligible farmers and ranchers in the affected county as well as contiguous counties to apply for low interest loans. A USDA declaration will automatically follow a major disaster declaration for counties designated major disaster areas and those that are contiguous to declared counties, including those that are across state lines. As part of an agreement with the USDA, the SBA offers low interest loans for eligible businesses that suffer economic losses in declared and contiguous counties that have been declared by the USDA. These loans are referred to as Economic Injury Disaster Loans.

Fresno is among the many counties in California that are susceptible to disaster. Details on federal and state disaster declarations were obtained by the FEMA, and CA-OES and compiled in chronological order in **Table 10. Fresno County Federal Disaster Declarations 1953-2024** and **Table 11.**

California State Disaster Proclamations Covering Fresno County 1991-2024. A review of state and federal declared disasters indicates that Fresno County received 13 state declarations between 1991 and March 2024, as well as 20 federal disaster declarations. USDA declarations for the planning area are discussed in the Agricultural Hazards Section.

This disaster history (combined federal and state) suggests that Fresno County experiences a major event worthy of a disaster declaration approximately every 2.5 years. The County has a roughly 39 percent chance of receiving a California disaster proclamation in any given year, and a 29 percent chance of receiving a federal disaster declaration. Except for the declarations for earthquake, wildfire, and epidemic/pandemic due to the COVID-19 pandemic in 2019/2020, every declaration resulted directly or indirectly from severe weather. Most disaster-related injuries to people and damage to property and crops resulted from severe weather. However, the recent COVID-19 pandemic resulted in significant economic damage, hospitalizations, and loss of life compared to any other disaster related event. More information on the COVID-19 pandemic is summarized in the Pandemic/Epidemic hazard profile section.

Table 10. Fresno County Federal Disaster Declarations 1953-2024

Declaration Number	Description of Hazard	Date of Declaration	Incident Period	Assistance Provided
4699	Severe winter storms, straight-line winds, flooding, landslides, and mudslides	04/03/2023	02/21/2023 – 04/10/2023	Individual Assistance, Public Assistance, Hazard Mitigation Assistance

4. Risk Assessment



Declaration Number	Description of Hazard	Date of Declaration	Incident Period	Assistance Provided
3592	Severe winter storms, flooding, landslides, and mudslides	03/10/2023	03/09/2023 – 04/10/2023	N/A
4683	Severe winter storms, flooding, landslides, and mudslides	01/14/2023	12/27/2022 – 01/31/2023	Individual Assistance, Public Assistance, Hazard Mitigation Assistance
3591	Severe winter storms, flooding, and mudslides	01/09/2023	01/08/2023 – 01/31/2023	N/A
4569	Wildfires	10/16/2020	09/04/2020 – 11/17/2020	Individual Assistance, Public Assistance, Hazard Mitigation Assistance
5348	Creek Fire	09/06/2020	09/06/2020 – 09/06/2020	N/A
4482	COVID-19 Pandemic	03/22/2020	01/20/2020 – 05/11/2023	Individual Assistance, Public Assistance, Hazard Mitigation Assistance
3428	COVID-19	03/13/2020	01/20/2020 – 05/11/2023	Public Assistance
5140	Goose Fire	07/31/2016	07/30/2016 – 08/08/2016	Public Assistance
1689	Severe freeze	03/13/2007	01/11/2007 – 01/17/2007	N/A
3248	Hurricane Katrina Evacuation	09/13/2005	08/29/2005 – 09/01/2005	Public Assistance
1267	CA-Citrus Crop Damage	02/09/1999	12/20/1998 – 12/28/1998	N/A
1203	Severe winter storms and flooding	02/09/1998	02/02/1998 – 04/30/1998	N/A
1155	Severe storms, flooding, mud and landslides	01/04/1997	12/28/1996 – 04/01/1997	N/A
1046	Severe winter storms, flooding, landslides, mud flow	03/12/1995	02/13/1995 – 04/19/1995	N/A
979	Severe winter storm, mud & landslides, & flooding	02/03/1993	01/05/1993 – 03/20/1993	N/A
894	Severe freeze	02/11/1991	12/19/1990 – 01/03/1991	N/A
758	Severe storms & flooding	02/21/1986	02/12/1986 – 03/10/1986	N/A
3023	Drought	01/20/1977	01/20/1977 – 01/20/1977	N/A
253	Severe storms & flooding	01/26/1969	01/26/1969 – 01/26/1969	N/A

Source: FEMA

In addition to the disaster declarations from FEMA, Los Angeles County has been covered by multiple California disaster proclamations. Governor-proclaimed disasters covering Los Angeles County since 1991 are listed in the following table.



Table 11. California State Disaster Proclamations Covering Fresno County 1991-2024

Date of Disaster	Type of Disaster
August 20, 2023	Hurricane Hilary
February – March 2023	Severe winter storms
May 10, 2021	Drought
September 4-5, 2020	Wildfires
March 2018	Winter storms
January 2017	Storm system
April 2006	Severe rainstorms and flooding
December 2005	Severe rainstorms
December 1998	Freeze
February 2, 1998	El Niño
December 1996 – January 1997	Floods
January 1995	Severe winter storms
December 1992	Winter storms

Source: California Governor's Office of Emergency Services, www.oes.ca.gov/



HAZARD PROFILES

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

The hazards identified in the Hazard Identification section are profiled individually in this section. In general, information provided by planning team members is integrated into this section with information from other data sources. These profiles set the stage for the Vulnerability Assessment section, where the vulnerability is quantified, where possible, for each of the priority hazards.

Each hazard is profiled in the following format:

- **Hazard/Problem Description**—This section gives a description of the hazard and associated issues followed by details on the hazard specific to the Fresno County planning area. Where known, this includes information on the hazard extent, seasonal patterns, speed of onset/duration, and magnitude and/or secondary effects.
- **Extent** – This section gives a description of the potential strength or magnitude of the hazard as it pertains to Fresno County. The geographic extent or location of the hazard is also discussed.
- **Past Occurrences**—This section contains information on historical incidents, including impacts where known. The extent or location of the hazard within or near the Fresno County planning area is also included here. Historical incident worksheets were used to capture information from participating jurisdictions on past occurrences.
- **Likelihood of Future Occurrence**—The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, frequency was calculated based on existing data. It was determined by dividing the number of events observed by the number of years on record and multiplying by 100. This gives the percent chance of an event happening in any given year (e.g., three droughts over a 30-year period equates to a 10 percent chance of a drought in any given year). The likelihood of future occurrences is categorized into one of the following classifications:
 - **Highly Likely**—Greater than 90 percent annual probability of occurrence
 - **Likely**—Between 50 and 90 percent annual probability of occurrence
 - **Occasional**—Between 1 and 49.9 percent annual probability of occurrence
 - **Unlikely**—Less than 1 percent annual probability of occurrence
- **Climate Change Considerations** - This describes the potential for climate change to affect the frequency and intensity of the hazard in the future.

The Vulnerability Assessment section has more detail on the County's total exposure to natural hazards, considering assets at risk, critical facilities, and future development trends. Where feasible the vulnerability of people, property, critical facilities, the natural environment, and future development are considered for each hazard.



The following sections provide profiles of the natural hazards that the HMPC identified in Identifying Hazards section. The hazards follow alphabetically.

SUMMARY OF CLIMATE CHANGE IMPACTS IN CALIFORNIA

Overall, the planet is warming faster than ever. Heat trapping gases—such as carbon dioxide and methane—are building up in our atmosphere, creating a blanket around the globe that traps heat, like a greenhouse. This is also known as global warming, even though many of its effects go far beyond temperature changes. Global warming pollution comes from the use of fossil fuels such as oil, coal, and natural gas, and from agricultural and industrial activities. We burn fossil fuels to generate energy, to power vehicles and other transportation such as planes, and to manufacture countless products. The extra trapped heat has been changing important aspects of our climate and the water cycle, which is the movement of water on our planet.

Summary of climate change trends and projections are listed below:

- Higher temperatures
- Increasing evapotranspiration (water that evaporates or is used by plants)
- Longer and more severe droughts
- Declining snowpack
- More intense rainstorms
- More frequent and extensive wildfires
- Sea level rise¹

¹ <https://www.ucsusa.org/sites/default/files/2020-10/climate-change-in-SJValley.pdf>

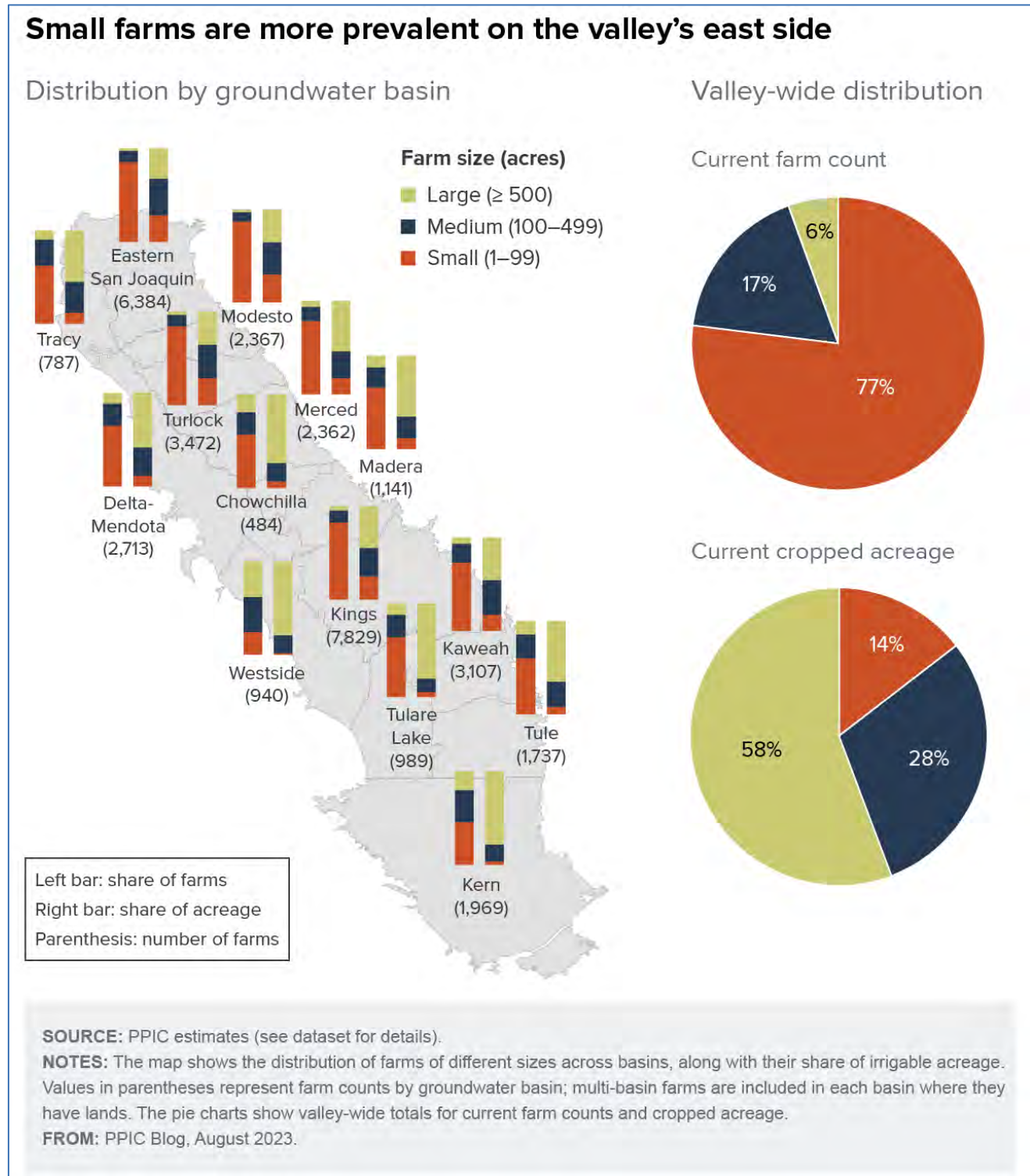


AGRICULTURAL HAZARDS

HAZARD/PROBLEM DESCRIPTION

Located in the Central San Joaquin Valley, Fresno County's farming and agricultural industry is ranked as one of the top agriculture-producing counties in California and the country. Farming and agriculture-related businesses are a significant component of the local economy and are responsible for 20 percent of all jobs in the Fresno area. The following figure, **Figure 4. Farm Size in the San Joaquin Valley**, shows the type of farms across the San Joaquin Valley.

Figure 4. Farm Size in the San Joaquin Valley



Source: Public Policy Institute of California

In Fresno County, according to the USDA 2022 agricultural census, there were a total of 4,427 farms encompassing 1,659,451 acres of land, which brings the average size of a farm to approximately 375 acres. The market value of agricultural products sold reached a staggering \$6,995,967,000, averaging \$1,580,295 per farm. Out of the total farms, 3,823 were dedicated to cropland, covering 1,182,023 acres. According to the Fresno County Agricultural Commissioner the County has approximately 678,103 acres of prime agricultural land, 404,083 acres of farmland of statewide importance, and 825,276 acres of grazing land (see **Table 12. Fresno County's Farmland Inventory** below). An updated source for the information below was not available during the latest plan update.

Table 12. Fresno County's Farmland Inventory

Soil Category	Acres
Prime Farmland	678,103
Farmland of Statewide Importance	404,083
Unique Farmland	33,653
Farmland of Local Importance	131,341
Grazing Land	825,276
Urban and Built-Up Land	124,025
Water	4,915
Other Land	116,094

Source: Fresno County Agricultural Commissioner 2017

According to the 2022-2023 Fresno County Agricultural Crop and Livestock Report, the total gross value of agricultural commodities in Fresno County in 2021 was over \$8 billion. The County's leading agricultural products included grapes, almonds, pistachios, milk, poultry, cattle and calves, tomatoes, peaches, garlic, and mandarins.

Fresno's top ten crops have seen a shift between 1995 and 2022. However, the crops have mostly remained constant, their ranks in the county have changed in the intervening 20 years. A list of Fresno County's top leading crops is described in **Table 13. Fresno County's Ten Leading Crops**.

Table 13. Fresno County's Ten Leading Crops

Crop	2022 Rank	2022 Dollar Value	2015 Rank	2014 Rank	2005 Rank	1995 Rank
Almonds	2	\$1,141,308,000	1	1	2	7
Grapes	1	\$1,241,178,000	2	2	1	2
Poultry	5	\$538,305,000	3	3	7	3
Cattle and Calves	6	\$488,665,000	4	5	5	8
Tomatoes	7	\$429,263,000	5	6	4	4
Milk	4	\$655,138,000	6	4	3	5
Peaches	8	\$368,392,000	7	9	8	12



Crop	2022 Rank	2022 Dollar Value	2015 Rank	2014 Rank	2005 Rank	1995 Rank
Garlic	9	\$351,875,000	8	8	14	11
Mandarins	10	\$240,684,000	9	N/A	N/A	N/A
Oranges	N/A	N/A	10	11	10	10
Pistachios	3	\$705,941,000	N/A	N/A	N/A	N/A

Source: State of California Department of Conservation Farmland Mapping and Monitoring Program, www.conservation.ca.gov/

According to the HMPC, agricultural losses occur on an annual basis and are usually associated with severe weather events, including heavy rains, floods, hail, freeze, drought or disease outbreaks. The State of California Hazard Mitigation Plan attributes most of the agricultural disasters statewide to drought, freeze, and insect infestations. Other agricultural hazards include fires, crops and livestock disease, noxious weeds, and contamination of animal food and water supplies.

Fresno County is threatened by several insects that, under the right circumstances, can cause severe economic and environmental harm to the agricultural industry. Insects of concern to plants and crops include the medfly, peach fruit fly, Mexican fruit fly, guava fruit fly, oriental fruit fly, melon fly, gypsy moth, Japanese beetle, glassy-winged sharpshooter, paper wasp, and Turkestan roach. Livestock disease can also cause large-scale economic losses in any area that raises large amounts of livestock.

Noxious weeds, which are any plant that is or is liable to be troublesome, aggressive, intrusive, detrimental, or destructive to agriculture, silviculture, or important native species and that is difficult to control or eradicate, are also of concern. Noxious weeds within the planning area include yellow starthistle, purple loosestrife, and Japanese dodder.

Noxious weeds have been introduced in the planning area by a variety of means, including through commercial nurseries. An absence of natural controls combined with the aggressive growth characteristics and unpalatability of many of these weeds allows these weeds to dominate and replace more desirable native vegetation. Negative effects of weeds include the following:

- Loss of wildlife habitat and reduced wildlife numbers
- Loss of native plant species
- Reduced livestock grazing capacity
- Increased soil erosion and topsoil loss
- Diminished water quality and fish habitat
- Reduced cropland and farmland production
- Reduced land value and sale potential

Another threat to the agricultural industry is the wild hogs that run free in the eastern and western foothills of the County. These wild hogs can cause extensive agricultural crops and property damage to farms and private land. Wild hogs are known to carry and transmit 30 different virulent and bacterial diseases, as well as at least 37 parasites both to humans and livestock. E. coli contamination of leafy vegetables has been linked to wild hogs foraging in vegetable fields.

In addition to issues associated with wild hogs, the proper management of other wildlife within the planning area is of significant concern to the County Department of Agriculture. Wildlife such as coyotes, ground squirrels, and others can cause extensive livestock, crop, and property damage. Such wildlife is also known to carry and transmit diseases (e.g., bubonic plague and rabies) to livestock and domestic animals as well as to humans.

According to the Fresno County Operational Area Master Emergency Services Plan, the consequences of agricultural disasters to the planning area include ruined plant crops, dead livestock, ruined feed and agricultural equipment, monetary loss, job loss, and possible multi-year effects (i.e., trees might not produce if damaged, loss of markets, food shortages, increased prices, possible spread of disease to people, and loss or contamination of animal products). When these hazards cause a mass die-off of livestock, other issues arise that include the disposal of animals, depopulation of affected herds, decontamination, and resource problems. Those disasters related to severe weather may also require the evacuation and sheltering of animal populations. Overall, any type of severe agricultural disaster can have significant economic impacts on the agricultural community as well as the entire Fresno County planning area.

EXTENT

Historically, Fresno County has received disaster declarations from the USDA for a variety of incident types, including drought, hail, rain, cold and wind. Fresno County's agriculture industry is a multi-billion-dollar enterprise; a long-term, widespread agricultural hazard could have impacts in the hundreds of millions of dollars, if not billions of dollars.

PAST OCCURRENCES

Based on information from the USDA, Fresno County received 11 USDA disaster declarations between 1991 and 2024 (see **Table 14. Fresno County's USDA Disaster Declarations**). Between January of 2018 and 2024, Fresno County received seven additional USDA Declaration for drought, frost and freeze, excessive rain, moisture, humidity, and hail. All the declarations were associated with drought or severe weather events; none were related to agricultural disease.

Table 14. Fresno County's USDA Disaster Declarations

Incident Type	Incident Date	Damage (\$)
Short-term Drought	2009	\$164,893,718
Severe Spring Storm: Rain, Hail, High Winds	6/4 & 5/2009	\$4,533,107
Lack of Chill Hours	2014	\$53,534,295
Severe Long-Term Drought	2012-2016	Not Quantified
Excessive Rain, Moisture, Humidity	2019	Not Quantified
Excessive Rain, Moisture, Humidity, Hail	2019	Not Quantified
Drought	2020	Not Quantified
Drought	2021	Not Quantified



Incident Type	Incident Date	Damage (\$)
Frost, Freeze	2021	Not Quantified
Drought	2021	Not Quantified
Drought	2022	Not Quantified

Source: USDA, Farm Service Agency, Disaster Designation Information

Historical occurrences identified by the HMPC include the following:

Fresno County

- **1970s:** A local outbreak of scabies occurred.
- **1991:** There was an outbreak of bovine tuberculosis in Fresno County.
- **1997/1998:** One bird in downtown Fresno was discovered with exotic Newcastle disease, a contagious and fatal viral disease affecting all species of birds that does not affect humans. The bird and all chickens within a one-kilometer radius were destroyed.
- **1998:** Freeze resulted in almost \$70 million in losses, including crop loss, broken water pipes and water damage, damaged water treatment plants, and damaged fire sprinkler systems. Other impacts included almost 18,000 applications for services and assistance and over 1,700 unemployment insurance claims filed.
- **1999:** Severe weather caused a crop loss of over \$89 million.
- **2006:** Fresno County growers were impacted by adverse spring weather with \$21 million in losses.
- **2006:** Twenty-one days of over 100 degrees, including three days over 113 degrees, caused crop, livestock, poultry, and milk production losses of \$93 million.
- **2008:** A Fresno County dairy was quarantined after state and federal agriculture officials found bovine tuberculosis in five cows.
- **2009:** Short term drought with no or little allocation to the west side. Springtime hail brought damage to trees along the Kings River corridor.
- **2012 - 2016:** Long-term western states drought. Billions in losses.
- **2014:** Warm winter and spring brought a lack of chill hours affecting fruit set in cherry crop.
- **2019:** no description available
- **2020:** no description available
- **2021:** no description available
- **2022:** Highly Pathogenic Avian Influenza (HPAI) cases were confirmed in California commercial flock across the state including Fresno County. HPAI is a highly contagious and often fatal disease in birds.
- **2023:** Highly Pathogenic Avian Influenza (HPAI) cases were detected in a commercial flock in Fresno County. Infected flocks were euthanized to prevent further spread and the location was under quarantine.



Neighboring Counties

- **2002:** Merced County had an outbreak of avian influenza H5 (which is different from the severe variety found in Asia).
- **2002/2003:** After more than 10 years without a case of bovine tuberculosis in California, two dairy herds in Tulare County and one in Kings County were infected with bovine tuberculosis. All three herds were quarantined, 152,000 cattle were tested, 8,000 cattle destroyed, and the affected premises were cleaned and disinfected.
- **2002/2003:** There was an outbreak of exotic Newcastle disease in Southern California.
- **2022:** Highly Pathogenic Avian Influenza (HPAI) cases were confirmed in California commercial flock.
- **2023:** Highly Pathogenic Avian Influenza (HPAI) cases were confirmed in California commercial flock.

According to data provided by the Farm Subsidy Database, total indemnities, and premium subsidies of the crop insurance program in the U.S., 1995-2022 include \$172,457,906,536 total indemnities and \$123,784,169,781 in total premium subsidies. The major cause behind crop yield or revenue that prompts an indemnity payment are largely due to natural hazard events such as drought, hail, or excessive rain. The top 10 national causes of loss with the largest indemnity payments from 1995 to 2022 are described in **Table 15. Fresno County Indemnities by Hazard (1995-2022)**.

Table 15. Fresno County Indemnities by Hazard (1995-2022)

Cause of Loss	Indemnities Paid 1995-2022	Percent of Total Indemnities
Drought	\$60,391,798,966	35.0%
Excess Moisture/Precipitation	\$42,820,224,318	24.8%
GRP/GRIP/ARPI/SCO/STAX/MP/HIPWI Crops Only*	\$13,350,536,562	7.7%
Hail	\$10,773,528,422	6.2%
Heat	\$8,509,718,490	4.9%
Decline in Price	\$7,797,184,357	4.6%
Freeze	\$5,143,337,715	3.0%
Wind/Excess Wind	\$3,546,363,004	2.1%
Cold Wet Weather	\$3,284,833,480	1.9%
Hot Wind	\$2,867,328,212	1.7%

Source: EWG, from USDA Risk Management Agency, Cause of Loss Historical Data Files.

* Types of insurance policies; details on the RMA website. Indemnities for GRP/GRIP crops between 1995-2013; indemnities for ARPI, SCO, STAX, MP, HIP, WI crops 2014-2022, indemnities for ECO crops 2021 and 2022.

In Fresno County, the total amount of indemnities paid from 1995-2022 is 1,244,730,687. The breakdown of indemnities by crop and by cause are described in **Table 16. Fresno County**



Indemnities by Crops (1995-2022) and Table 17. Fresno County Indemnities by Cause of Loss (1995-2022).

Table 16. Fresno County Indemnities by Crops (1995-2022)

Crops	Indemnities Percent from 1995-2022
Other Crops	37.42%
Cotton Ex Long Staple	27.02%
Almonds	17.83%
Grapes	6.59%
Pistachios	6.51%
Tomatoes	4.64%

Source: EWG Farm Subsidy Database || Fresno County, California Crop Insurance Subsidies

Table 17. Fresno County Indemnities by Cause of Loss (1995-2022)

Cause of Loss	Indemnities Percent from 1995-2022
Failure of Irrigation Supply	29.68%
Other Causes	20.37%
Heat	18.67%
Excess Moisture/Precipitation	16.49%
Freeze	8.81%
Cold Wet Weather	5.97%

Source: EWG Farm Subsidy Database || Fresno County, California Crop Insurance Subsidies

LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely—As long as the hazards discussed in this section continue to be an ongoing concern to the Fresno County planning area, the potential for agricultural losses remains.

CLIMATE CHANGE CONSIDERATIONS

As climate change has progressed, noticeable changes have occurred with the climate and weather patterns across the globe. Weather events have become more numerous and more severe. Changes in weather patterns can have dramatic impacts on the ecosystem, including agriculture systems; more severe impacts can be expected into the future.



AVALANCHE

HAZARD/PROBLEM DESCRIPTION

Avalanches occur when loading of new snow on a slope increases stress at a rate faster than strength develops, and the slope fails. Critical stresses develop more quickly on steeper slopes and where deposition of wind-transported snow is common. Most avalanches occur during and shortly after storms. This hazard generally affects a small number of people, such as snowboarders, skiers, and hikers, who venture into backcountry areas during or after winter storms. Roads and highway closures, damaged structures, and destruction of forests are also a direct result of avalanches. Avalanches typically occur above 8,000 feet and on slopes ranging between 25- and 50-degrees incline. The eastern portion of Fresno County is in the Sierra National Forest in a high alpine environment and has potential for areas above 8,000 on slopes ranging between 25- and 50-degrees incline. When avalanches occur, they can travel as fast as 200 miles per hour and can spontaneously. ²The combination of steep slopes, abundant snow, weather, snowpack, and an impetus to cause movement creates avalanches. Areas prone to avalanche hazards include hard to access areas deep in the backcountry. Avalanche hazards exist in eastern Fresno County in the Sierras, where combinations of the above criteria occur.

EXTENT

Small - Based on this information, the geographic extent rating for avalanches in Fresno County is limited and only impacts the mountainous area within the eastern part of the county. Occasional death and injury might occur to persons in the backcountry.

PAST OCCURRENCES

Historically, avalanches occur within the County between the months of December and April, following snowstorms. According to the HMPC, there has been some historical avalanche activity involving people, but specific details are unknown.

LIKELIHOOD OF FUTURE OCCURRENCES

Likely—Injuries and loss of life from an avalanche are usually due to people recreating in remote areas during the time of the avalanche. Given the topography and amount of snow falling on an annual basis in eastern Fresno County, avalanches will continue to occur, but damage from avalanches should continue to be limited.

CLIMATE CHANGE CONSIDERATIONS

In the future, the likelihood and nature of avalanches may be affected by climate change. As winter is taking longer to descend, weaker snow accumulates at the very bottom of the snowpack. As more snow piles on top of the weak layer, and temperatures remain warm, the upper, moisture- laden layers

² Avalanches, facts and information (nationalgeographic.com)
<https://www.nationalgeographic.com/environment/article/avalanches>

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become vulnerable to sliding and create a delicate situation. More extreme precipitation events that deposit large amounts of snow in a short period of time could also periodically increase the potential for large avalanches.

DAM FAILURE

HAZARD/PROBLEM DESCRIPTION

Dams are manmade structures built for a variety of 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 causes:

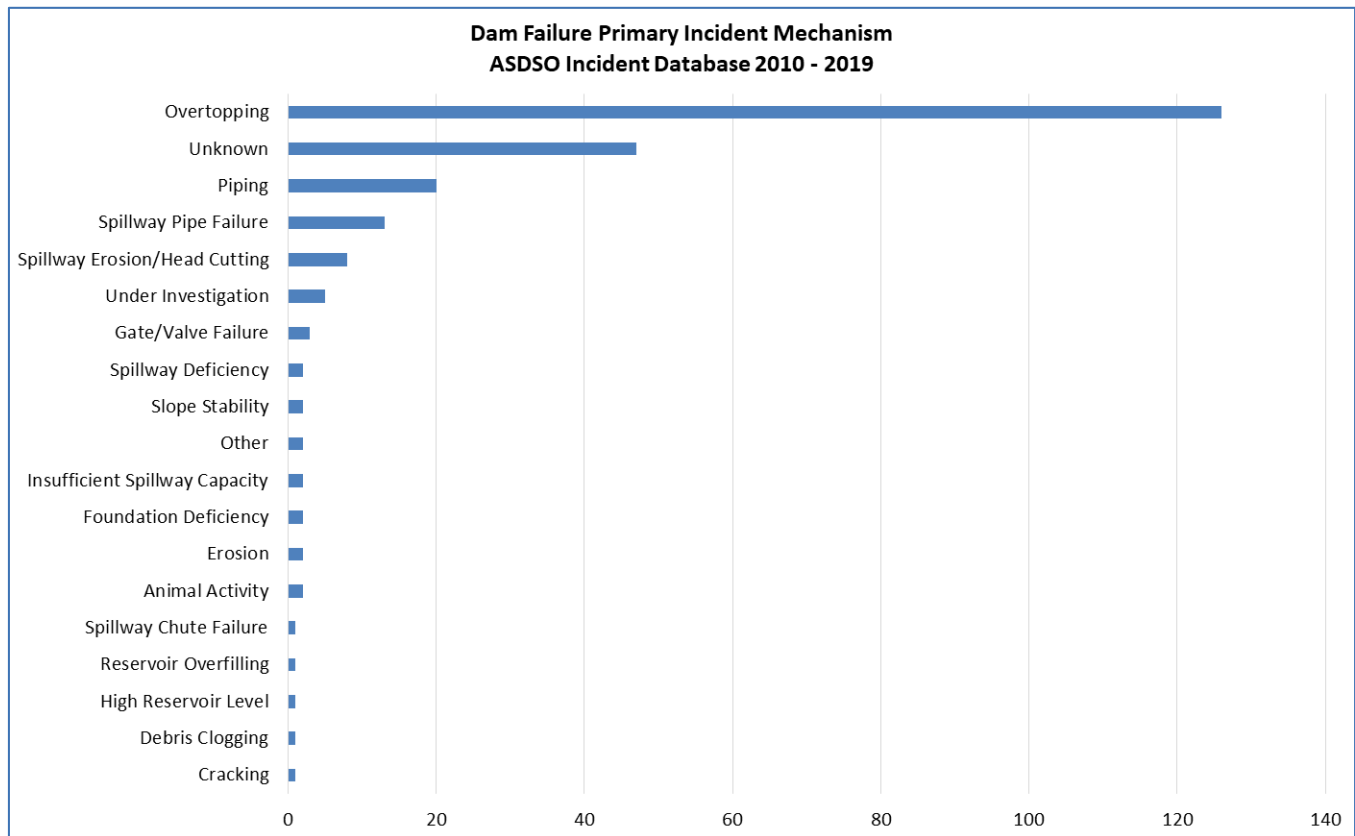
- Earthquake
- Inadequate spillway capacity resulting in excess overtopping flows
- Internal erosion caused by embankment or foundation leakage or piping or rodent activity
- Improper design
- Improper maintenance
- Negligent operation
- Failure of upstream dams on the same waterway

According to the Association of State Dam Safety Officials, the causes of dam failures are most likely due to one of five reasons:

1. **Overtopping:** caused by water spilling over the top of a dam. Overtopping of a dam is often a precursor of a dam failure. These account for approximately 34 percent of all U.S. dam failures.
2. **Foundation Defects:** including settlement and slope instability, cause about 30 percent of all dam failures.
3. **Cracking:** caused by movements like the natural settling of a dam.
4. **Inadequate** maintenance and upkeep.
5. **Piping:** when seepage through a dam is not properly filtered and soil particles continue to progress, and form sink holes in the dam. About 20 percent of U.S. dam failures have been caused by piping.

The percentage of dam failure causes is shown in **Figure 5. Dam Failure Primary Incident Mechanism, ASDSO Incident Database (2010-2019)**, with overtopping accounting for the majority of the incidents and cracking accounting for the least percentage of incidents.

Figure 5. Dam Failure Primary Incident Mechanism, ASDSO Incident Database (2010-2019)



Source: ASDSO Incident Database

Water released by a failed dam generates tremendous energy and 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 to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Associated water quality and health concerns could also be issues. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure. In general, there are three types of dams with different failure characteristics, described below:

- **Concrete arch or hydraulic fill:** A concrete arch or hydraulic fill dam can fail almost instantaneously: the flood wave builds up rapidly to a peak then gradually declines.
- **Earth-rockfill:** earth-rockfill dam fails gradually due to erosion of the breach: a flood wave will build gradually to a peak and then decline until the reservoir is empty.
- **Concrete gravity:** concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

EXTENT

Extensive - According to the Fresno County Operational Area Master Emergency Services Plan, there are several hundred dams in Fresno County constructed for flood control, irrigation storage, electrical generation, recreation, and stock watering purposes. The National Inventory of Dams identifies 52 dams (see **Table 18. Fresno County and Surrounding Areas Dams**) that are located in or are of significance to Fresno County. Of these dams, 32 are considered high hazard, 4 are significant hazard, and 14 are low hazard. Several are located within Madera County and Kern County; however, they pose a threat to Fresno County based on the topography and hydrological flow characteristics of the area. According to the Fresno County Flood Control District, in a worst-case scenario of a hypothetical failure of a dam or its critical structures, such as spillways or outlet gates, the areas that would be impacted by flooding would include areas east of the Highway 168, Areas to the west of Highway 99, and any neighborhood or business touching Highway 41.³

Table 19. Fresno County Dams details the dams affecting Fresno County. The majority of these dams are in the San Joaquin River or Kings River watersheds in the eastern part of the county. Both incorporated and unincorporated areas are at risk of damage from flooding in the event of a dam failure, however, the City of Fresno, Clovis, Sanger and the eastern unincorporated county are at greater risk. Generally, the areas at risk are large urban and rural areas downstream and below the dams on the valley floor. There have not been any failures of major dams in Fresno County; future failures are more likely to occur with smaller dams, with minimal or no damage potential. Based on this information, the geographic extent rating for dam failure in Fresno County is extensive.

Table 18. Fresno County and Surrounding Areas Dams

Hazard	Dam Name	City	Owner Name	Dam Type	NID Storage (Acre-Feet)
High	Alluvial Drain Detention	Clovis	Fresno Metropolitan Flood Control District	Earth	832.7
High	Balsam Meadow Forebay Main	Big Creek	Southern California Edison Company	Rockfill	1,960
High	Big Creek Dam No.1	Big Creek	Southern California Edison Company	Concrete/Arch, Gravity	89,800
High	Big Creek Dam No.3	Big Creek	Southern California Edison Company	Concrete/Gravity/Rockfill	89,800
High	Big Creek Dam No.6	Big Creek	Southern California Edison Company	Concrete/Arch	1,726

³ The areas of Fresno at risk of flooding if a dam breaks | YourCentralValley.com | KSEE24 and CBS47 Fresno CA
<https://www.yourcentralvalley.com/digital-exclusive/the-areas-of-fresno-at-risk-of-flooding-if-a-dam-breaks/>

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Hazard	Dam Name	City	Owner Name	Dam Type	NID Storage (Acre-Feet)
High	Big Creek Dam No.7	Auberry	Southern California Edison Company	Concrete/Gravity	35,000
High	Big Dry Creek	Clovis	Fresno Metropolitan Flood Control District	Earth	30,200
High	Courtright	Balch Camp	Pacific Gas and Electric Company	Rockfill	134,342
High	Crane Valley	North Fork	Pacific Gas and Electric Company		45,410
High	Fancher Creek	Clovis	Fresno Metropolitan Flood Control District	Earth	9,600
High	Fancher Creek Detention	Fresno	Fresno Metropolitan Flood Control District	Earth	1,891
High	Florence Lake	Mono Hot Springs	Southern California Edison Company	Concrete/Multi Arch	68,000
High	Fresh Water Pond**	Old River	CalMat	Earth	46
High	Friant	Fresno	U.S. Bureau of Reclamation	Concrete, Gravity	520,500
High	Friant Dike 3	Fresno	U.S. Bureau of Reclamation	Earth	555,500
High	Friant Millerton Road Embankment A	Fresno	U.S. Bureau of Reclamation	Earth	555,500
High	Giffen Reservoir	Fresno	Harris Farms Inc	Earth	900
High	Hume Lake	Barton's Resort	USDA Forest Service	Concrete	0
High	Little Panoche Detention	Oro Loma	U.S. Bureau of Reclamation	Earth	13,240
High	Mammoth Pool*	Big Creek	Southern California	Earth	122,175

4. Risk Assessment



Hazard	Dam Name	City	Owner Name	Dam Type	NID Storage (Acre-Feet)
			Edison Company		
High	Manzanita Diversion	North Fork	Pacific Gas and Electric Company	Concrete/Arch	168
High	Pine Flat Dam	Sanger	USACE-Sacramento District	Gravity	1,091,700
High	Red Bank	Clovis	Fresno Metropolitan Flood Control District	Earth	1,100
High	Redbank Creek Detention Basin	Fresno	Fresno Metropolitan Flood Control District	Earth	940
High	Sand Creek	Orosi	Tulare Co Resources Management Agency	Earth	1,050
High	Sequoia Lake		YMCA Inc	Earth	1,370
High	Shaver Dike	Shaver Lake	Southern California Edison Company	Concrete/Arch/Gravity	135,568
High	Shaver Lake	Shaver Lake	Southern California Edison Company	Concrete/Earth	135,568
High	Silt Pond	Coalinga	Granite Construction	Earth	25
High	Vermillion Valley	Mono Hot Springs	Southern California Edison Company	Earth	140,000
High	Wishon Main	Wishon Village	Pacific Gas and Electric Company	Rockfill	133,600
High	Mendota Diversion*	Firebaugh	Central Calif Irrigation District	Buttress	3,000
Significant	Balch Afterbay	Balch Camp	Pacific Gas and Electric Company	Concrete/Arch	325
Significant	Blach Diversion	Balch Camp	Pacific Gas and Electric Company	Concrete/Arch	1,295
Significant	Big Creek Dam No.5	Big Creek	Southern California	Concrete/Arch	74

4. Risk Assessment



Hazard	Dam Name	City	Owner Name	Dam Type	NID Storage (Acre-Feet)
			Edison Company		
Significant	Wishon Auxiliary No.1	Wishon Village	Pacific Gas and Electric Company	Concrete/Gravity	133,600
Low	Balsam Meadow Forebay Dike	Big Creek	Southern California Edison Company	Earth	1,960
Low	Bear Creek Diversion	Mono Hot Springs	Southern California Edison Company	Concrete/Arch	103
Low	Big Creek Dam No.3a	Big Creek	Southern California Edison Company	Concrete/Gravity/Rockfill	89,800
Low	Big Creek Dam No.4	Big Creek	Southern California Edison Company	Concrete/Arch	100
Low	Chilkoot*	Bass Lake	Pacific Gas and Electric Company	Rockfill	308
Low	Kerckhoff	Friant	Pacific Gas and Electric Company	Concrete/Arch	4,252
Low	Lemoore Div Weir		Lemoore Canal and Irrigation Company	Buttress	50
Low	Mono Creek Diversion	Mono Hot Springs	Southern California Edison Company	Concrete/Arch	45
Low	Mud	San Joaquin	James Irrigation District	Earth	304
Low	Portal Forebay Dike	Mono Hot Springs	Southern California Edison Company	Earth	390
Low	Portal Forebay Main	Mono Hot Springs	Southern California Edison Company	Earth/Rockfill	390
Low	Reynolds Weir	None	Laguna Irrigation District	Buttress	260

4. Risk Assessment



Hazard	Dam Name	City	Owner Name	Dam Type	NID Storage (Acre-Feet)
Low	San Joaquin No.3 Forebay*	North Fork	Pacific Gas and Electric Company	Earth	20
Low	Stinson Weir		Stinson Canal and Irrigation Company	Buttress	50
Low	Wishon Forebay*	Friant	Pacific Gas and Electric Company	Earth	69

Source: 2024; National Inventory of Dams Note: 1 acre-foot=326,000 gallons

Hazard: H=High, S=Significant, L=Low

*Madera County

**Kern County



Table 19. Fresno County Dams

Dam No. ⁴	Dam Number		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Lat.	Long.	Owner Type	Crest Type	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
1017-5	Alluvial Drain Detention		Fresno Metropolitan Flood Control District	12	833	Certified	Satisfactory	Fresno
CA01358	36.86	-119.67	Park, sanitation, utility, or water district	134	ERTH	High	No	1994
95-2	Balch Afterbay		Pacific Gas and Electric Company	139	1,295	Certified	Satisfactory	Fresno
CA00336	36.91	-119.09	Private company, corporation, LLC, partnership	235	CORA	High	No	1928
104-42	Balsam Meadow		Southern California Edison	127	2,040	Certified	Satisfactory	Fresno
CA01283	37.16	-119.25	Private company, corporation, LLC, partnership	1,325	ROCK	High	No	1986
104-0	Bear Creek Diversion		Southern California Edison	55	103	Certified	Satisfactory	Fresno
CA00428	37.34	-118.98	Private company, corporation, LLC, partnership	241	CORA	Low	No	1927

⁴ DAMS WITHIN JURISDICTION OF THE STATE OF CALIFORNIA DAMS LISTED ALPHABETICALLY BY COUNTY SEPTEMBER 2022
<https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/All-Programs/Division-of-Safety-of-Dams/Files/Publications/Dams-Within-Jurisdiction-of-the-State-of-California-Listed-Alphabetically-by-County-September-2022.pdf>

4. Risk Assessment



Dam No. ⁴	Dam Number		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Lat.	Long.	Owner Type	Crest Type	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
104-4	Big Creek No.4		Southern California Edison	75	100	Certified	Satisfactory	Fresno
CA00430	37.2	-119.24	Private company , corporation, LLC, partnership	220	CORA	Low	No	1913
104-5	Big Creek No.5		Southern California Edison	58	42	Certified	Satisfactory	Fresno
CA00431	37.2	-119.31	Private company , corporation, LLC, partnership	153	CORA	Significant	No	1921
104-6	Big Creek No.6		Southern California Edison	140	993	Certified	Satisfactory	Fresno
CA00432	37.21	-119.33	Private company , corporation, LLC, partnership	485	CORA	Low	No	1923
104-22	Big Creek No.7		Southern California Edison	223	35,000	Certified	Satisfactory	Fresno
CA00440	37.15	-119.45	Private company , corporation, LLC, partnership	893	GRAV	Extremely High	No	1951
1017-2	Big Dry Creek		Fresno Metropolitan Flood Control District	50	30,200	Certified	Satisfactory	Fresno
CA0175	36.89	-119.66	Park, sanitation , utility, or water district	25,300	ERTH	Extremely High	No	1948

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Dam No. ⁴	Dam Number		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Lat.	Long.	Owner Type	Crest Type	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
97-119	Courtright		Pacific Gas and Electric Company	315	123,300	Certified	Satisfactory	Fresno
CA00412	37.08	-118.97	Private company , corporation, LLC, partnership	862	ROCK	High	No	1958
1017-4	Fancher Creek		Fresno Metropolitan Flood Control District	46	9,600	Certified	Satisfactory	Fresno
CA01327	36.85	-119.54	Park, sanitation , utility, or water district	15,312	ERTH	Extremely High	No	1991
1017-6	Fancher Creek Detention		Fresno Metropolitan Flood Control District	16	1,891	Certified	Satisfactory	Fresno
CA01497	36.76	-119.61	Park, sanitation , utility, or water district	2,860	ERTH	Extremely High	No	2006
104-9	Florence Lake		Southern California Edison	149	64,406	Certified	Satisfactory	Fresno
CA00433	37.27	-118.97	Private company , corporation, LLC, partnership	3,106	MULA	Extremely High	No	1926
699-0	Giffen Reservoir		Harris Farms, Inc	29	900	Certified	Satisfactory	Fresno
CA00711	36.8	-119.44	Private company , corporation, LLC, partnership	1,250	ERTH	High	No	1971

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Dam No. ⁴	Dam Number		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Lat.	Long.	Owner Type	Crest Type	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
104-10	Huntington Lake 1		Southern California Edison	170	88,834	Certified	Satisfactory	Fresno
CA00434	37.23	-119.24	Private company , corporation, LLC, partnership	1,310	GRAV	Extremely High	No	1917
104-25	Mammoth Pond		Southern California Edison	406	123,000	Certified	Satisfactory	Fresno
CA00443	37.32	-119.32	Private company , corporation, LLC, partnership	820	ERTH	Extremely High	No	1960
1053-0	Mendota Diversion		Central California Irrigation District	23	3,000	Certified	Satisfactory	Fresno
CA00886	36.79	-120.37	Park, sanitation , utility, or water district	485	FLBT	Significant	No	1917
104-12	Mono Creek Diversion		Southern California Edison	50	45	Certified	Satisfactory	Fresno
CA00436	37.36	-119	Private company , corporation, LLC, partnership	112	CORA	Low	No	1927
1085-0	Mud		James Irrigation District	14	304	Certified	Satisfactory	Fresno
CA00913	36.56	-120.17	Park, sanitation , utility, or water district	127	ERTH	Low	No	1919
104-24	Portal Powerhouse Forebay		Southern California Edison	65	325	Certified	Satisfactory	Fresno

4. Risk Assessment



Dam No. ⁴	Dam Number		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Lat.	Long.	Owner Type	Crest Type	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
CA00442	37.32	-119.07	Private company , corporation, LLC, partnership	792	ERTH	Low	No	1955
1017-0	Redbank		Fresno Metropolitan Flood Control District	33	1,100	Certified	Satisfactory	Fresno
CA00837	36.81	-119.58	Park, sanitation , utility, or water district	1,450	ERTH	Extremely High	No	1962
1017-3	Redbank Creek Detention Basin		Fresno Metropolitan Flood Control District	17	940	Certified	Satisfactory	Fresno
CA-1331	36.77	-119.66	Park, sanitation , utility, or water district	6,619	ERTH	Extremely High	No	1990
80-0	Reynolds Weir		Laguna Irrigation District	13	260	Certified	Satisfactory	Fresno
CA00302	36.43	-119.67	Park, sanitation , utility, or water district	130	FLBT	Low	No	1928
693-0	Sequoia Lake		Y.M.C.A., Inc.	51	1,370	Certified	Satisfactory	Fresno
CA00709	36.73	-119	Private company , corporation, LLC, partnership	225	ERRK	High	No	1888
104-18	Shaver Lake		Southern California Edison	180	135,283	Certified	Satisfactory	Fresno
CA00437	37.15	-119.3	Private company , corporation	2,169	GRAV	Extremely High	No	1927

4. Risk Assessment



Dam No. ⁴	Dam Number		Owner Name	Dam Height	Reservoir Capacity	Certified Status	Condition Assessment	County
National ID No.	Lat.	Long.	Owner Type	Crest Type	Dam Type	Downstream Hazard	Reservoir Restrictions	Year Built
			on, LLC, partnership					
696-0	Stinson Weir		Stinson Canal and Irrigation Company	14	50	Certified	Satisfactory	Fresno
CA00710	36.46	-119.99	Private company, corporation, LLC, partnership	256	FLBT	Low	No	1910
104-23	Vermillion Valley		Southern California Edison	167	125,000	Certified	Satisfactory	Fresno
CA00441	37.37	-119	Private company, corporation, LLC, partnership	4,234	ERTH	Extremely High	No	1954
97-118	Wishon		Pacific Gas and Electric Company	265	118,000	Certified	Satisfactory	Fresno
CA00411	37.01	-118.97	Private company, corporation, LLC, partnership	3,328	ROCK	High	No	1958

Source: California Department of Water Sources, Division of Safety of Dams, Dams within Jurisdiction of the State of California, September 2022



Both unincorporated and incorporated areas of the County are identified on dam failure inundation maps included in the County's dam failure evacuation plan. The inundation areas for each of the dams are generally downstream and include large rural and urban areas on the valley floor below the dams. Adjacent jurisdictions could also be affected by a dam failure in Fresno County. These include, depending on the dam involved, the Counties of Tulare, Kings, Madera, and Merced. **Figure 6. Fresno County Dams by Hazard Classification** illustrates the locations of identified dams of concern within Fresno County. **Figure 7. Fresno County Dams by Capacity** shows a map of dams in Fresno County and their hazard class, while **Figure 8. Water Routes and Dams that Impact Fresno County** shows the water routes and the dams that impact Fresno County.

Fresno County Hazard Mitigation Plan
Dams

Dams
Downstream Hazard Classification

- Extremely High** (Red Triangle): Expected to cause considerable loss of human life or would result in an inundation area with a population of 1,000 or more.
- High** (Orange Triangle): Expected to cause loss of at least one human life.
- Significant** (Yellow Triangle): No probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts.
- Low** (Green Triangle): No probable loss of human life and low economic & environmental losses. Losses are expected to be principally limited to the owner's property.

Legend:
 Grey square: Fresno County, CA
 White square: Bordering Counties
 Black outline: City Boundaries

Fresno-Clovis Inset Map

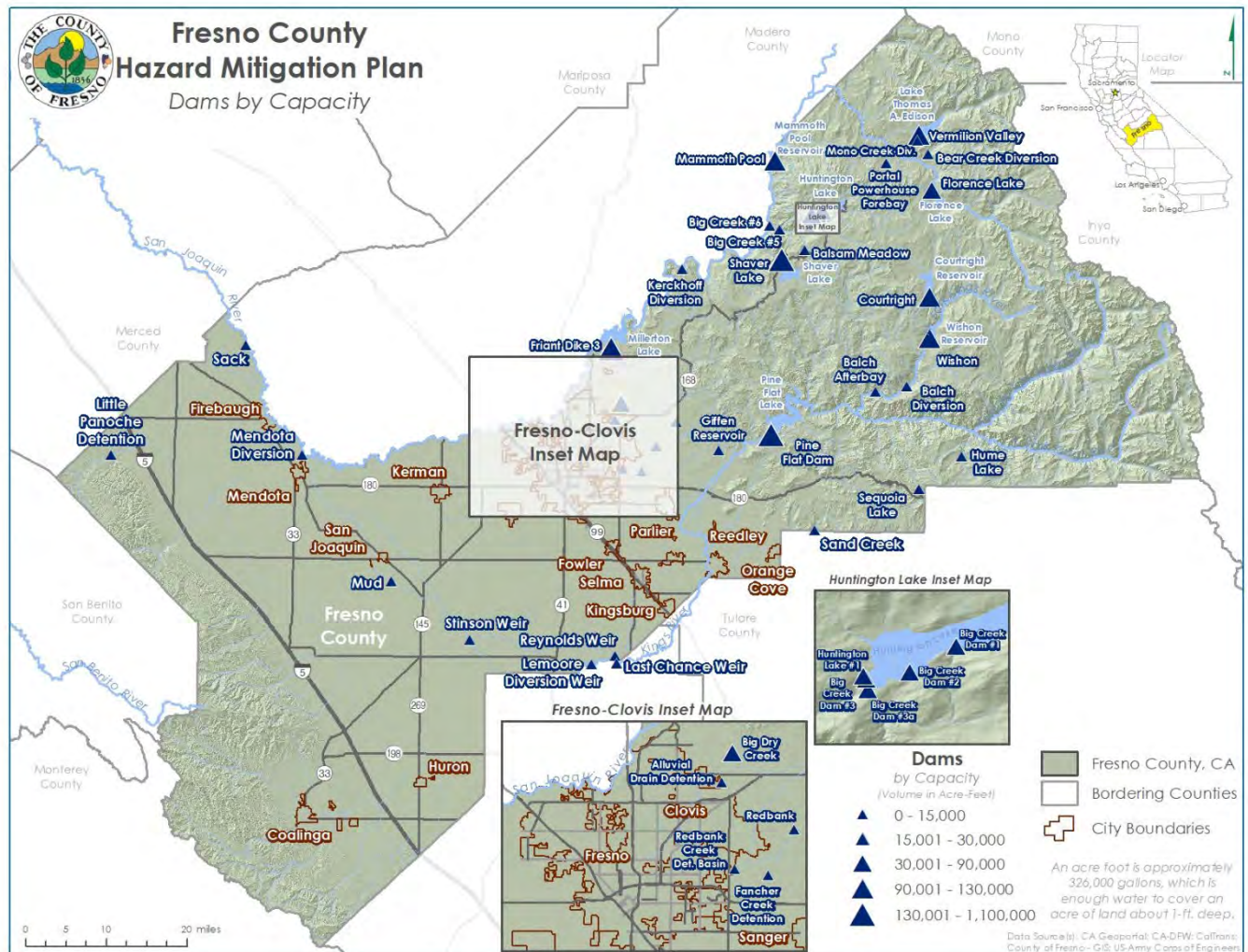
Huntington Lake Inset Map

Scale: 0 5 10 20 miles

Data Source(s): CA Geoportal; CA-DPW; Caltrans; County of Fresno - GIS; US-Army Corps of Engineers

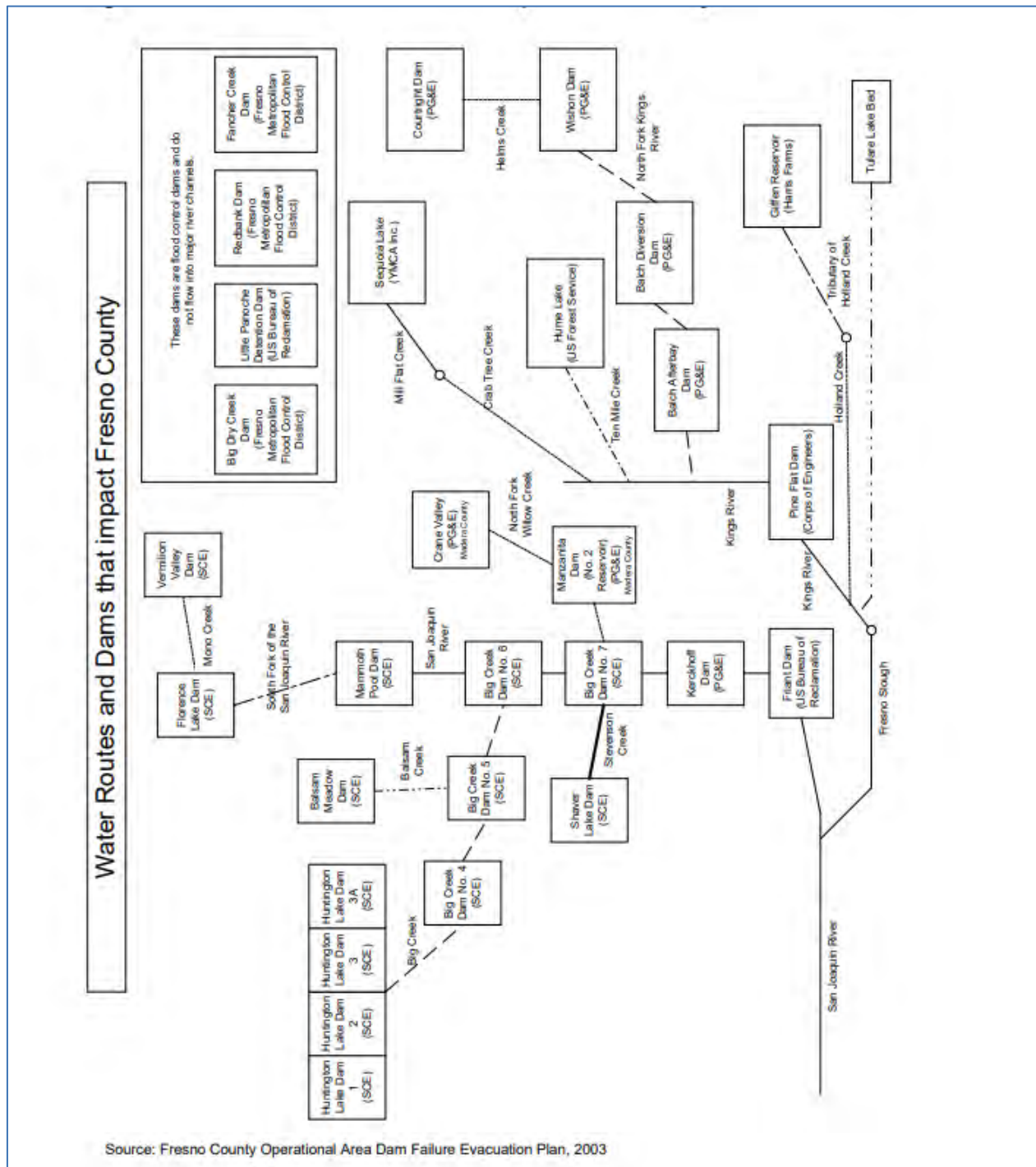
Note: California identifies 4 dam hazard classifications, while the NID identifies 3 dam hazard classifications.

Figure 7. Fresno County Dams by Capacity



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; US Army Corps of Engineers

Figure 8. Water Routes and Dams that Impact Fresno County



Source: Fresno County Operational Area Dam Failure Evacuation Plan, 2003



PAST OCCURRENCES

According to the National Performance of Dams Program at Stanford University, there have been 32 dam incidents based on the list of dams that impact Fresno County in **Table 20. Fresno County Previous Dam Incidents**. Two of the incidents were Uncontrolled Release of Reservoir (URR) which is an incident that involves damage to a dam and is an uncontrolled release. A few of the previous dam incidents were due to penstock leaks and ruptures, sinkholes, embankment instability, earthquakes, inflow flooding, piping, unknown causes, or the cause was not documented. The incidents impacting Fresno County dates to January 1, 1916, to October 27, 2021. Based on past occurrences, there has been a dam incident about every 3 years. The majority of the incidents were dam types such as concrete, rockfill, and gravity. The dams with multiple incidents include Big Creek Dam 3a, 4, 5, and 6, Crane Valley, Florence Lake, Mammoth Pool, and Mud Lake. More information on dam incidents is described in the table below.

Table 20. Fresno County Previous Dam Incidents

Dam Name	Incident Date	Incident Type	Dam Type	Uncontrolled Release of Reservoir (URR)
Balch Diversion	6/8/1998	Earthquake	Arch	No
Bear Creek Diversion	8/6/2003	Penstock Rupture	Unknown	No
Big Creek Dam 5	10/27/2021	Unknown	Concrete	Unknown
Big Creek Dam No. 3a	6/8/1998	Earthquake	Gravity	No
Big Creek Dam No. 3a	6/14/1996	Penstock Rupture	Gravity	No
Big Creek Dam No. 4	6/14/1996	Unknown	Concrete	No
Big Creek Dam No. 4	1/5/2010	Unknown	Concrete; Arch	No
Big Creek Dam No. 4	6/8/1998	Earthquake	Concrete; Arch	No
Big Creek Dam No. 5	6/8/1998	Earthquake	Concrete; Arch	No
Big Creek Dam No. 5	3/10/1995	Unknown	Concrete; Arch	No
Big Creek Dam No. 6	1/3/1997	Unknown	Concrete	No
Big Creek Dam No. 6	1/2/1997	Unknown	Concrete	No
Big Creek Dam No. 6	6/8/1998	Earthquake	Concrete; Gravity	No
Big Creek Dam No. 7	6/8/1998	Earthquake	Gravity	No
Courtright	6/8/1998	Earthquake	Rockfill	No
Crane Valley	3/13/2012	Sinkhole	Rockfill	No
Crane Valley	12/17/2009	Unknown	Rockfill	No
Crane Valley	6/8/1998	Earthquake	Rockfill	No
Crane Valley	3/22/2011	Embankment Instability	Unknown	No
Florence Lake	5/12/2011	Unknown	Concrete	No
Florence Lake	5/15/1999	Not Known	Concrete	No
Florence Lake	6/8/1998	Earthquake	Concrete	No
Mammoth Pool	2/16/2016	Sinkhole	Rockfill	No



Dam Name	Incident Date	Incident Type	Dam Type	Uncontrolled Release of Reservoir (URR)
Mammoth Pool	6/8/1998	Earthquake	Rockfill	No
Mendota Diversion	1/1/1916	Piping	Unknown	Unknown
Mono Creek Diversion	6/8/1998	Earthquake	Concrete; Arch	No
Mud Lake	1/1/1982	Not Known	Rockfill	Yes
Mud Lake	1/1/1932	Inflow Flood - Hydrologic Event	Rockfill	Yes
Portal Forebay Dike	5/15/1999	Earthquake	Rockfill	No
San Joaquin No. 3 Forebay	12/17/2016	Penstock Leak	Unknown	No
Shaver Lake	6/8/1998	Earthquake	Gravity	No
Wishon Auxiliary No. 1	6/8/1998	Earthquake	Rockfill	No

Source: Stanford, NPDP Dam Incident Database

According to the Fresno County Operational Area Master Emergency Services Plan, there were 14 dam failures in Fresno County between 1976 and 1983, but all were earthen dams on private property. None of the County's 23 major dams were involved. The failures were due to inadequate rodent and vegetation control, unauthorized and inadequate construction, and failure to consult an engineer. The main impacts from these failures were silting of downstream waters, properties, and dams; flooded or undermined roadways; and eroded embankments. Main losses were flooding of a residence and construction lumber washed downstream. In 1986, Friant Dam experienced a small, uncontrolled release. The lock on the drum gate opened, releasing 3,000 cubic feet per second. No major flooding resulted. One incident that was not captured in the NPDP Dam Incident Database was the Friant Dam incident that occurred on January 3, 1997. Stormwater breached the Friant Dam sending a historic 59,000 cubic feet of water a second cascading down the San Joaquin River, laying waste to the bridge a few hundred feet downstream from the dam. ⁵

- **4/02/2018:** At the Auberry Lumber Mill, the dam's spillway pipes became obstructed by overgrown vegetation, leading to water overtopping the structure. This overtopping resulted in erosion of the dam's downstream slope, a situation that had the potential to escalate to a dam failure. Fortunately, this event did not necessitate any evacuations, nor did it result in any reported damages.

Dam failures can occur very quickly depending on the severity of the event and what caused the failure to occur. Additionally, planned releases of dam can occur in order to mitigate flood risk from heavy rain events. For example, The Oroville Dam released billions of gallons of water in February 2024 to reduce flood risk from several recent atmospheric river events that produced heavy rain in California. This was an effort to protect downstream communities from flood risk. ⁶ Planned releases can occur over several hours or days depending on how much water is being released.

⁵ In 1997, California was devastated by historic floods (sfgate.com) <https://www.sfgate.com/bayarea/article/1997-historic-floods-devastated-california-17697232.php>

⁶ California Reservoir 'Spectacular' Release of Billions of Gallons of Water (newsweek.com) <https://www.newsweek.com/california-reservoir-spectacular-release-billions-gallons-water-1866518>



LIKELIHOOD OF FUTURE OCCURRENCES

Possible—The County remains at risk of dam failures from numerous dams under a variety of ownership and control and of varying ages and conditions. Given the high number of dams in the County and the history of past dam failures, the potential exists for future dam failures in the Fresno County planning area. Nonetheless, it should be noted that there have not been any failures of major dams in the County. Uncontrolled or controlled release flooding below dams due to excessive rain or runoff are more likely to occur than failures.

CLIMATE CHANGE CONSIDERATIONS

The potential for climate change to affect the likelihood of dam failure is not fully understood at this point in time. With a potential for more extreme precipitation events as a result of climate change, this could result in large inflows to reservoirs. However, this could be offset by generally lower reservoir levels if storage water resources become more limited or stretched in the future due to climate change, drought and/or population growth.

DROUGHT

HAZARD/PROBLEM DESCRIPTION

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends.

Drought is a complex issue involving many factors—it occurs when a normal amount of moisture is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects:

- **Meteorological drought** is defined by a period of substantially diminished precipitation duration and/or intensity. The commonly used definition of meteorological drought is an interval of time, generally in the order of months or years, during which the actual moisture supply at a given place consistently falls below the climatically appropriate moisture supply.
- **Agricultural drought** occurs when there is inadequate soil moisture to meet the needs of a particular crop at a particular time. Agricultural drought usually occurs after or during meteorological drought, but before hydrological drought and can affect livestock and other dry-land agricultural operations.
- **Hydrological drought** refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow, snowpack, and as lake, reservoir, and groundwater levels. There is usually a delay between lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Therefore, hydrological measurements tend to lag behind other drought indicators.
- **Socio-economic drought** occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product.

One dry year does not normally constitute a drought in California. California's extensive system of water supply infrastructure—its reservoirs, groundwater basins, and inter- regional conveyance facilities—mitigates the effect of short-term dry periods for most water users. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions.

The drought issue in California is further compounded by water-rights. Water is a commodity possessed under a variety of legal doctrines. The prioritization of water rights between farming and federally protected fish habitats in California is part of this issue.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in the planning area are those related to water intensive activities such as agriculture, wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Also, during a drought, allocations go down, which results in reduced water availability. Voluntary water conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact which reduces its ability to absorb water, potentially making an area more susceptible to flooding.

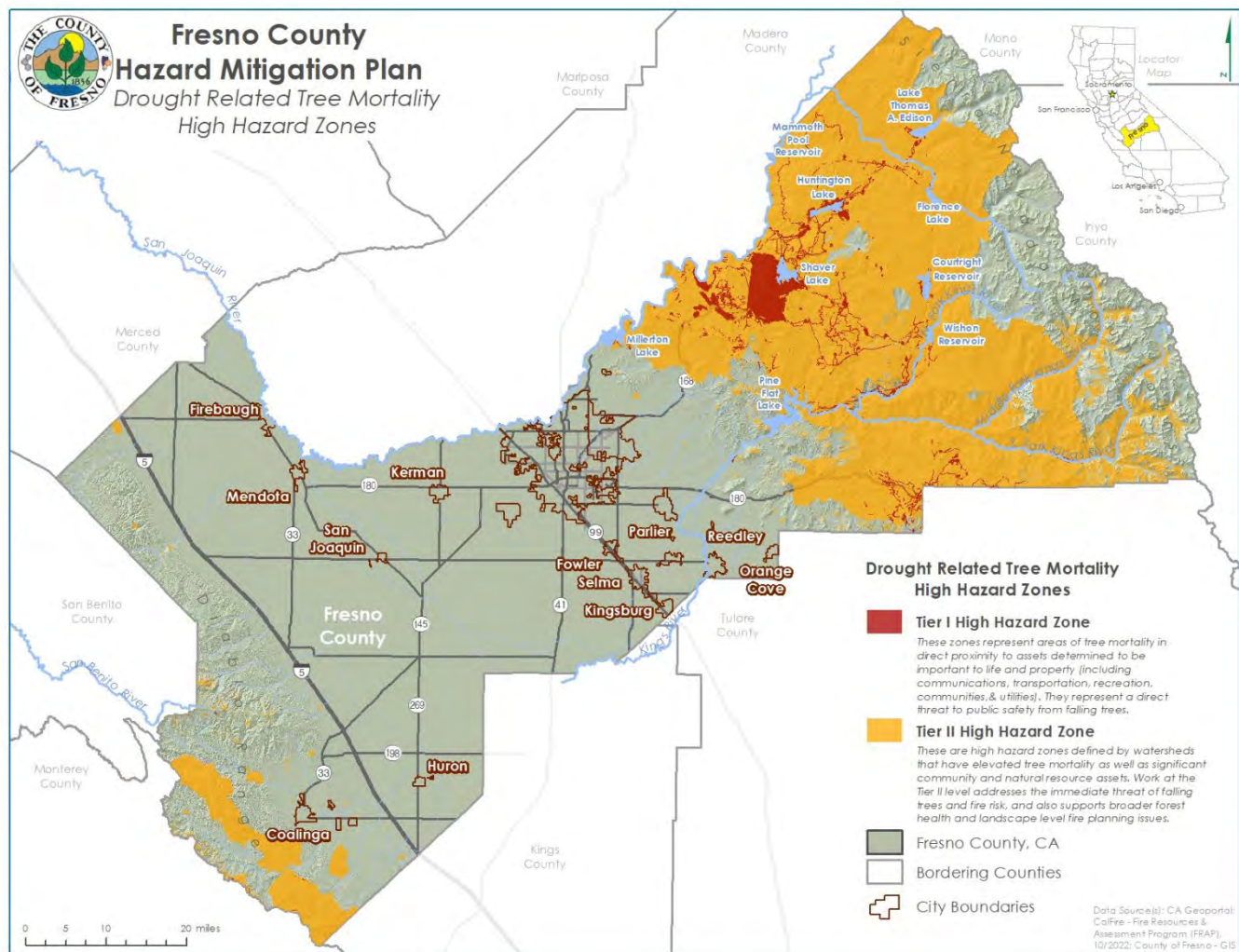


TREE MORTALITY

The HMPC identified tree mortality as an additional drought impact of significance to Fresno County during the 2018 update. In recent years, due to the multi-year drought throughout the planning area and state-wide, a vast number of trees have been (and continue to be) impacted within Fresno County foothill and mountain communities and beyond. Standing dead trees could fall and pose a risk to people, buildings, power lines, roads, and other infrastructure. In addition, drought-impacted trees become susceptible to diseases and insect infestations (bark beetle) further adding to the risk of tree mortality and related potential impacts.

The location, extent, and probability of occurrence for tree mortality can be viewed as sub-set to the drought hazard. Those areas of the natural environment susceptible to drought comprise a larger area, since tree mortality is related to other sub-factors specific to the species impacted such as tree age and soil composition. **Figure 9. Fresno County Drought Related Tree Mortality High Hazard Zones** shows the extent of the impact of drought and tree mortality in Fresno County. The Tier 1 High Hazard Zones (as indicated in red) depict areas where tree mortality directly coincides with critical infrastructure.

Figure 9. Fresno County Drought Related Tree Mortality High Hazard Zones



Source: CA Geoportal; CalFire – Fire Resources & Assessment Program (FRAP), 10/2022; County of Fresno - GIS

EXTENT

Given the historical occurrence of severe drought impacts throughout Fresno County and across the state, the HMPC understands that drought will continue to pose a high degree of risk to the entire planning area, potentially impacting crops, livestock, water resources, the natural environment at large, buildings and infrastructure (from land subsidence), and local economies. While drought affects the entire planning area equally, the potential impacts may be variable and specific to each jurisdiction, depending on contextual factors such as the degree of assets and activities historically impacted by drought within each jurisdiction, such as the agricultural and parks and tourism industries.

Figure 10. U.S. Drought Monitor: California (January 23, 2024) and **Figure 11. U.S. Drought Monitor: California (January 23, 2018)** provide a “snapshot in time” of the drought conditions in California in January 2024 and January 2018 when the plan was last updated. The snapshots selected are instrumental in depicting both the historic and potential change in drought’s geographic range and severity in Fresno County. Compared to 2018, drought conditions across California state have significantly improved due to the increased precipitation in early 2023. The majority of the state experienced no drought conditions while some small areas in northern and southern California experienced abnormally dry conditions. These two figures alone show the duality of drought conditions over the span of a couple of years.

The magnitude or intensity of drought is measured by the U.S. Drought Monitor (USDM) through maps that are updated weekly to show the location and intensity of drought across the country. The USDM identifies areas in drought and labels them by intensity using four categories of drought, D1 (the least intense) to D4 (the most intense). It also describes areas with no drought and uses the D0 category to indicate abnormally dry areas that could be entering or recovering from drought, **Table 21. U.S. Drought Monitor Drought Categories.**

Table 21. U.S. Drought Monitor Drought Categories

Category	Description
None (Gray)	Normal or wet conditions
D0 (Light Yellow)	Abnormally Dry
D1 (Light Orange)	Moderate Drought
D2 (Orange)	Severe Drought
D3 (Red)	Extreme Drought
D4 (Maroon)	Exceptional Drought

Source: U.S. Drought Monitor

Other drought indices have been developed by the National Oceanic and Atmospheric Administration (NOAA) to measure impacts and severity of meteorological and hydrological drought and to map their extent and locations.

- **The Crop Moisture Index:** measures the short-term drought weekly to assess impacts on agriculture.
- **The Palmer Z Index:** measures the short-term drought on a monthly scale.
- **The Palmer Drought Severity Index:** is based on long-term weather patterns. The intensity of drought in each month is dependent on current weather plus the cumulative patterns of previous months.
- **The Palmer Hydrological Drought Index:** quantifies hydrological effects (reservoir levels, groundwater levels, etc.) which take longer to develop and last longer. This index responds more slowly to changing conditions than the Palmer Drought Index.
- **The Standardized Precipitation Index:** only considers precipitation.

To ensure that the State of California can maintain safe, clean, and reliable water service, Cal Water follows a set of drought severity stages to determine the level of water conservation and assess potential water-use restrictions described in **Table 22. California Drought Severity Stages**.

Table 22. California Drought Severity Stages

Stage	Description
1	<ul style="list-style-type: none"> • We implement policies and guidelines for reducing water usage by 10 percent. • Residential and business customers are subject to water-use restrictions • Outdoor irrigation is subject to limited times • Leak repairs must be made in a timely manner • Shut-off nozzles are required when using a hose to wash a car • Outdoor watering is prohibited within 48 hours of rain
2	<ul style="list-style-type: none"> • We implement policies and guidelines for reducing water usage by 20 percent • Residential and business customers are subject to additional water-use restrictions • Outdoor irrigation by residential and business customers is limited further to 1-3 days per week, depending on local ordinance • Use of non-recirculating systems in all new conveyer car wash and commercial laundry systems are prohibited • Use of single pass cooling systems in new connections is prohibited
3	<ul style="list-style-type: none"> • We implement policies and guidelines for reducing water usage by 30 percent • Residential and business customers are subject to additional water-use restrictions • Water usage for construction and dust control is prohibited • Irrigation of ornamental turf on public street medians is prohibited • Filling ornamental lakes or ponds is prohibited
4	<ul style="list-style-type: none"> • We implement policies and guidelines for reducing water usage by 40 percent • Residential and business customers are subject to additional water-use restrictions • Vehicle washing is prohibited, except with recirculated water or low-volume systems • Use of water for recreational purposes, such as water parks, is prohibited • Filling swimming pools is prohibited
5	<ul style="list-style-type: none"> • We implement policies and guidelines for reducing water usage by 50 percent • Residential and business customers are subject to additional water-use restrictions • Net zero demand increase is required on new water service connections • Single pass cooling systems are prohibited

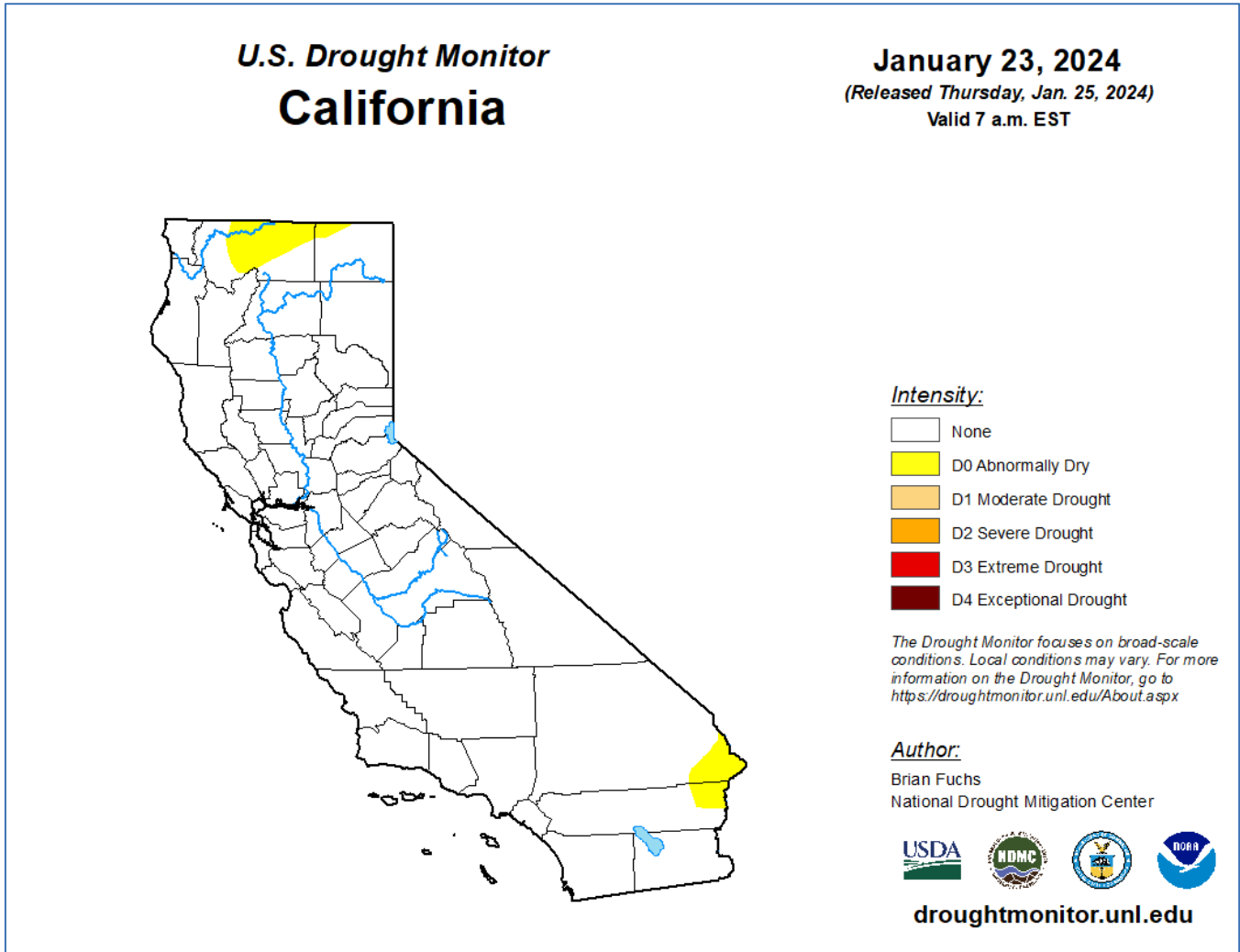
4. Risk Assessment



Stage	Description
	<ul style="list-style-type: none">Swimming pool covers are required
6	<ul style="list-style-type: none">We implement policies and guidelines for reducing water usage by more than 50 percentResidential and business customers are subject to additional water-use restrictionsAll landscape irrigation is prohibitedNew water service connections are prohibited

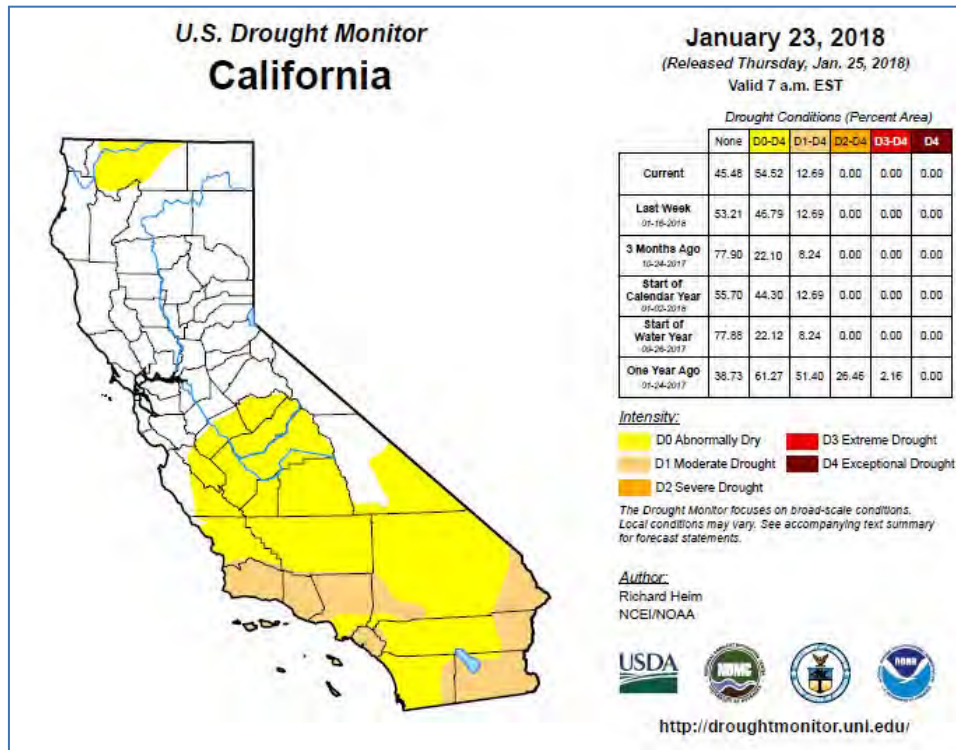
Source: California Water Service: <https://www.calwater.com/help/drought-faqs/what-are-the-stages-of-drought/>

Figure 10. U.S. Drought Monitor: California (January 23, 2024)



Source: U.S. Drought Monitor

Figure 11. U.S. Drought Monitor: California (January 23, 2018)



Source: U.S. Drought Monitor

TREE MORTALITY EXTENT

Extensive - The US Forest Service (USFS), Pacific Southwest Region, State and Private Forestry staff conduct annual aerial surveys throughout forested areas of California to detect tree mortality and tree damage (i.e., defoliation or branch flagging). The survey found approximately 39.6 million acres were surveyed during the 2022 flight season and 36.3 million dead trees. The majority of the trees killed were fir, followed by ponderosa pine, and Douglas fir. The elevated levels of tree mortality can be attributed to the ongoing drought period (2020-2023) and bark and engrave beetle attacks.⁷

The California/Shasta red fir, white fir, and grand fir mortality was attributed to fir engraver beetle increased in 2022. Approximately 28.1 million dead fir trees were recorded across 1.9 million acres, compared to approximately 6.1 million dead fir trees across 780,000 acres recorded in 2021. The central Sierra Nevada Region experienced the tree mortality that was most severe and widespread.

Within Fresno County, there are several national parks and forests. In fact, the Sequoia and Sierra forests have increased tree mortality in 2022 compared to 2021. **Table 23. Tree Mortality by National Forest** shows the National Forests and acres with mortality and estimated number of dead trees by Forest (2022).

⁷ 2022 Aerial Survey Results: California (usda.gov) https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd1099786.pdf

- **Sequoia:** Mortality increased from an estimated 380,000 dead trees across 64,000 acres in 2021 to approximately 410,000 dead trees across 75,000 acres in 2022. Most of the mortality was light in severity except for moderate levels of mortality along southern Hume Lake District
 - California red fir mortality decreased from approximately 230,000 dead trees across 34,000 acres in 2021 to ~200,000 dead trees across 35,000 acres in 2022.
 - White fir mortality increased from approximately 100,000 dead trees across 17,000 acres in 2021 to ~110,000 dead trees across 19,000 acres in 2022.
- **Sierra:** Mortality increased from an estimated 860,000 dead across 91,000 acres in 2021 to approximately 1.7 million dead trees across 180,000 acres in 2022
 - California red fir mortality increased from approximately 790,000 dead trees across 75,000 acres in 2021 to ~1.5 million dead trees across 150,000 acres in 2022.
 - White fir mortality increased from approximately 13,000 dead trees across 5,500 acres in 2021 to ~130,000 dead trees across 26,000 acres in 2022.

Table 23. Tree Mortality by National Forest

National Forest	Acres	Dead Trees
Angeles National Forest	1,100	10,000
Cleveland National Forest	1,500	8,000
Eldorado National Forest	91,000	1,300,000
Humboldt-Toiyabe National Forest*	50,000	750,000
Inyo National Forest*	78,000	880,000
Klamath National Forest*	140,000	1,800,000
Lake Tahoe Basin Management Unit	58,000	1,400,000
Lassen National Forest	170,000	1,900,000
Los Padres National Forest	12,000	59,000
Mendocino National Forest	40,000	550,000
Modoc National Forest	180,000	2,200,000
Plumas National Forest	110,000	1,600,000
San Bernardino National Forest	3,900	13,000
Sequoia National Forest	75,000	410,000
Shasta-Trinity National Forest	290,000	4,400,000
Sierra National Forest	180,000	1,700,000
Six Rivers National Forest	24,000	150,000
Stanislaus National Forest	140,000	2,600,000
Tahoe National Forest	260,000	5,000,000

The numbers of acres and trees throughout this report have been rounded as appropriate.

*include acreage outside of California but within the National Forest Boundary.

The Tree Mortality Task Force mapping effort (see previous map) identifies Tier 1 and Tier 2 risk zones to fully capture the extent of tree mortality risk to populations, buildings, infrastructure, and natural

resources. Tier 1 are those areas that directly coincide with critical infrastructure, and which pose a direct threat to people and assets operating in these areas. Tier 2 are areas defined by watersheds and which have a significant degree of tree mortality coinciding with significant community and natural resource assets.⁸

Based on the mapping as well as input from the LHMP, the extent of the Tree Mortality Tier I and II Hazard Areas in Fresno County comprises over 25 percent of the planning area and therefore covers an extensive area in Fresno County.

PAST OCCURRENCES

Historically, California has experienced multiple severe droughts. According to the DWR, droughts exceeding three years are relatively rare in Northern California, and the region is the geographic source of much of the state's developed water supply. According to the "Water Year 2023: Weather Whiplash, From Drought to Deluge" from the California Department of Water Resources, California Natural Resources Agency, stated in their report that 2023 demonstrated dramatic extremes of California's climate. At the beginning of the year, California had the three driest years on record that prompted the Governor to issue a proclamation of a state of emergency for Fresno County described in the table below. The storms from 2023 have provided relief from the water shortages of the prior drought years due to atmospheric rivers, tropical storms, and hurricane events.

The 1929-1934 drought established the criteria commonly used in designing storage capacity and yield of large Northern California reservoirs. **Table 24. Severity of Extreme Droughts in the Sacramento and San Joaquin Valleys** below compares the 1929-34 drought in the Sacramento and San Joaquin Valleys to drought periods in 1976-77, and 1987-92, 2012-17, and 2020-2023. The driest single year of California's measured hydrologic record was 2022.⁹

Table 24. Severity of Extreme Droughts in the Sacramento and San Joaquin Valleys

Drought Period	Sacramento Valley Runoff		San Joaquin Valley Runoff	
	(maf*/yr)	(% Average 1901-96)	(maf*/yr)	(% Average 1906-96)
1929-34	9.8	55	3.3	57
1976-77	6.6	37	1.5	26
1987-92	10.0	56	2.8	47
2012-17	N/A	43	N/A	N/A
2020-23	N/A	N/A	N/A	N/A

Source: California Department of Water Resources, www.water.ca.gov/

*Million acre-feet

The HMPC identified the following droughts as having significant impacts on the planning area:

⁸ CAL FIRE

⁹ 2022 Is California's Record Driest Year, So Far, NOAA Says | Weather.com <https://weather.com/news/climate/news/2022-07-11-june-record-driest-noaa-climate-report>



- **1928-1934:** This seven-year drought predated the construction of many of the water projects in California including the Federal Central Valley Project and State Water Project. Because the 1928-34 drought constituted the first major drought on record in California, it served as the basis for early reservoir operations planning and the development of shortage criteria for water supply contracts.
- **1976:** A federal disaster declaration was declared because of a drought affecting Fresno County and much of California.
- **1987-1992:** Fresno County also suffered adverse effects resulting from this statewide drought.
- **2002:** Abnormally dry to moderate drought conditions lingering from 2001 into 2002 reduced rangeland grasses and feed for cattle. Losses to rangeland and loss of feed were estimated at \$2.5 million. An estimated 850,000 acres were affected in both the east and west side of the valley. A USDA disaster declaration on November 22 made low interest loans available to family-size operations.
- **2008:** Drought impacted Fresno County of most of the Central valley, resulting in significant crop damage. In addition, the drought not only impacted agriculture, but the economy of the planning area in general, where small towns were especially hard hit, including job loss and the need for food-supply assistance provided by the state.
- **2012-2017:** Drought produced severe impacts to water wells throughout the planning area, with a high number of wells running dry. Land subsidence due to increased groundwater pumping also occurred in areas of the San Joaquin Valley including Fresno County. Crop damage was widespread as well. Water allotments were drastically reduced in many towns and water agencies, with extremely high costs for procuring water. In addition, job loss occurred with many families requiring food supply assistance, and water supply assistance provided to homeowners with dry wells. According to a report released by UC Davis Center for Watershed Sciences, the 2014 California drought cost the state's agriculture industry about \$1 billion in lost revenue, with a total statewide economic cost of the drought calculated to be \$2.2 billion. The 2014 drought, the report says, is responsible for the greatest water loss ever seen in California agriculture - about one third less than normal. The report calls the groundwater situation in California "a slow-moving train wreck." Spring snowpack at Donner Summit reached record low levels in 2014, exceeded in 2015 by a remarkable April 1 snow- water-equivalent value of only 5 percent of average. Decreased precipitation since contributed to near-record low levels in the Shasta Reservoir. The ongoing drought has contributed to declines in Fresno County crop values, based on information from an article in the Fresno Bee. Fresno County's overall gross value fell 2.2 percent to \$6.4 billion in 2013, and with the reduction lost its status as the number one agricultural county in California. The Fresno County Agricultural Commissioner noted the drought -- one of the worst in state history -- has pinched the production of several west side field crops including cotton, corn silage and barley. The field crop category fell by 42 percent ¹⁰
- **2020-2023:** The three-year drought is the most recent drought period. The state ranked driest on record for much of 2022, including driest ever January-March, January-May, and January-October. Drought conditions started on February 11, 2020, and ended October 10, 2023. Overall, the state experienced 76 percent of its average precipitation in 2022. The beginning of 2022 was the driest January through April based on records dating back to 1895 and received only 25 percent of the average statewide precipitation. In addition to a lack of precipitation, a persistent heat dome settled over California in early September that was long-lasting and intense, setting numerous daily and

¹⁰ California - State Climate Summaries 2022 (ncics.org) <https://statesummaries.ncics.org/ca/>

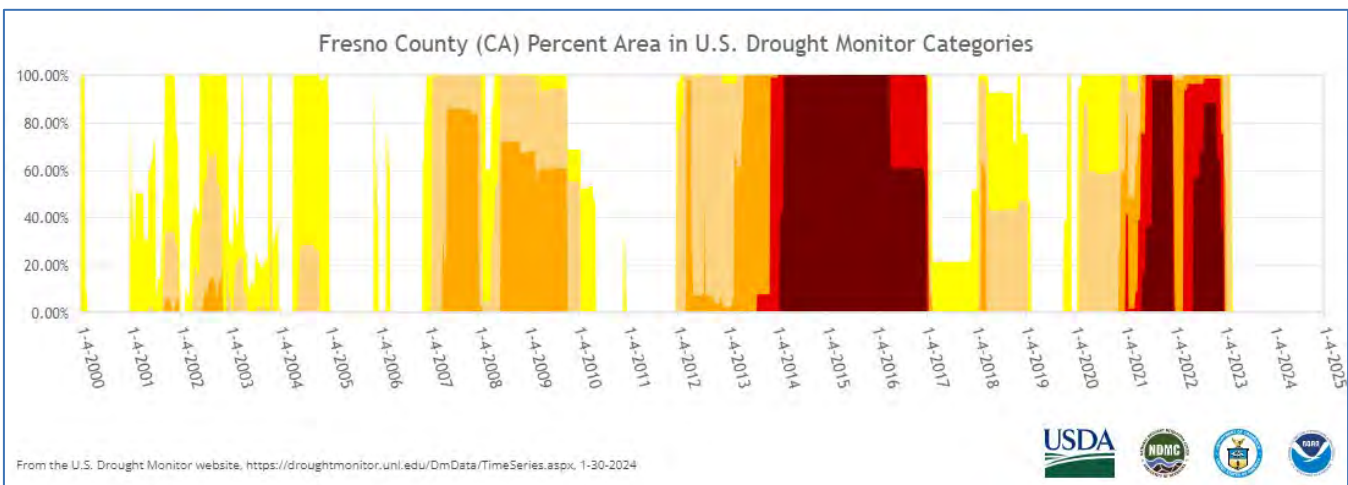
nightly high temperatures records. The majority of California did not receive any precipitation for a record-breaking 212 days. This drought period was the hottest and driest since at least 1895. ¹¹

LIKELIHOOD OF FUTURE OCCURRENCES

Possible —Historical drought data for the Fresno County planning area and the Central Valley region indicate there have been six significant droughts and 26 years of were classified as a drought year in the last 96 years. This equates to a 27 percent chance of a drought in any given year. Based on this data, droughts will likely affect the planning area.

Using the data from the U.S. Drought Monitor from 2000-2024, Fresno County has experienced moderate (D1) to exceptional drought (D4) about 77 percent of the time, up from 60 percent from the last plan update. The U.S. Drought Monitor produces weekly reports and of the 1251 weekly reports that had been produced, when the data was pulled in on January 30th, 2024, 958 weekly reports indicated that Fresno County experienced some level of drought. **Figure 12. Fresno County Percent Area in U.S. Drought Monitor Categories (2000-2023)** depicts a drought time series from January 2000 to January 2024 for Fresno County.

Figure 12. Fresno County Percent Area in U.S. Drought Monitor Categories (2000-2023)



Source: U.S. Drought Monitor

LIKELIHOOD OF TREE MORTALITY OCCURRENCE

Highly Likely - Based on historical data in lack of precipitation and increased temperatures, it is a certainty that tree mortality resulting from drought and insect infestation will continue in the future, though the degree to which it occurs depends on future rainfall levels and other factors. Some of the current challenges include how to eradicate the bark beetle, dead tree removal strategies, how to utilize the wood once it is removed, and how to restore the forests to a sustainable ecosystem. ¹²

¹¹ Statewide Rankings | Climate at a Glance | National Centers for Environmental Information (NCEI) (noaa.gov) <https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/rankings/4/pcp/202209>

¹² http://frap.fire.ca.gov/projects/projects_drought

CLIMATE CHANGE CONSIDERATIONS

In California, rising temperatures are projected to increase the average lowest elevation at which snow falls, reducing water storage in the snowpack, particularly at those lower mountain elevations which are now on the margins of reliable snowpack accumulation. This is especially concerning as mountain snowpack provides as much as a third of California's water supply by accumulating snow during wet winters. Higher spring temperatures will also result in earlier melting of the snowpack. The shift in snow melt to earlier in the season is critical for California's water supply because flood control rules require that water be allowed to flow downstream, and that water cannot be stored in reservoirs for use in the dry season. It is projected that by the end of the century, California's Sierra Nevada snowpack is projected to experience a 48 to 65 percent loss from the historical April 1 average and will have a significant decrease in snowpack impacting water supply and crop production.

WATERSHED AND ECOSYSTEMS

Climate change will likely adversely impact the ability of watersheds and ecosystems to deliver important ecosystem services such as clean water, fertile soil for crop production, and flood control. There is a broad range of climate change impacts that affect water resources in California which can be seen in **Table 25. Summary of Climate Change Impacts on Water Resources**. These changes may limit the natural capacity of healthy forests to capture water and regulate stream flows.

Table 25. Summary of Climate Change Impacts on Water Resources

Resource	Type of Impact	Description
Sea Level	Direct	Sea level is rising and will likely impact coastal areas
Soil Moisture	Direct	Prolonged dry seasons can lead to decreases in soil moisture; drier vegetation
Vegetation	Indirect	Longer and more intense fire season with increased extent of area burned
Stream Conditions	Direct	Increases in water temperature; potential effects on fish
Snowpack	Indirect	Increases in temperature will lead to decreases in snowpack
Runoff	Direct	Warmer temperatures are likely to lead to a shift in peak runoff from spring to winter and a likely decrease in summer baseflow
Hydropower	Indirect	Decreased summer flows resulting from earlier snowmelt and a shift in peak runoff could affect hydropower generation during summer months
Precipitation	Direct	Warmer winter temperatures will result in a greater percentage of precipitation falling as rain rather than as snow
Groundwater	Indirect	Reduction in snowpack and extended periods of drought are likely to increase dependency on groundwater



Source : <http://frap.fire.ca.gov/data/assessment2010/pdfs/3.1water.pdf> p. 140

SNOWFALL AND SNOWPACK

In the southern portion of the Sierra Nevada, temperatures are generally cooler, and more precipitation falls as snow than the central and northern portions of the range due to higher elevations. However, average annual precipitation decreases gradually moving southward because of the position of the jetstream in northern California and the Pacific Northwest during winter. In general, precipitation varies greatly in the Sierra Nevada region with historical annual precipitation ranging from 50 to 200 percent of average. Weather phenomena such as the El Nino Southern Oscillation, contribute to these variabilities.

Increased winter temperatures have resulted in more precipitation falling as rain rather than snow and reduced snowpack in my parts of the Sierra Nevada. Reduce snowpack and earlier snowmelt have led to earlier timing of streamflow in the region. According to the Fourth California Climate Assessment report, by 2050 the average water supply from snowpack is projected to decline to two-thirds from historical levels. If emission reductions do not occur, water from snowpack could fall to less than one-third of historical levels by 2100 which will have significant impacts on California's water management system. However, during the 2022 water year the State of California experienced record-breaking precipitation with one of the largest snowpack years on record. The 2022 water year alleviated drought conditions however brought flooding concerns across the state, including in Fresno County.¹³

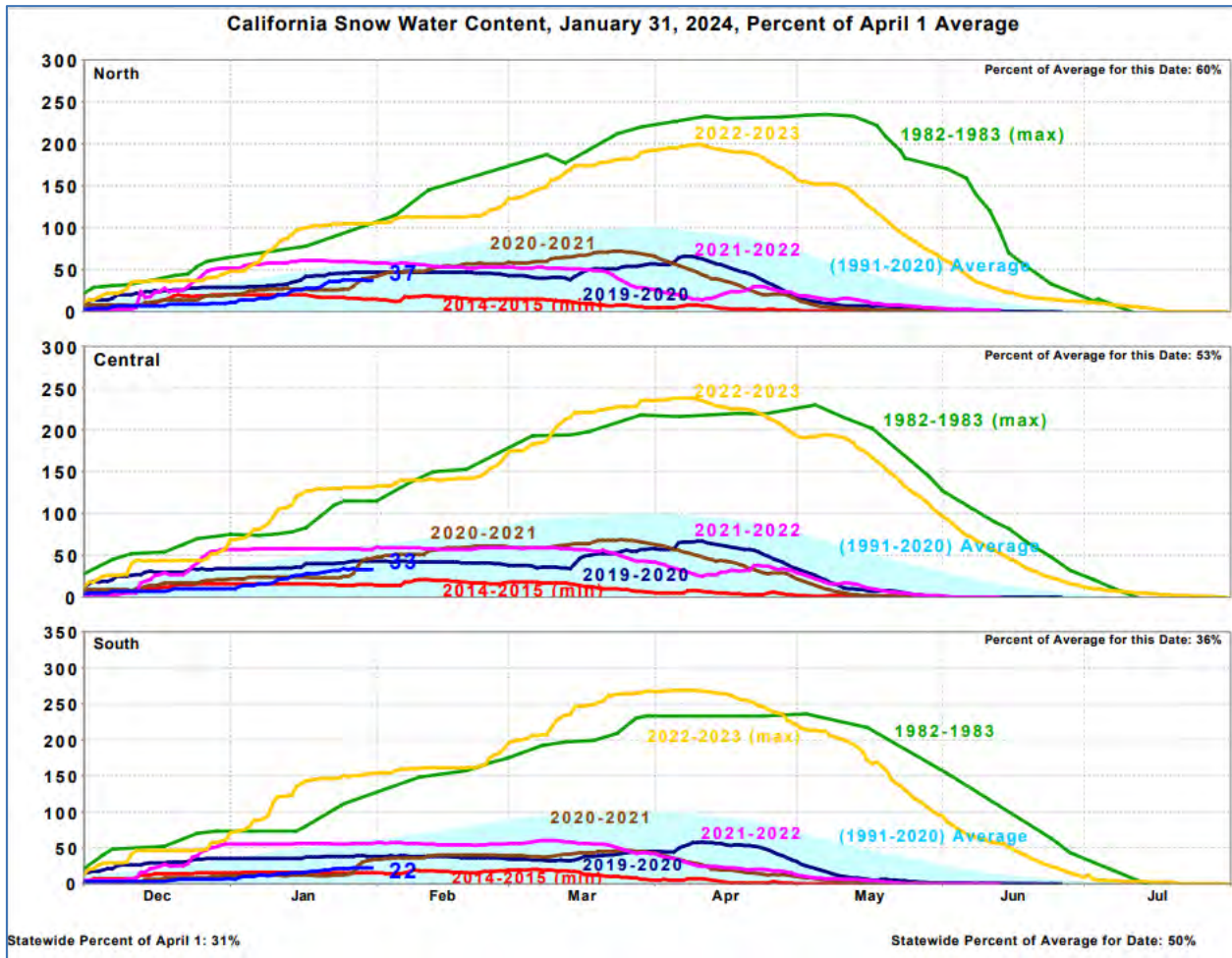
As such, Fresno County potentially has less capacity to address future drought (and wildfire) risk related to climate change due to projected temperature increases and shortages in water. About 85 percent of Californians depend on groundwater for some portion of their water supply. In fact, in some basins, groundwater withdrawal exceeds the amount is replenished long-term.¹⁴ Groundwater overdraft in some agricultural regions averages about 2 million acre-feet annually, where the impacts of drought include decreased availability of water for agriculture and environmental uses. In forested and other vegetated areas, prolonged drought decreases the moisture content of forest fuels and increases the risk of high severity wildfires.

California is the single most productive agricultural state with Fresno County and the San Joaquin Valley being a key factor to such productivity. The agricultural industry relies heavily on reservoir water supplied by snowmelt and rainfall runoff. Yearly variations in snowpack depths have implications for water availability as snowmelt from the winter snowpack feeds a network of reservoirs. California snowpack over the past several years is described in **Figure 13. California Snow Water Content Percent of April 1 Average (January 31, 2024)**. The 2022-2023 season was one of the highest snowpack levels since the 1982-1983 season.

¹³ <https://water.ca.gov/News/News-Releases/2023/April-23/Snow-Survey-April-2023>

¹⁴ <https://www.ppic.org/publication/groundwater-in-california/>

Figure 13. California Snow Water Content Percent of April 1 Average (January 31, 2024)



Source: California Department of Water Resources, Historical Snowpack Comparison

As such, the HMPC understands that high degree of risk posed by drought will be exacerbated by greater climate variation in the future, which, in this case, means greater variation and uncertainty regarding the availability of water supplies which are already under tremendous stress. The HMPC will continue to explore solutions for mitigating the drought hazard by accessing the best available data and resources on climate change and its relationship to drought.

EARTHQUAKE

HAZARD/PROBLEM DESCRIPTION

An earthquake occurs when two blocks of the earth suddenly slip past one another creating a vibration through the release of energy in the earth's crust. The vibrations that are generated are called "seismic waves". The surface where they slip is called the fault or fault plane. Earthquakes can result in ground shaking, soil liquefaction, landslides, fissures, avalanches, fires, and tsunamis. Additionally, earthquakes can cause buildings to collapse and cause heavy items to fall, resulting in injuries and property damage. They happen anywhere and at any time.

A fault is a fracture or zone of fractures between two blocks of rock. Faults allow blocks to move relative to each other. The movement may occur rapidly, in the form of an earthquake – may occur slowly, in the form of creep. There are major faults which include Normal, Reverse, Strike-Slip, and Oblique Slip Faults. Fresno County has major active or potentially active faults, including the Ortigalita Fault in the Panoche Valley and the Nunez Fault northwest of Coalinga. The Clovis Fault is a concealed fault near Clovis but is not considered to be active currently. Active faults zones outside of the county include the San Andreas Fault to the west and the Sierra Nevada Fault Zone to the east. Both of these faults present seismic ground shaking hazard throughout the county.¹⁵

SEISMIC HAZARDS

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. The degree of damage depends on many interrelated factors. Among these are the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction. The following analysis of seismic hazards from the Fresno County General Plan Background Report (2023) discusses some of these factors in more detail.

Ground Shaking

When movement occurs along a fault, the energy generated is released as waves, which cause ground shaking. Ground shaking intensity varies with the magnitude of the earthquake, the distance from the epicenter, and the type of rock or sediment through which the seismic waves move. The geological characteristics of an area thus can be a greater hazard than its distance to the earthquake epicenter.

Although most of Fresno County is situated within an area of relatively low seismic activity, the faults and fault systems that lie along the eastern and western boundaries of Fresno County, as well as other regional faults, have the potential to produce high-magnitude earthquakes throughout the County. A high-magnitude earthquake on one of these faults could cause moderate intensity ground shaking in Fresno County. The valley portion of Fresno County is located on alluvial deposits, which tend to experience greater ground shaking intensities than areas located on hard rock. Therefore, structures in the valley areas would tend to suffer greater damage from ground shaking than those located in the foothill and mountain areas.

Seismic Structural Safety

¹⁵ Fresno County General Plan Background Report (2023)

Older buildings constructed before building codes were established, and even newer buildings constructed before earthquake-resistance provisions were included in the codes, are the most likely to be damaged during an earthquake. Buildings one or two stories high of wood-frame construction are considered to be the most structurally resistant to earthquake damage. Older masonry buildings without seismic reinforcement (unreinforced masonry) are the most susceptible to the type of structural failure that causes injury or death.

The susceptibility of a structure to damage from ground shaking is also related to the underlying foundation material. A foundation of rock or very firm material can intensify short-period motions, which affects low-rise buildings more than tall, flexible ones. A deep layer of water-logged soft alluvium can cushion low-rise buildings, but it can also accentuate the motion in tall buildings. The amplified motion resulting from softer alluvial soils can also severely damage older masonry buildings.

Other potentially dangerous conditions include, but are not limited to, building architectural features that are not firmly anchored, such as parapets and cornices; roadways, including column and pile bents and abutments for bridges and overcrossings; and above-ground storage tanks and their mounting devices. Such features could be damaged or destroyed during strong or sustained ground shaking.

LIQUEFACTION POTENTIAL

Liquefaction is a process whereby soil is temporarily transformed to a fluid form during intense and prolonged ground shaking. Areas most prone to liquefaction are those that are water saturated (e.g., where the water table is less than 30 feet below the surface) and consist of relatively uniform sands that are loose to medium density. In addition to necessary soil conditions, the ground acceleration and duration of the earthquake must be of sufficient energy to induce liquefaction. Scientific studies have shown that the ground acceleration must approach 0.3g before liquefaction occurs in a sandy soil with relative densities typical of the San Joaquin alluvial deposits.

Liquefaction during major earthquakes has caused severe damage to structures on level ground because of settling, tilting, or floating. Such damage occurred in San Francisco on bay-filled areas during the 1989 Loma Prieta earthquake, even though the epicenter was several miles away. If liquefaction occurs in or under a sloping soil mass, the entire mass may flow toward a lower elevation. Also, of particular concern in terms of developed and newly developing areas are fill areas that have been poorly compacted.

No specific countywide assessments to identify liquefaction hazards have been performed. Areas where groundwater is less than 30 feet below the surface are primarily in the valley. However, soil types in the area are not conducive to liquefaction, because they are either too coarse or too high in clay content. Areas subject to 0.3g acceleration or greater are in a small section of the Sierra Nevada along the Fresno-Inyo border and along the Coast Range foothills in western Fresno County. However, the depth to groundwater in such areas is greater than in the valley, which would minimize liquefaction potential as well. Detailed geotechnical engineering investigations would be necessary to evaluate liquefaction potential more accurately in specific areas and to identify and map the areal extent of locations subject to liquefaction.

SETTLEMENT

Settlement can occur in poorly consolidated soils during ground shaking. During settlement, the soil materials are physically rearranged by the shaking to result in a less stable alignment of the individual minerals. Settlement of sufficient magnitude to cause significant structural damage is normally



associated with rapidly deposited alluvial soils or improperly founded or poorly compacted fill. These areas are known to undergo extensive settling with the addition of irrigation water, but evidence is not available. The only urban area directly affected by settlement is the City of Coalinga. Fluctuating groundwater levels may have changed the local soil characteristics. Sufficient subsurface data is lacking to conclude that settlement would occur during a large earthquake; however, the data is sufficient to indicate that the potential exists.

Other Hazards

Earthquakes can also cause seiches, tsunamis, landslides, and dam failures. A seiche is a periodic oscillation of a body of water resulting from seismic shaking or other causes that can cause flooding. Earthquake-induced seiches and tsunamis are not considered a risk in Fresno County. Earthquakes may cause landslides, particularly during the wet season, in areas of high water or saturated soils. The most likely areas for earthquake-induced landslides are the same areas of high landslide potential discussed in Section 4.2.9 Landslide. Finally, earthquakes can cause dams to fail (see Section 4.2.3 Dam Failure).

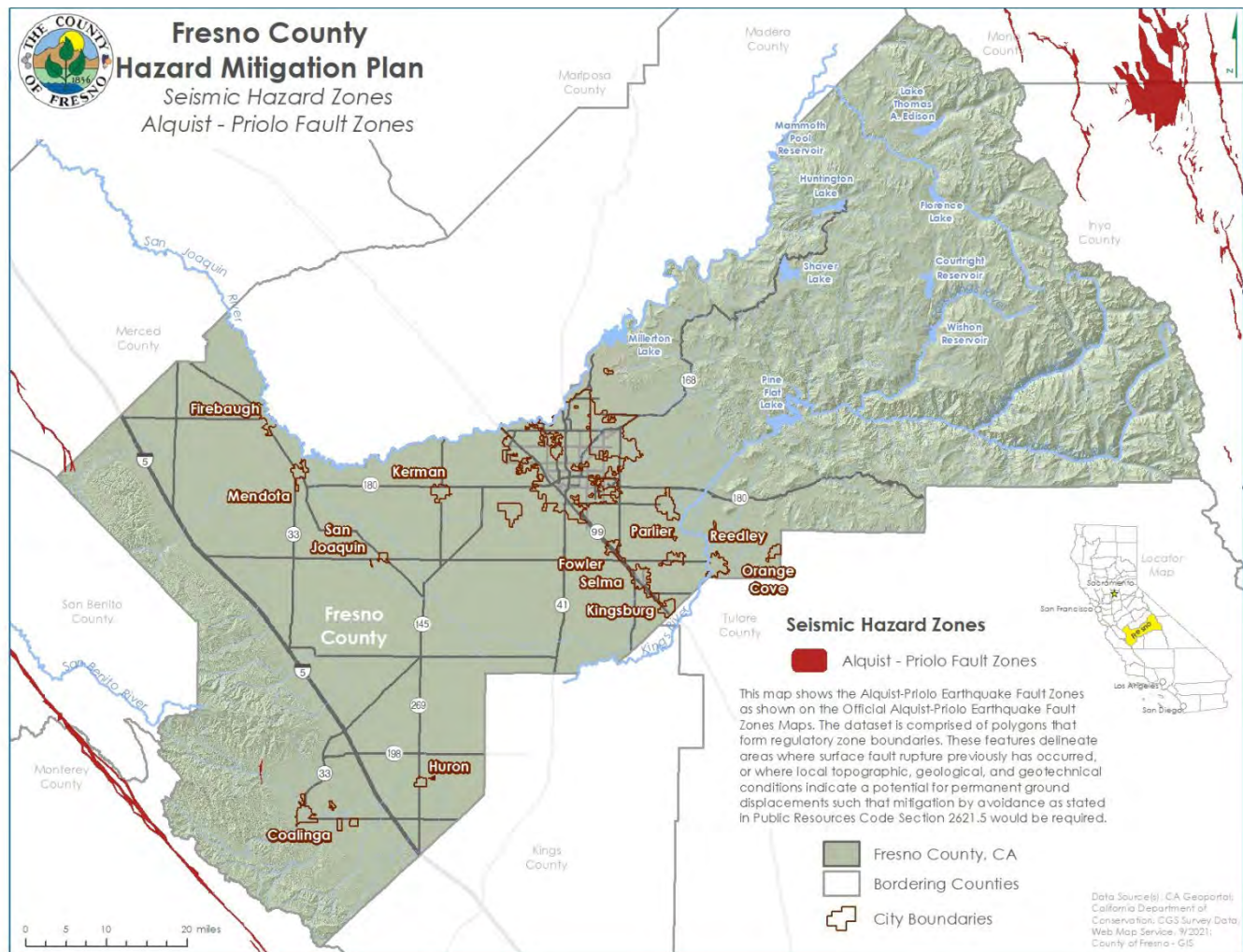
Hazardous material incidents following an earthquake represent a significant and complex challenge. Earthquakes, by their very nature, can cause extensive structural damage, leading to the disruption of systems and containers that store or transport hazardous materials. This disruption can result in leaks, spills, or even explosions of hazardous substances, such as chemicals, gases, and radioactive materials. The immediate aftermath of an earthquake often sees a chaotic environment, where the release of these materials can go undetected or unaddressed for a critical period. Earthquakes can also result in fires from ruptured gas or power lines.

FAULTS

An active fault is defined by the California Geological Survey as one that has had surface displacement within the last 11,000 years (Holocene). This does not mean, however, that faults having no evidence of surface displacement within the last 11,000 years are necessarily inactive. For example, the 1975 Oroville earthquake, the 1983 Coalinga earthquake, and the 1987 Whittier Narrows earthquake occurred on faults not previously recognized as active. Potentially active faults are those that have shown displacement within the last 1.6 million years (Quaternary). An inactive fault shows no evidence of movement in historic (last 200 years) or geologic time, suggesting that these faults are dormant. There are several active and potentially active faults within and adjacent to Fresno County.

Faults within Fresno County and major active and potentially active faults in the region are illustrated in **Figure 14. Alquist-Priolo Earthquake Fault (Hazards) Zones.**

Figure 14. Alquist-Priolo Earthquake Fault (Hazards) Zones



Source: California Department of Conservation



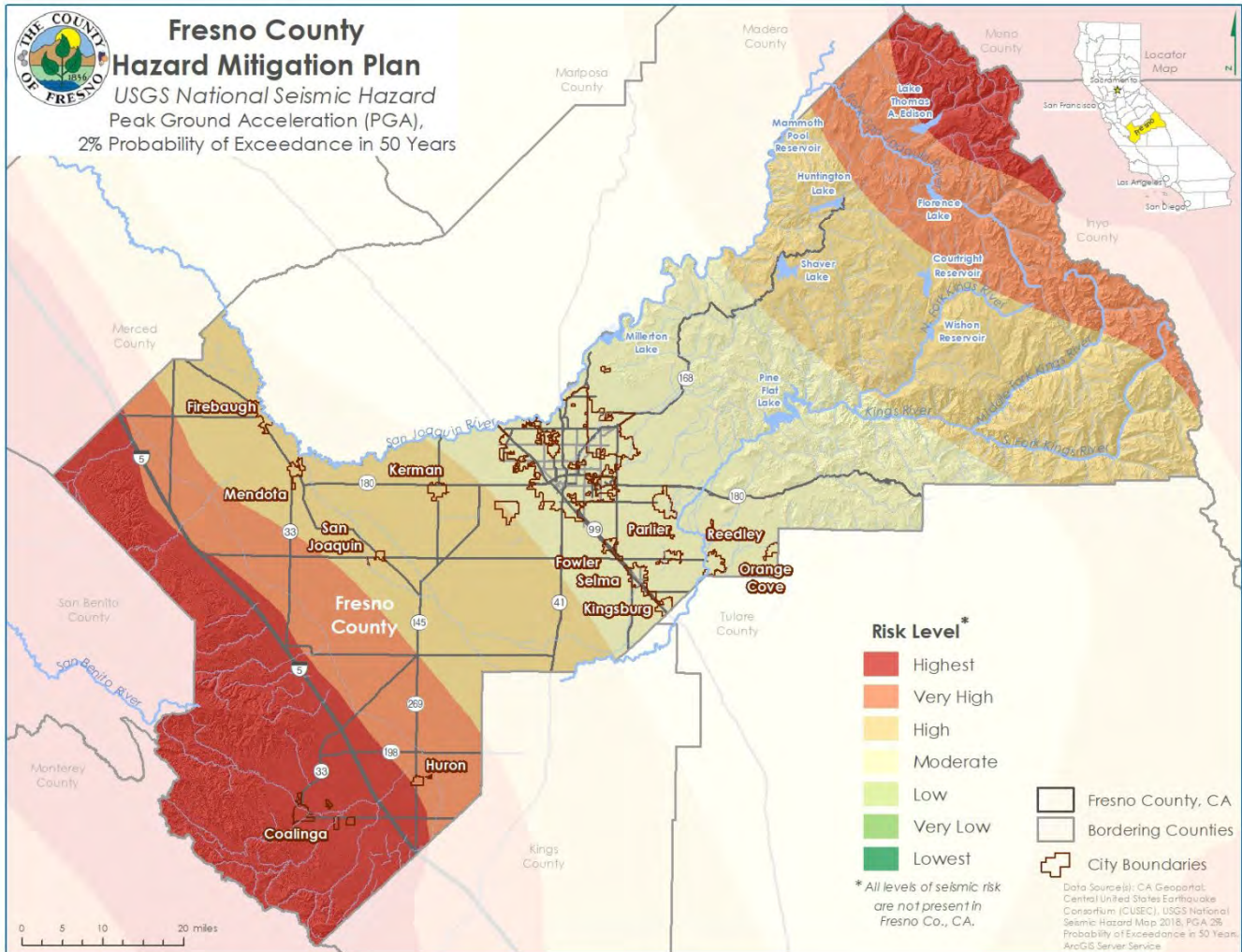
- **Clovis Fault**—The northwest-trending Clovis fault is believed to be approximately five to six miles east of the City of Clovis, extending from an area just south of the San Joaquin River to a few miles south of Fancher Creek. The Clovis fault is considered a pre-Quaternary fault or fault without recognized Quaternary displacement. This fault is not necessarily inactive.
- **Hartley Springs Fault, Silver Lake Fault (Parker Lake Fault), Unnamed Faults**— Holocene and Quaternary faults are present in the vicinity of Duck Lake in the northeastern part of Fresno County, a few miles south of Mammoth Lakes.
- **Unnamed Inferred Faults**—Relative or apparent upward and downward displacement, which are interpreted as inferred faults, occur in an area located a few miles south of Helm, extending southeast to approximately Lanare (between Fresno Slough and Crescent Ditch). As with the Clovis fault, there is no apparent Quaternary displacement; however, the possibility for fault movement in this area cannot be eliminated.
- **Nuñez Fault**—The Nuñez fault is located approximately six to seven miles northwest of Coalinga. The Nuñez fault experienced surface rupture during the 1983 Coalinga earthquake and is designated an earthquake fault zone under the Alquist-Priolo Earthquake Fault Zoning Act of 1994. No structure for human occupancy may be built within an earthquake fault zone until geologic investigations demonstrate that the site is free of fault traces that are likely to rupture with surface displacement. Special development standards associated with Alquist- Priolo requirements would be necessary for development in this area.
- **Ortogonalita Fault**—The Ortogonalita fault zone is approximately 50 miles long, originating near Crow Creek in western Stanislaus County and extending southeast to a few miles north of Panoche in western Fresno County. Most of the faults are considered active due to displacement during Holocene time and are designated an earthquake fault zone under the Alquist-Priolo Earthquake Fault Zoning Act of 1994. The southernmost extension of the fault lies in Fresno County.
- **The San Andreas Fault**—The San Andreas fault lies to the west and southwest of Fresno County. In the southwestern part of the County, the fault is roughly parallel to and a few miles west of the County line. This fault is considered active and is of primary concern in evaluating seismic hazards throughout western Fresno County, although effects of earthquakes along the San Andreas fault could occur farther east as well.
- **Sierra Nevada Fault Zone (Owens Valley Fault Zone)**—Approximately 12 miles east of the eastern Fresno County boundary lies the Owens Valley fault zone. This northwest-trending fault zone is a lengthy and complex system containing active and potentially active faults. Historically, this fault has been the source of seismic activity in Madera County to the north.
- **Foothills Fault System**—The southern part of the Foothills Fault System, located approximately 70-80 miles north of the City of Fresno, includes the Bear Mountains fault and the Melones fault zone, as well as numerous smaller, but related faults. According to the California Geological Survey data, these faults have not shown any activity during the last 1.6 million years; however, geologic investigations of the seismic safety of the Auburn Dam site suggest these faults are potentially active. Therefore, the possibility exists that earthquakes could occur on these faults.
- **White Wolf Fault**—The White Wolf fault is located approximately 100 miles south of western Fresno County. The fault was not considered active until 1952, when movement along it generated a series of damaging earthquakes in the Bakersfield (Kern County) area.
- **Coast Range-Sierran Block Boundary**—Recent evidence suggests that faults along the western boundary of the Central Valley may be more active than once believed. According to the California Geological Survey, asymmetrical folds have recently been identified on the eastern slopes of the



Coast Range, which includes western Fresno County. Such folds can hide faults that show no surface rupture. These faults and folds, which are part of a large system called the Coast Range-Sierran Block Boundary, are like the faults/folds identified as the cause of the 1983 Coalinga earthquake. Therefore, faults beneath the Central Valley once believed to be inactive are now believed to be active and capable of generating large magnitude earthquakes.

Figure 15. USGS National Seismic Hazard Peak Ground Acceleration (PGA), 2% Probability of Exceedance in 50 Years is an earthquake shaking map of Fresno County that is based on the 2 percent probability of occurrence in 50 years, based on analyses of these faults, soils, topography, groundwater, and the potential for earthquake shaking sufficiently strong to trigger landslide and liquefaction. It represents worst-case ground shaking and supports the conclusion that the Fresno County planning area is at risk of future damaging earthquake hazards, especially in the western and northeastern portions of the County.

Figure 15. USGS National Seismic Hazard Peak Ground Acceleration (PGA), 2% Probability of Exceedance in 50 Years



Source: Central United States Earthquake Consortium (CUSEC), USGS National Seismic Hazard Map 2018

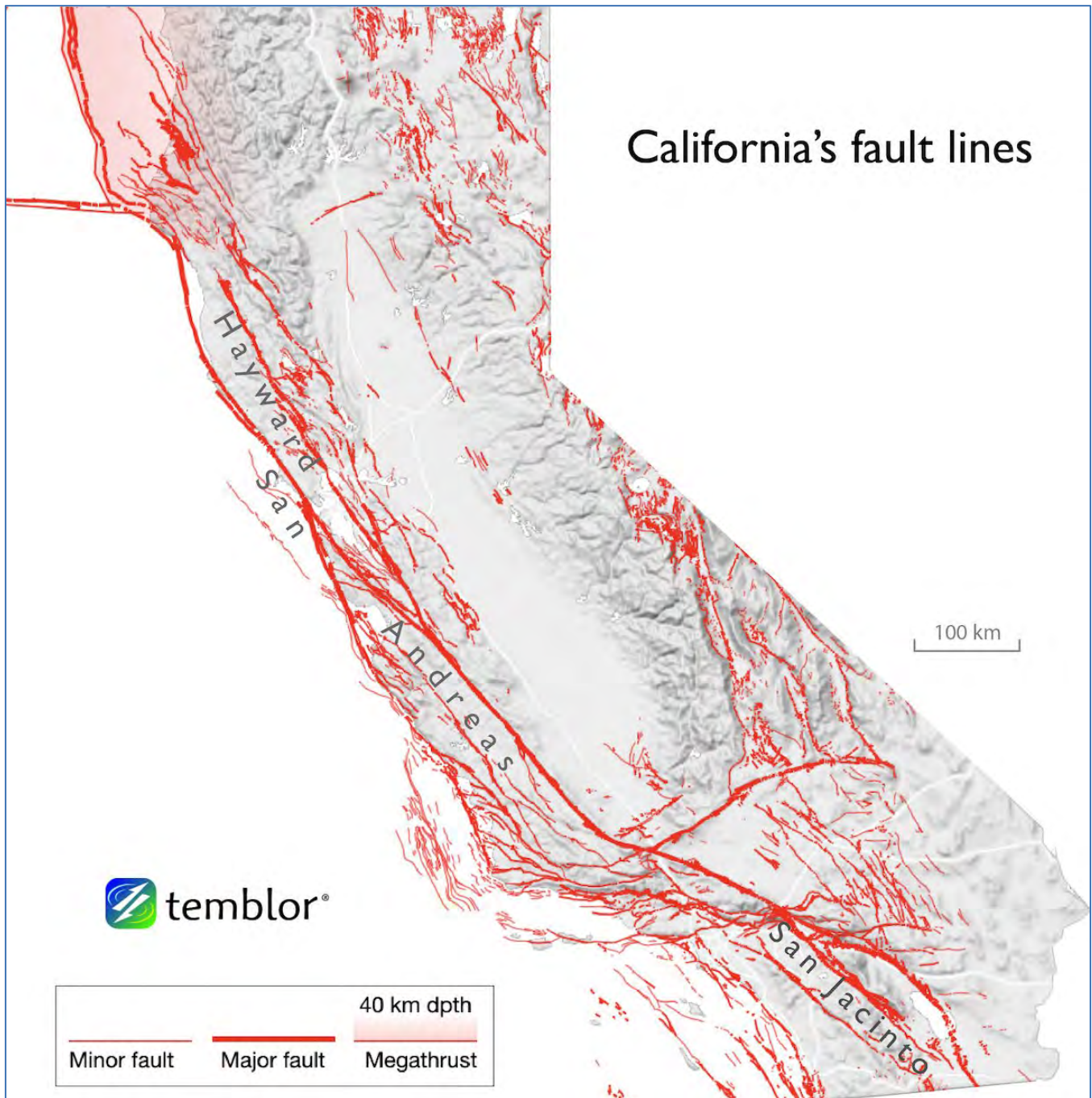


Seismic risk is not limited to identified faults. A significant fraction of small to moderately large earthquakes occur on faults not previously recognized. Such earthquakes are characterized as “background seismicity” or “floating earthquakes,” which means that the expected sources and locations of such earthquakes are unknown.

EXTENT

Large - Figure 16. California's Fault Lines shows the location of faults and past earthquake epicenters in Southern California. Since earthquakes affect large areas the earthquake hazard extent within city limits is considered significant, potentially impacting 50-100 percent of the planned area.

Figure 16. California's Fault Lines



Source: California Institute of Technology, Southern California Earthquake Data Center, 2017

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. Seismologists have developed several magnitude scales; one of the first was the Richter Scale, developed in 1932 by the late Dr. Charles F. Richter of the California Institute of Technology.

The Moment Magnitude Scale is used to quantify the magnitude or strength of the seismic energy released by an earthquake. Another measure of earthquake severity is Intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface based on felt or observed effects. Seismic shaking is typically the greatest cause of losses to structures during earthquakes. Intensity is measured with the Modified Mercalli Intensity (MMI) scale. **Table 26. Richter Scale Measurements and Associated Characteristics** below compares Magnitude and the felt effects associated with the MMI scale. Damage typically occurs in MMI VII or above, and some areas of the County are susceptible to this level of shaking.

Table 26. Richter Scale Measurements and Associated Characteristics

Magnitude	Mercalli Intensity	Effects	Frequency
Less than 2.0	I	Microearthquakes, not felt or rarely felt; recorded by seismographs.	Continual
2.0-2.9	I to II	Felt slightly by some people; damages to buildings.	Over 1M per year
3.0-3.9	II to IV	Often felt by people; rarely causes damage; shaking of indoor objects noticeable.	Over 100,000 per year
4.0-4.9	IV to VI	Noticeable shaking of indoor objects and rattling noises; felt by most people in the affected area; slightly felt outside; generally, no to minimal damage.	10K to 15K per year
5.0-5.9	VI to VIII	Can cause damage of varying severity to poorly constructed buildings; at most, none to slight damage to all other buildings. Felt by everyone.	1K to 1,500 per year
6.0-6.9	VII to X	Damage to a moderate number of well-built structures in populated areas; earthquake-resistant structures survive with slight to moderate damage; poorly designed structures receive moderate to severe damage; felt in wider areas; up to hundreds of miles/kilometers from the epicenter; strong to violent shaking in epicentral area.	100 to 150 per year
7.0-7.9	VIII <	Causes damage to most buildings, some to partially or completely collapse or receive severe damage; well- designed structures are likely to receive damage; felt across great distances with major damage mostly limited to 250 km from epicenter.	10 to 20 per year
8.0-8.9	VIII <	Major damage to buildings, structures likely to be destroyed; will cause moderate to heavy damage to sturdy or earthquake-resistant buildings; damaging in large areas; felt in extremely large regions.	One per year
9.0 and Greater	VIII <	At or near total destruction - severe damage or collapse to all buildings; heavy damage and shaking extends to distant locations; permanent changes in ground topography.	One per 10-50 years

Source: USGS

PAST OCCURRENCES

Earthquakes have occurred in Fresno County in the past. Earthquakes can be felt in Fresno County by earthquakes that occur within jurisdictional boundaries and outside of jurisdictional boundaries. In the last 10 years, Fresno County has experienced on average 30 earthquakes per year that are within 186 miles and at least magnitude 4.0 or greater. According to the Fresno County Operational Area Master Emergency Services Plan, the California Geological Survey has identified a minimum of four magnitude 5.0 or greater earthquakes that caused damaging shaking in Fresno County between 1800 and 1999. Details on some of these events follow.

- **1983:** In Coalinga, a surface rupture occurred along the Nuñez fault. The main shock was 6.7 on the Richter scale. The surface rupture was determined not to be the cause of the main shock; instead, a blind thrust fault concealed deep within a complex fold-and-thrust belt at the western end of the San Joaquin Valley was identified as the cause. Approximately 800 buildings were destroyed, and 1,000 people were left homeless. No deaths resulted, but 47 people were injured. Private homeowner losses exceeded \$25 million. Public agency losses were roughly \$6 million. The commercial section of Coalinga was heavily damaged; however, most schools and the hospital received only slight damage. Local, state, and federal declarations resulted.
- **August 4, 1985:** A magnitude 6.0 earthquake occurred, centered about 10.5 kilometers east of Coalinga. It is unknown to what extent earthquakes occurring outside of the planning area were felt by Fresno County residents.



LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely - Based on the past occurrences, Fresno County is likely to experience about 2 earthquakes a month. Not every earthquake is significant, and the majority of the earthquakes do not cause damage, but earthquakes do occur and can be felt in Fresno County on an annual basis.

According to the Fresno County Operational Master Emergency Services Plan, the faults and fault systems that lie along the eastern and western boundaries of Fresno County, as well as other regional faults, have the potential to produce high magnitude earthquakes throughout the County. Based on the Alquist-Priolo Earthquake Fault Zone chart, Fresno County would be affected by earthquake activity in the Alcalde Hills and Ortigalita Peak faults. There are also several faults in the vicinity of Coalinga that could cause problems in the future. These include the Nuñez fault, about ten kilometers northwest of Coalinga, the Coalinga fault, 5 kilometers northeast of Coalinga; and the New Idria fault, approximately 21 kilometers northwest of Coalinga. In addition, there are many faults in neighboring counties that could potentially affect Fresno County. Specifically, the U.S. Geological Survey is predicting an earthquake at the community of Parkfield in Monterey County, approximately 15 miles southwest of Coalinga.

In addition, according to the California Earthquake Authority (CEA) the Central Valley South region (which includes Fresno, Kern, Kings, Madera, Mariposa, Merced, and Tulare counties), has a 75 percent likelihood or one or more M7.0 or greater quakes striking Southern California based on a 30-year period, beginning in 2014. The nearby San Andreas Fault system is the major geologic boundary between the North American and Pacific tectonic plates and passes through much of the state with the potential to create the biggest earthquakes. A study by the U.S. Geological Survey indicates that a portion of the San Andreas Fault near Tejon Pass could be overdue for a major earthquake.¹⁶

CLIMATE CHANGE CONSIDERATIONS

There is some evidence to suggest that weather and climate change impacts can affect seismic activity under the Earth's surface. Geologists have identified a relationship between rainfall rates and seismic activity in certain regions across the globe. In the Himalayas for example, the frequency of earthquakes is influenced by the annual rainfall cycle of the summer monsoon season. Research reveals that 48 percent of earthquakes in the Himalayas strike during the drier pre-monsoon months of March, April, and May while just 16 percent occur in the monsoon season.¹⁷ According to the U.S. Geological Survey, the only correlation that's been noted between earthquakes and weather is that large changes in the atmosphere pressure caused by major storms like hurricane have been shown to occasionally trigger "slow earthquakes" which release energy over a comparatively long periods of time. However, these numbers are small and are not significantly significant.¹⁸

While climate change may have a connection to seismic activity, it is not expected to directly affect earthquake frequency or intensity as most earthquakes occur far beneath the Earth's surface and far from the influence of weather conditions. However, climate change impacts could exacerbate indirect impacts of earthquakes (e.g., climate change will increase the frequency and intensity of extreme precipitation events, increasing the probability of landslides and liquefaction events during an earthquake).

¹⁶ California Earthquake Authority <https://www.earthquakeauthority.com/california-earthquake-risk/faults-by-county>

¹⁷ <https://theconversation.com/how-climate-change-might-trigger-more-earthquakes-and-volcanic-eruptions-210841>

¹⁸ <https://climate.nasa.gov/news/2926/can-climate-affect-earthquakes-or-are-the-connections-shaky/>

FLOOD

HAZARD/PROBLEM DESCRIPTION

Floods are among the most frequent and costly natural disasters in terms of human hardship and economic loss and are usually caused by weather events. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Certain health hazards are also 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.

A floodplain is an area adjacent to a channel of water. Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to the area that is inundated by the 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The 100-year flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program. The 500-year flood is a flood that has a 0.2 percent chance of being equaled or exceeded in any given year.

In addition to the standard 100-year and 500-year flood maps, the California Department of Water Resources (CA DWR) has initiated a program that covers areas at risk of a 200-year flood. After propositions IE and 84 were passed in 2006, funding became available to support the Central Valley Floodplain Evaluation and Delineation (CVFED) program. To assist DWR with fulfilling new California code requirements, the CVFED Program provides new maps delineating the 100-year, 200-year and 500-year floodplains for areas receiving protection from the State federal flood protection system in the Central Valley. The potential for flooding can change and increase through various land use changes and changes to land surface, which can 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.

The Fresno County planning area is susceptible primarily to three types of flooding: localized, riverine, and dam failure flooding.

- **Localized flooding:** Localized flooding problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems. The term “flash flood” describes localized floods of great volume and short duration. This type of flood usually results from heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the winter and spring. Flash floods often require immediate evacuation within the hour.
- **Riverine flooding:** Riverine flooding, defined as when a watercourse exceeds its “bank-full” capacity, generally occurs because of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface



due to urbanization. In the Fresno County planning area, riverine flooding is largely caused by heavy and continued rains, sometimes combined with snowmelt, increased outflows from upstream dams, and heavy flow from tributary streams. These intense storms can overwhelm the local waterways as well as the integrity of flood control structures. The warning time associated with slow rise floods assists in life and property protection.

- **Dam failure flooding:** Flooding from failure of one or more upstream dams is also a concern to the Fresno County planning area. A catastrophic dam failure could easily overwhelm local response capabilities and require mass evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result, and there could be associated health concerns as well as problems with the identification and burial of the deceased. Dam failure is further addressed in the Dam Failure section.

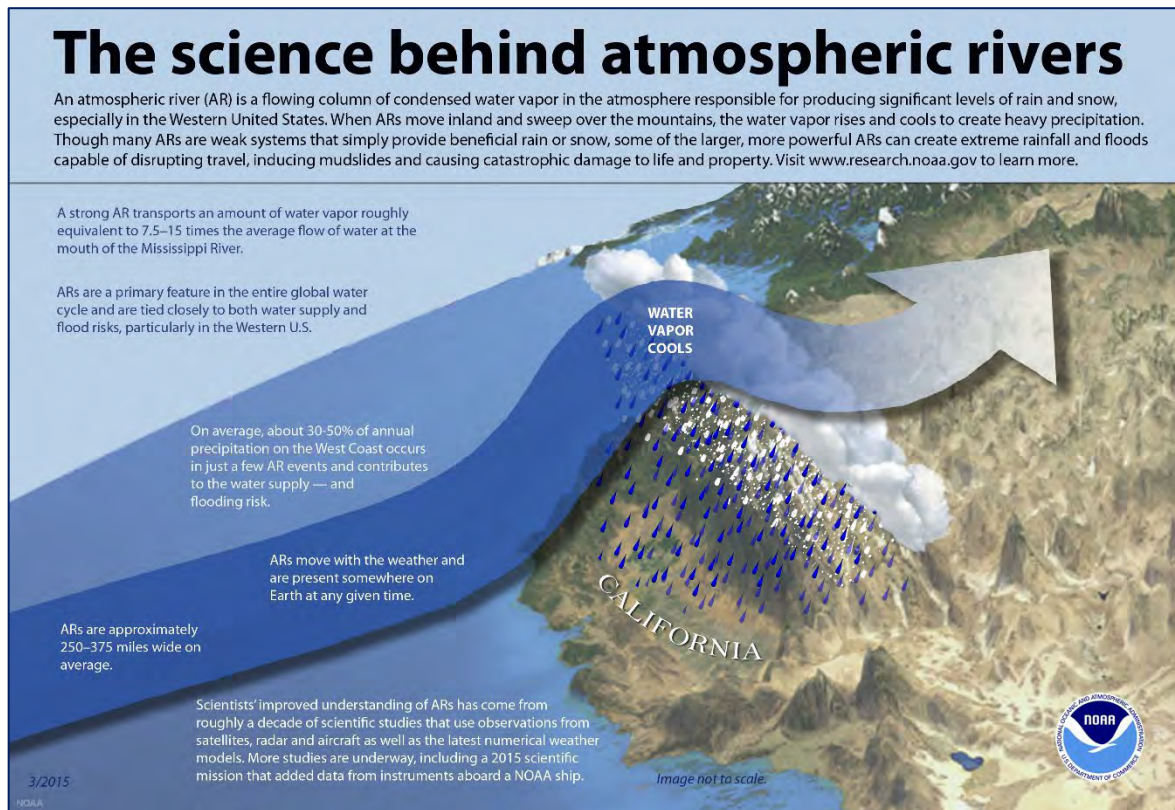
ATMOSPHERIC RIVER

California, including the location of the planning area, is subject to the effects of a phenomenon referred to as atmospheric rivers. These weather events consist of long, narrow regions in the atmosphere transporting tremendous amounts of water vapor from the tropics, shown in **Figure 17. The Science Behind Atmospheric Rivers**. These weather regions behave like rivers in the sky. They can carry heavy volumes of water vapor compared to the amount of water flowing at the mouth of the Mississippi River. As these atmospheric rivers arrive in California, they tend to generate significant rain and snow.

Atmospheric rivers can arrive in many different shapes and sizes. The larger events can generate extreme rainfall amounts resulting in flooding. They can stall over watersheds vulnerable to flooding, often saturated with heavy snow amounts. The atmospheric rivers known as a “Pineapple Express” coming from the tropics and arriving with warmer air may produce heavy rains that will melt ground snow, adding to the water volume that will be in the flood runoff.

These events can produce heavy amounts of precipitation creating extensive damage. However, these events may present as weaker systems that produce precipitation that is enough to be beneficial for the local water supply. At the higher elevations in the California mountains, these events have the potential to generate a tremendous snowpack providing a source of water during the dry summer months.

Figure 17. The Science Behind Atmospheric Rivers

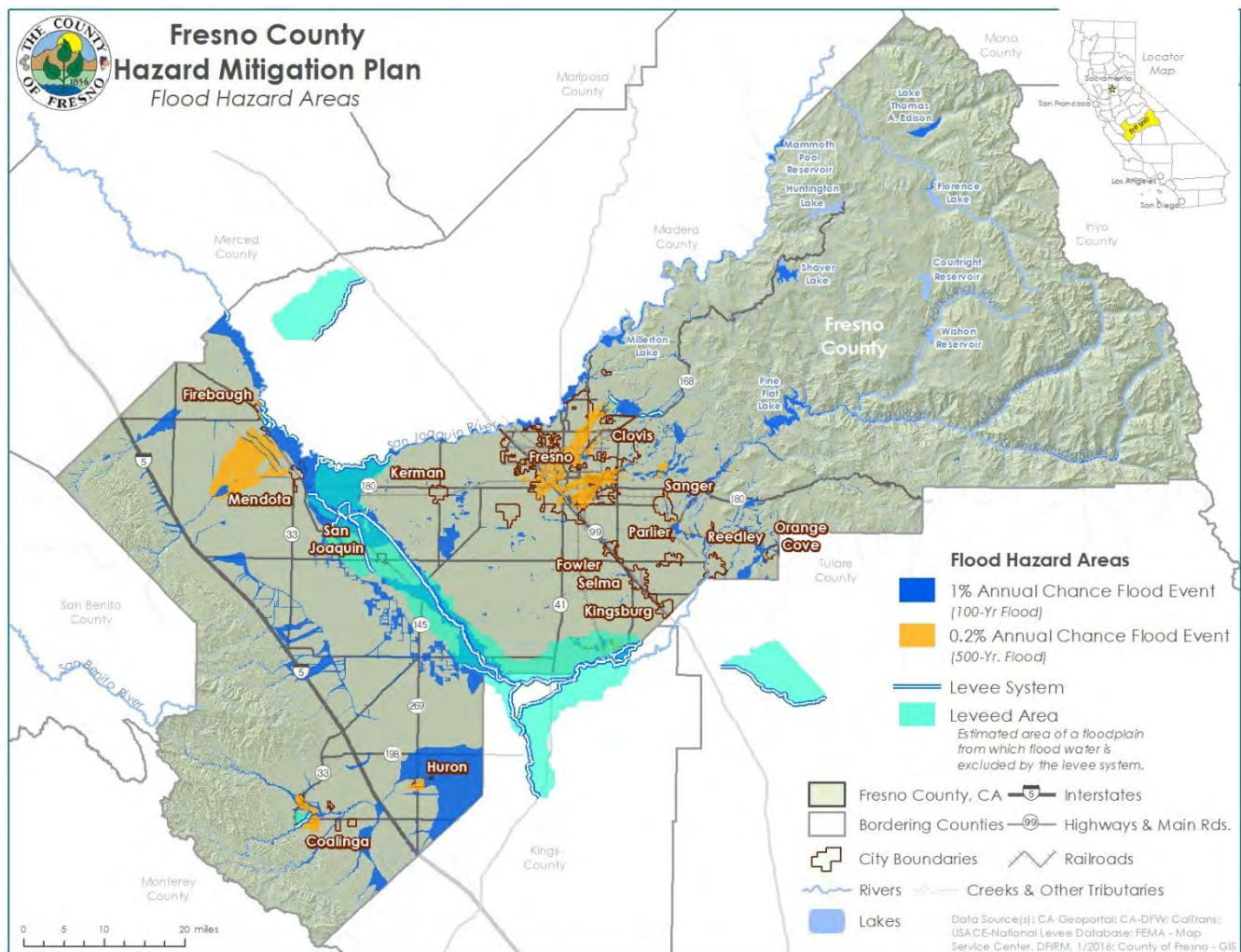


Source: NOAA

LOCATION

Flooding is a hazard which can impact virtually all of the planning area. Many communities in Fresno County have development in or near floodplains which are vulnerable to fluvial flooding. Additionally, there are several leveed areas in the County, and failures of these levees could result in extensive flooding. Flash flooding occur as result of intense rainfall, and this can occur practically anywhere in the County. **Figure 18. Fresno County Flood Hazard Areas and Leveed Areas** shows the extent of the 100-year and 500-year floodplains in the County as well as the leveed areas. Analysis of the flood hazard risk for individual communities in Fresno County is available in the community annexes.

Figure 18. Fresno County Flood Hazard Areas and Leveed Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database ; FEMA – Map Service Center, DIRM, 1/2016 ; County of Fresno – GIS

EASTERN AND CENTRAL FRESNO COUNTY

Eastern Fresno County extends from the Sierra Nevada foothills to the Great Western Divide. It is located primarily in the Sierra Nevada, where precipitation falls mainly as snow. The region is characterized by small local watersheds and draining to the reservoirs upstream of Millerton and Pine Flat reservoirs. Flows originating in the mountains and foothills contribute to the drainage and flooding problems on the valley floor.

Central Fresno County includes the area between the valley floor around Fresno Slough and eastward to the Sierra Nevada foothills, including Millerton Reservoir to Pine Flat Reservoir. The geographic area of central Fresno County runs along the Sierra Nevada foothills at elevations around 500 feet, slopes down to the Fresno Slough on the valley floor and drains gently to the north. This area is the population center of the County; thus, most storm drainage and flood control systems are largely designed to

protect urban development. In central Fresno County, annual precipitation typically amounts to 6 inches in areas like Mendota, while in Fresno itself, the average is about 11.50 inches.

The western slope of the Sierra Nevada drains into central Fresno County via the San Joaquin and Kings rivers and small creeks and stream systems. The Fresno Slough, also known as the North Fork of the Kings River, is connected to the San Joaquin River by the James Bypass, a manmade canal. It directs floodwater from the Kings River to the San Joaquin River. Three dams have been constructed to control flows on the rivers. These dams are Friant and Mendota dams on the San Joaquin River and Pine Flat Dam on the Kings River. Pine Flat Dam is operated primarily for flood control purposes. Friant Dam was constructed and is managed by the U.S. Bureau of Reclamation as part of the Central Valley Project. Although Friant Dam does serve to reduce release volumes in the main San Joaquin River channel, it was not sited, designed, or engineered for the purpose of flood control. Mendota Dam is operated primarily for irrigation.

In addition to the flood control facilities on the San Joaquin and Kings rivers, several reservoirs and detention basins have been constructed on streams east of the Fresno-Clovis area to prevent urban flooding. These facilities include Redbank Dam and the Redbank-Fancher Creeks Flood Control Project. The Redbank-Fancher Creeks Flood Control Project consists of two dams (Big Dry Creek Dam and Fancher Creek Dam), three detention basins (Redbank Creek, Pup Creek, and Alluvial Drain detention basins), and various canals to convey discharges around developed areas. The Friant-Kern Canal draws water from Millerton Reservoir at Friant Dam and flows south along the foothills toward Bakersfield.

The rivers, streams, and flood control systems of eastern and central Fresno County are described in further detail below. **Table 27. Major Flood Control Facilities and Stream Systems in Eastern and Central Fresno County** summarizes the location, capacity, and managing agency for each stream system and flood control facility in eastern and central Fresno County.

Table 27. Major Flood Control Facilities and Stream Systems in Eastern and Central Fresno County

Facility/Water Body	Location	Capacity	Managing Agency
Millerton Reservoir*	17 miles northeast of SR 99 on the San Joaquin River in the north central part of the county	520,500 acre-ft ¹	U.S. Bureau of Reclamation
Pine Flat Reservoir	16 miles northeast of Sanger on the Kings River in the east central part of the county	1,000,000 acre-ft ¹	U.S. Army Corps of Engineers
Mendota Pool	On the San Joaquin River at Mendota where the river turns north, and Fresno Slough joins the river in the northwestern part of the county	5,000 acre-ft ²	U.S. Bureau of Reclamation
Big Dry Creek Reservoir	West of Friant-Kern Canal and north of Tollhouse Road on Big Dry Creek	30,200 acre-ft ¹	Fresno Metropolitan Flood Control District
Redbank Reservoir	7 miles east of Clovis, 3 miles southwest of the Friant-Kern Canal between	1,030 acre-ft	Fresno Metropolitan Flood Control District

4. Risk Assessment



Facility/Water Body	Location	Capacity	Managing Agency
	Dog Creek and Fancher Creek in the central part of the county		
Fancher Creek Reservoir	East of the Friant-Kern Canal at the confluence of Fancher and Hog creeks	9,712 acre-ft ¹	Fresno Metropolitan Flood Control District
Redbank Creek Detention Basin	On Redbank Creek north of McKinley Avenue and west of DeWolf Avenue	940 acre-ft ¹	Fresno Metropolitan Flood Control District
Pup Creek Detention Basin	On Pup Creek south of Herndon Avenue and east of Temperance Avenue	559 acre-ft ¹	Fresno Metropolitan Flood Control District
Alluvial Drain Detention Basin	On Alluvial Drain west of Temperance Avenue and north of Nees Avenue	305 acre-ft ¹	Fresno Metropolitan Flood Control District
Eastern and Central Fresno County 1997	Flows from the Sierra Nevada southwest along the northern border of the county to Mendota where it turns to flow to the northwest. Forms the border between Fresno and Madera counties	8,000 cfs ^{1**} (Friant Dam to Chowchilla) 2,500 cfs ^{1,4} (to Mendota) 4,500 cfs ^{1,4} (Mendota Dam to Sand Slough)	U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, and Local Irrigation Districts
Kings River	Flows from the Sierra Nevada to Sanger and Reedley and into Kings County boundary to Army Weir above Hwy 41 where the normal flow is diverted to the North Fork. Excess flows are diverted to Tulare Lake bed	13,000 cfs ^{3**}	Kings River Conservation District
Fresno Slough & James Bypass	A seasonal waterway system which connects the Kings River near Laton and Lemoore NAS to the San Joaquin River at Mendota Pool during flood events	4,750 cfs ¹	U.S. Army Corps of Engineers
Friant-Kern Canal	Flows southeasterly from Millerton Lake through Orange Cove continuing on to Bakersfield. Crosses five feet below Kings River via a 24.5 ft diameter 3,000 ft siphon	5,000 cfs ¹	Friant-Kern Water Users' Authority, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers
Millerton Reservoir*	17 miles northeast of SR 99 on the San Joaquin River in the north central part of the county	520,000 acre-ft ¹	U.S. Bureau of Reclamation
Holland Creek Diversion Channel	South of the Friant-Kern Canal where it crosses Trimmer Springs Road	Peak channel capacity is 1,044 cfs	Fresno Metropolitan Flood Control District



Facility/Water Body	Location	Capacity	Managing Agency
Fancher Creek Detention Basin	Southwest corner of McKinley Avenue and McCall Avenue	Ultimate capacity is 1,802 ac/ft.	Fresno Metropolitan Flood Control District
Pup-Enterprise Detention Basin	East side of DeWolf Avenue, just south of Herndon Avenue	Ultimate capacity is 200 ac/ft.	Fresno Metropolitan Flood Control District
Big Dry Creek Detention Basin	North of Freeway 168 and Dakota Avenue	Ultimate capacity is 251 ac/ft.	Fresno Metropolitan Flood Control District
Dry Creek Extension Basin	Northwest corner of Annadale Avenue and Brawley Avenue	Ultimate capacity is 854 ac/ft.	Fresno Metropolitan Flood Control District
Facility/Water Body	Location	Capacity	Managing Agency
Millerton Reservoir*	17 miles northeast of SR 99 on the San Joaquin River in the north central part of the county	520,500 acre-ft ¹	U.S. Bureau of Reclamation

Source: Fresno County General Plan, 2017; Fresno Metropolitan Flood Control District

Note: The numbers provided in this table are design capacity and actual river capacity may vary significantly

*Friant Dam/Millerton Reservoir is not sited, designed, or operated to function as a flood control facility, and any such capability is incidental to its function as a diversion facility

¹U.S. Army Corps of Engineers

²Central California Irrigation District

³Kings River Conservation District

⁴River channel capacity is difficult to define due to significant changes in the river conditions over time, variance in channel conditions and geometry along a given river reach, and assumptions made in developing hydraulic models

San Joaquin River

The San Joaquin River forms the boundary between Fresno and Madera counties, shown in **Figure 19. San Joaquin River**. It flows from the Great Western Divide in the Sierra Nevada southwest along the northern border of Fresno County where it is joined by flows from the North Fork of the Kings River. From there, the river flows northwest up the San Joaquin Valley toward the Delta. Friant Dam, which serves to regulate river flows, is the most significant of the dams on the San Joaquin River. Several dams are located upstream of Friant Dam.

The storage capacity of **Millerton Reservoir (formed by Friant Dam)** is 520,500 acre-feet. The Central Valley Project Friant Unit consists of Friant Dam and Millerton Reservoir; the Friant-Kern Canal, which runs south to Kern County; and the Madera Canal, which runs northwesterly to Madera County. Releases from Friant Dam to the San Joaquin River and the Friant-Kern Canal provide service to water users within Fresno County.

This storage capacity of **Millerton Reservoir** is inadequate for full flood protection during wet years, and emergency releases may result in flooding problems downstream. The U.S. Army Corps of Engineers (the Corps) has evaluated the operational plans for all the dams in the San Joaquin River system to determine the possibility of coordinated releases to reduce the likelihood of coincident peak flows downstream with some success. However, in 1997, emergency releases from Friant Dam



combined with large storm events and several levee breaks contributed to flooding along the San Joaquin River. Not designed for purposes of flood control, any flood control capability of the Friant Unit is incidental to its function as a diversion facility. The Madera Canal, also part of this unit, also serves to release runoff volumes from the San Joaquin River.

The **Friant-Kern Canal** carries irrigation water from Millerton Reservoir southeast to Kern County. The average annual delivery from the canal is about one million acre-feet with a design capacity of 5,000 cubic feet per second (cfs). There is a spillway into the Kings River just upstream of a double barrel 24 ½-foot diameter siphon under the river. Although the canal was constructed by the Bureau of Reclamation and is normally managed by the Friant-Kern Water Users Authority, floodwater in the canal is managed by the U.S. Army Corps of Engineers. During times of flooding, water from the Friant-Kern Canal may not be releasable to the Kings River since the Corps may not want additional flows on the river.

Mendota Pool is a 5,000-acre-foot reservoir created by Mendota Dam located just outside City of Mendota on the San Joaquin River. The primary function of the dam is storage of irrigation water for agriculture; however, the water level in the pool also functions to maintain water levels in the Mendota Wildlife Management Area. Mendota Pool provides little or no flood protection. Mendota Dam contains flow from the San Joaquin River as well as discharge and releases from the Kings River via the Fresno Slough and James Bypass. The Delta-Mendota Canal conveys Delta water to Mendota Pool from the north, and several irrigation channels divert flows from it. The Bureau of Reclamation, in coordination with the Central California Irrigation District, manages this system, which is part of the Central Valley Project.

Southern California Edison and Pacific Gas and Electric own and operate several dams and reservoirs on the San Joaquin River and its tributaries upstream of Friant Dam. The most notable of these are Edison Lake and Florence Lake. These upstream storage facilities are operated to produce electric energy and have a combined capacity of about 609,530 acre-feet. Their operation does affect the flow of water into Millerton Reservoir and subsequently the timing and availability of releases to Friant Unit contractors. None of these storage facilities are designed or operated for flood control, and the Corps currently has no jurisdiction over releases from these structures. Cumulative flood releases from the upper San Joaquin River dams could overwhelm Friant Dam.

From Friant to Gravelly Ford, the San Joaquin River is part of the Designated Floodway Program administered by the State Reclamation Board. Land use restrictions and river management practices allow the river to meander, flood the overbanks, and remain in a relatively natural state. Downstream of Gravelly Ford, the river is confined by levees. The design capacity of the San Joaquin River from Friant Dam to Chowchilla Bypass is in excess of 8,000 cfs, while the channel capacity downstream is reduced. The major San Joaquin River “choke point” in Fresno County is the reach near Mendota and Firebaugh, which has a channel capacity of 8,000 cfs. Beyond that point, San Joaquin River channel capacity continues to decrease for some distance due to lack of annual flooding and natural channel clearing since Friant Dam was constructed. Further downstream, the river channel has been deepened and widened by historical flows of the Merced and Tuolumne rivers and other tributaries.

In addition to releases from Friant Dam, two uncontrolled streams, Cottonwood Creek, and Little Dry Creek, add significantly to the river flows below Friant during heavy precipitation. Historically, large areas within the Central Valley were within the river’s floodplain. Development has encroached on the floodplain and the flow is now confined to a relatively narrow channel constrained by levees, which reduce the carrying capacity of the river. Most of the flow from Friant Dam is diverted to the Chowchilla Bypass, which branches off the San Joaquin River about 11 river miles upstream from Mendota Dam. Over time, encroachment of vegetation, substantial sedimentation, and land subsidence has considerably reduced channel capacity. Erosion, seepage, and prolonged high water compromise levee

integrity. Downstream of the Chowchilla Bypass, the river is not confined by levees (within Fresno County) and generally carries no more than 2,500 cfs.

Flood control measures constructed along the main stem of the river have impacted riparian and wetland wildlife habitat areas. Levee construction and sediment and vegetation removal can damage streamside vegetation, divert floodwater from wetlands and riparian areas, and reclaim natural wetlands for other uses.

Figure 19. San Joaquin River



Source: American Rivers

Kings River

The Kings River originates high in the Sierra Nevada Mountains near the Inyo County line and flows southwest through the central part of Fresno County and into Tulare County at Reedley. It has a large



drainage basin, which includes most of Kings Canyon National Park and most of the area between Shaver and Florence lakes in the north to the Fresno/Tulare County border in the south. North of Hanford, the river branches, and the south fork flows southward to the Tulare Lakebed. The north fork joins Fresno Slough, which conveys flows north to the San Joaquin River at Mendota Pool. Several sloughs and canals branch off the river and are used for water storage and to convey irrigation water.

The Kings River flows are regulated by Pine Flat Dam, completed in 1954 for flood control purposes. Pine Flat Reservoir has a storage capacity of approximately one million acre-feet. The flood control functions of the facility are managed by the Corps while the releases for irrigation diversion are managed by the Kings River Water Association. There are additional reservoirs upstream of Pine Flat that are owned and operated by Pacific Gas and Electric for the purpose of hydroelectric power generation. These facilities have a combined storage capacity of about 252,000 acre-feet. Two uncontrolled creeks, Hughes Creek and Mill Creek, flow into the Kings River below Pine Flat Dam. Pine Flat Reservoir has adequate storage capacity to avoid emergency releases in most storm events, but these downstream creeks can add significant flow to the river.

Downstream of Pine Flat Dam, the Kings River is managed for flood control by the Kings River Conservation District in cooperation with the Corps, the California Department of Water Resources (DWR), and local irrigation districts. Releases from Pine Flat Dam and flows from Hughes Creek and Mill Creek provide most of the river's flow. Numerous sloughs and irrigation canals branch off the Kings River. The capacity of the river is more than 13,000 cfs. The Kings River flood control facilities include many miles of levees in central Fresno County.

There are three weirs on the river: Army Weir, Crescent Weir, and Stinson Weir. Army Weir is located where the north and south forks branch off the natural river just upstream from State Route 41. Crescent Weir is located at the Crescent Bypass southwest of 22nd and Excelsior Avenues. The Crescent Bypass flows to Fresno Slough. Stinson Weir is located near the confluence of Murphy Slough and Fresno Slough at Elkhorn Avenue. Normal flows are held by these weirs in the main channel. During storm events, as much as 4,750 cfs is diverted to the North Fork and the San Joaquin River. As much as 3,200 cfs can then be diverted to the Crescent Bypass. Any flow above approximately 10,000 cfs is divided equally between the north and south forks.

In practice, the flow of the Kings River is carefully managed using analysis of anticipated weather, upstream flows, and ability of downstream users to receive the water. Significant adjustment may be necessary, and a variety of operations options are considered, including storing or routing water through alternate sloughs or requesting users to accept additional water. Fresno Slough and the James Bypass are normally dry except for groundwater seepage and irrigation returns. Flow is diverted to the South Fork only in very wet years.

Sand and gravel extraction has occurred along both the San Joaquin River and the Kings River in Fresno County, although most of this aggregate mining has occurred outside of the main river channels. The hydrologic effect of the mining and subsequent reclamation activity has generally been to increase the overall hydraulic capacity of the rivers to accommodate major flood events.

EASTERN COUNTY STREAMS

There are many creeks and lakes in the high Sierra Nevada within Fresno County, all of which eventually feed into either the Kings River or the San Joaquin River. In addition, several creeks drain the foothill areas and flow into developed areas in central Fresno County. Most of these streams (i.e., Redbank, Fancher, Dry, and Dog creeks) have been controlled by efforts of the Corps and the Fresno Metropolitan Flood Control District to protect the City of Fresno from damage from flooding from a 200-



year storm. Other creeks, such as Wahtoke Creek, are uncontrolled. Some streams in foothill areas of southeastern Fresno County are tributaries to the Orange Cove Stream Group and to Sand Creek, which is a tributary to the Kaweah River.

Flood control efforts along some of these eastern Fresno County streams include the following:

- **Redbank Reservoir**—Redbank Reservoir, formed by Redbank Dam, is located on Redbank Creek north of Shaw Avenue. The reservoir has a gross pool capacity of 1,030 acre-feet and receives water from the Redbank Creek watershed. The reservoir is operated for flood control by the Fresno Metropolitan Flood Control District.
- **Redbank-Fancher Creeks Flood Control Project**—This project consists of a system of two dams, three detention basins, and canals to protect developed areas in and around the City of Fresno from a 200-year storm. The project was built by the Corps and is managed and operated by the Fresno Metropolitan Flood Control District. Fancher Creek Reservoir has a capacity of 9,712 acre-feet and retains water from Fancher and Hog creeks and some flows from Redbank Creek. Fancher Dam diverts flows via canals around Fresno. Redbank Creek Detention Basin (940 acre-feet) contains local flows from Redbank Creek downstream from Redbank Dam. The Alluvial Drain and Pup Creek detention basins have capacities of 305 and 559 acre-feet, respectively, and can each regulate discharges into Dry Creek at 25 cfs.
- **Big Dry Creek Reservoir**—Big Dry Creek Reservoir, with a capacity of 30,200 acre-feet, retains flows from Big Dry Creek and Dog Creek and diverts flows via Little Dry Creek to the San Joaquin River at a rate of up to 700 cfs. During a flood event, water is not typically released from Big Dry Creek Dam; however, during a severe flood event, it may be necessary to do so.

WESTERN COUNTY STREAMS

Western Fresno County consists of the Coast Range within which lies the County's western boundary with San Benito and Monterey counties and the San Joaquin Valley area between the Range and the Fresno Slough. Interstate 5 and the California Aqueduct pass in a north-south direction through western Fresno County. A complex system of streams drains the eastern slope of the Coast Range into the valley and the Fresno Slough. Western Fresno County is significantly different from the rest of the County in climate and character.

Western Fresno County is largely unpopulated. The major land uses are agriculture and grazing. The region is quite dry, with an average annual rainfall of only six to eight inches, yet the stream systems are prone to high flows and flooding because they drain very large watersheds. The soil in the Coast Range is subject to erosion. As a result, stormwater runoff typically carries large volumes of sediment and naturally occurring minerals, such as selenium, arsenic, boron, and asbestos, which is undesirable to downstream users.

Western Fresno County contains five major stream systems that flow from the Coast Range as described further below.

- **Little Panoche Creek**—Little Panoche Creek, located in the northwestern corner of Fresno County, is managed for flood control purposes by the DWR. The DWR operates and maintains a detention dam and reservoir (Little Panoche Reservoir) on the creek. The facility was constructed by the Bureau of Reclamation to provide flood protection for the California Aqueduct. It was designed for a 100-year storm and has a storage capacity of 820 acre-feet. When storage levels in the reservoir



exceed 820 acre-feet, the dam's uncontrolled spillway releases water. The creek flows under Interstate 5 and the California Aqueduct. Little Panoche Creek ends at a retention basin on the east side of the aqueduct. When the retention basin fills with stormwater during high flows, stormwater is pumped into the aqueduct. The reservoir also serves as a wildlife preserve.

- **Panoche Creek**—Panoche Creek is located just south of Little Panoche Creek in northwestern Fresno County. It flows under Interstate 5 and across the California Aqueduct. The estimated 100-year peak flow for Panoche Creek is 22,000 cfs. On the east side of the aqueduct, the water is not channelized and flows overland. During high creek flows, stormwater floods vast tracks of agricultural land and portions of the City of Mendota.
- **Tumey Gulch and Arroyo Ciervo**—Tumey Gulch and Arroyo Ciervo are in central western Fresno County and flow easterly from Ciervo Mountain. The estimated 100-year peak flow is 3,600 cfs for Tumey Gulch and is 900 cfs Arroyo Ciervo. No flood control facilities exist on the streams; however, the California Aqueduct obstructs their eastward flow. During periods of high stream flow, sediment laden floodwater may form ponds on the west side of the aqueduct. These ponds may spill stormwater and sediment into the aqueduct during storm events.
- **Cantua Creek System**—This creek system includes Arroyo Hondo, Cantua Creek, Salt Creek, Martinez Creek, and Domegine Creek in central western Fresno County. These creeks drain the east side of Joaquin Ridge, crossing Interstate 5 between Kamm Road and Fresno-Coalinga Road. The estimated 100-year peak flow from the Cantua Creek system is 8,300 cfs. As with Tumey Gulch and Arroyo Ciervo, stormwater from the Cantua Creek system ponds on the east side of the California Aqueduct during periods of high flow, dumping large quantities of sediment and storm runoff into the aqueduct. Cantua Creek has inundated Interstate 5 during large storm events.
- **Arroyo Pasajero Stream System**—The Arroyo Pasajero stream system encompasses the largest drainage area in the western San Joaquin Valley. The major creeks in the system are Los Gatos, Warthan, Jacalitos, and Zapato-Chino creeks. They flow through the City of Coalinga and under Interstate 5 to a small ponding basin on the west side of the California Aqueduct. Arroyo Pasajero carries large quantities of sediment containing naturally occurring asbestos. During flood events, the system may damage the aqueduct and Interstate 5. Floodwater may also wash asbestos fibers into the aqueduct.

MAJOR SOURCES OF FLOODING/PROBLEM AREAS

Flooding is a natural occurrence in the Central Valley because it is a natural drainage basin for thousands of watershed acres of Sierra Nevada and Coast Range foothills and mountains. FEMA's Flood Insurance Study for the County, effective January 20, 2016, describes several types of primary flood problems.

- **General rainfall floods** can occur in Fresno County during winter and spring months. This type of flood results from prolonged heavy rainfall over tributary areas and is characterized by high peak flows of moderate duration. Flooding is more severe when antecedent rain has resulted in saturated ground conditions; when the ground is frozen, and infiltration is minimal; or when rain on snow in the high elevations on the east side adds snowmelt to rain flood runoff.
- **Snowmelt floods** on the San Joaquin and Kings rivers and their higher elevation tributaries can be expected to occur any time from April through June. Although snowmelt flooding is of much larger volume and longer duration than rain flooding, it does not have the high peak flows characteristic of rain floods. Snowmelt flood runoff is sometimes augmented by late spring rains on the snowfields or lower elevation tributary watersheds.



- **Cloudburst storms** sometimes lasting as long as three hours can occur any time from late spring to early fall and may occur as an extremely severe sequence within a general rainstorm. Cloudbursts are high-intensity storms that can produce floods characterized by high peak flows, short duration of flood flows, and small volume of runoff. In some areas, especially where drainage basins are small, cloudbursts can produce peak flows substantially larger than those of general rainstorms. Cloudburst storms usually cover small areas and would not generally affect flood flows or flood stages on the San Joaquin or Kings rivers. Generally, only the upper reaches of the smaller streams are affected by cloudbursts.

In urban areas, flood problems intensify because open land available to absorb rainfall and runoff is being used for new development, which increases the number of paved areas (i.e., impervious surfaces). The decrease in the amount of open land increases the volume of water that must be carried away by waterways. Urban development in some areas of Fresno County has been substantial in recent years and is expected to continue.

EASTERN AND CENTRAL FRESNO COUNTY FLOOD PROBLEM AREAS

Most flood issues in eastern and central Fresno County are associated with the San Joaquin River, Kings River, and several other stream systems. In Fresno County, there are 23 dams that could cause substantial flooding in the event of a failure. The majority of these dams are in the San Joaquin and Kings River watersheds in the eastern part of the county. Generally, the areas at risk are large urban and rural areas downstream and below the dams on the valley floor.

San Joaquin River System

The San Joaquin River from Gravelly Ford to the Chowchilla Bypass outside Fresno County is confined by a levee system. The design capacity of the river is 5,000 cfs, which is considered a safe carrying capacity with three feet of allowable freeboard. Over time, encroachment of vegetation, substantial sedimentation, and land subsidence has considerably reduced channel capacity. Erosion, seepage, and prolonged high water compromise levee integrity. Levee maintenance is generally under the jurisdiction of local reclamation districts. Uncontrolled flooding from the San Joaquin River between the Chowchilla Bypass and Dos Palos tends to flow into Madera County north of Mendota.

The Mendota Pool area has shown evidence of significant subsidence, possibly affecting levee height, river invert (i.e., bottom of low-flow channel), as well as the pool depth. The flooding hazards in the region are from Panoche Creek to the west into Madera County downstream from Mendota Pool. It was reported in 1997 (Fresno County General Plan Background Report) that the Mendota Dam is of limited usefulness for flood control purposes. Construction of a new dam at Mendota has been contemplated to improve flood control capabilities of the lower reaches of the San Joaquin.

The flooding potential from creeks and streams between the San Joaquin and Kings Rivers in the east has been substantially eliminated within the last few years by the completion of the Redbank- Fancher Creeks Flood Control Project. This has resulted in a decrease in the areas designated for the 100-year floodplain. However, as noted in the Fresno County General Plan Background Report, the 100-year storm event flows have increased from 18,000 cfs to 24,500 cfs in the San Joaquin River over last few decades (due to increasing intensity of storms and statistical analysis of the meteorologic/hydrologic database for the San Joaquin River).

Kings River System

Uncontrolled creeks within the Kings River system, notably Mill Creek, continue to challenge management of Pine Flat Dam and Kings River flood control during consecutive large storm events. In 1997, water was not released from Pine Flat due to large flows in Mill Creek, which pushed the limits of the system. If another large event had occurred before Pine Flat Reservoir releases could provide adequate storage space and the Mill creek watershed was still saturated, rapid runoff in Mill Creek and an emergency spill at Pine Flat would have overwhelmed the system. In the event of a major release from Pine Flat Dam, downstream flooding would occur over agricultural lands near the riverbanks and possibly within the Cities of Reedley and Kingsburg.

WESTERN FRESNO COUNTY FLOOD PROBLEM AREAS

Flood issues in western Fresno County are varied in scope and unique in nature. Many creeks prone to high flows and significant erosion are found in the area, but most of the region is unpopulated, so flooding in many areas poses little threat to life or personal property. Major facilities that are subject to flooding include Interstate 5 and the California Aqueduct. Urban areas subject to flooding include the communities of Coalinga, Huron, and Mendota. Important wetland habitat in the Mendota Wildlife Management Area is also subject to flooding and may be impacted by sediments carried by flood flows from these creeks.

During large storm events, the California Aqueduct is flooded by high flows from Arroyo Pasajero. Consequently, the Bureau of Reclamation, the Corps, and the DWR are coordinating efforts to relieve the threat of flooding from this stream system. Other stream systems obstructed by the aqueduct may pose a flooding hazard during periods of high flow when ponds form on the west side of the aqueduct. The streams carry large amounts of sediment. When ponds fill with sediment, water spills into the aqueduct.

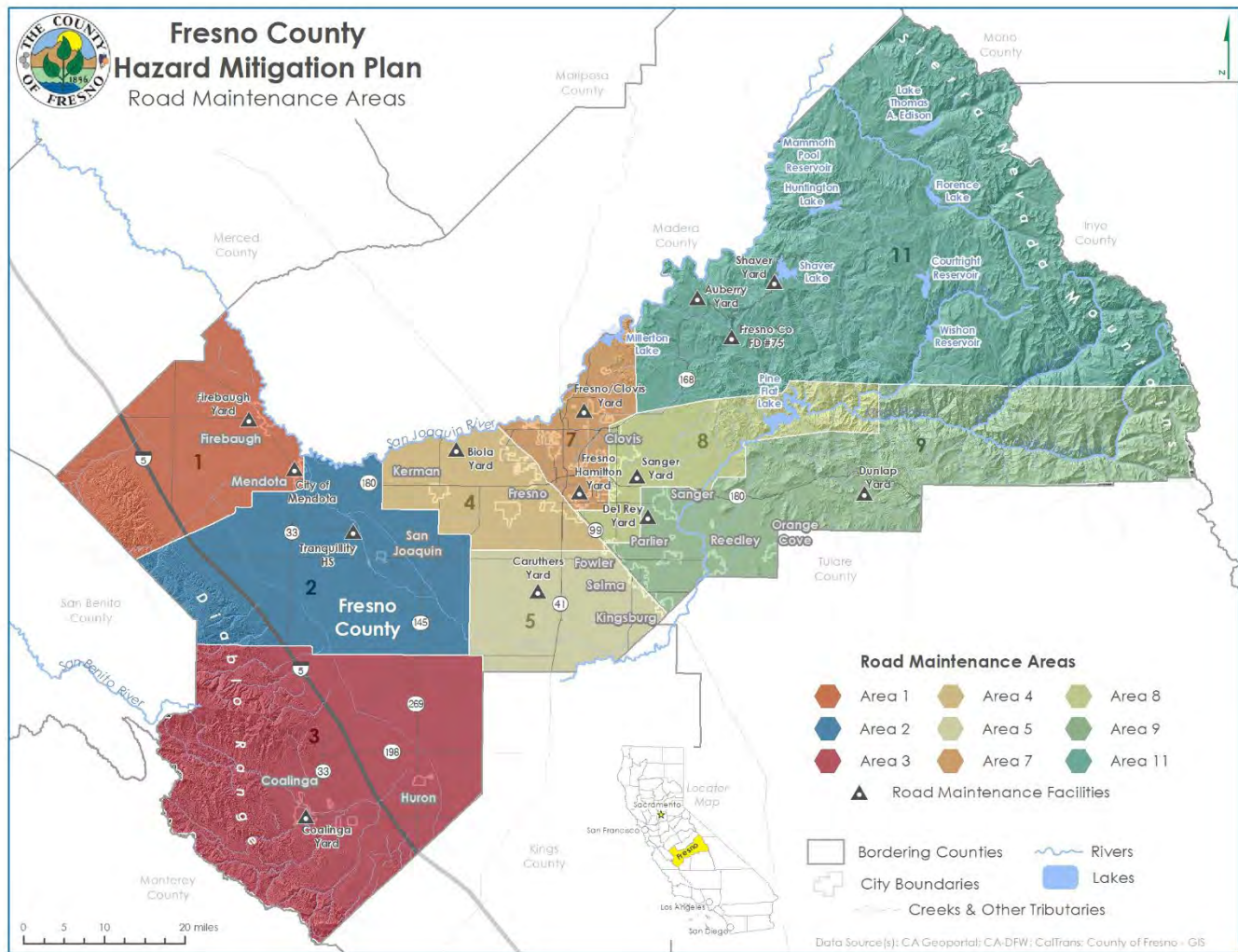
Various stream systems also flood developed areas in western Fresno County during storm events. Creeks that feed into Arroyo Pasajero flow through the City of Coalinga, creating flood hazards and preventing development in impacted areas. Downstream, Arroyo Pasajero is prone to flooding the road into the City of Huron. After crossing the California Aqueduct, Panoche Creek flows overland and floods both agricultural land and portions of the City of Mendota.

The Mendota Wildlife Management Area receives water from Panoche Creek, which drains into Mendota Pool. During storm events, the sediments carried in Panoche Creek contain high levels of selenium and arsenic, which may degrade the water quality in the Mendota Wildlife Management Area.

LOCALIZED FLOODING PROBLEM AREAS

Localized flooding also occurs throughout the County with several areas of primary concern. According to the Fresno County Department of Public Works, numerous roads throughout the County are subject to flooding in heavy rains. In addition to flooding, damage to these areas during heavy storms includes pavement deterioration, washouts, landslides/mudslides, debris areas, and downed trees. The amount and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff. Flooding problems are tracked by road maintenance area (see **Figure 20. Fresno County Road Maintenance Areas**) and noted below.

Figure 20. Fresno County Road Maintenance Areas



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

A1. Firebaugh Area

The following roads in Area #1 are subject to flooding in heavy rains and flooding signs are required.

- Washoe at Delta Mendota Canal southeast of Bridge
- Herndon at Russell
- Belmont from San Diego to Fairfax
- Shaw between Milux and Russell
- Washoe .01 miles north of California
- Shields at Fairfax southwest corner
- Russell 1.9 miles south of Shields



- Little Panoche, numerous areas 1.3 miles west of Interstate 5 to C/L
- Milux at Bullard, west side
- Bullard east of Milux numerous areas to Fairfax
- Althea 1 mile west of Russell
- Hudson at Merrill northeast corner
- Fairfax at Valeria southwest corner
- Fairfax .02 miles south of Valeria
- Oxalis .04 miles west of Ormsby

A.2 Tranquility

Areas that flood east of James Road:

- Butte, American to North
- American, Denver to El Dorado
- El Dorado, American to Colorado
- Marin, Adams South .2 miles
- Sumner, Colorado to Placer
- Yuba, Manning to Colorado
- Parilier, Placer to Yuba
- Springfield, Colorado to Plumas
- Springfield, Colusa to Sutter
- Huntsman, Colorado to El Dorado
- Floral, Colorado to Graham
- Rose, Colorado to Trinity
- Napa, at drain ditch crossing (Nebraska)?
- Kamm, Placer to Yuba

A.3 Coalinga

- Mt. Whitney

Areas that flood west of James Road:

- San Mateo north of State Route 180
- Sante Fe at San Benteo
- Jefferson Amador to Tuolumne



- Lincoln James Rd. to Calaveras
- Mt. View San Mateo to Monterey
- Clarkson San Mateo to Amador
- Amador Clarkson to Elkhorn
- Elkhorn Amador to Sonoma
- Sonoma Elkhorn to Mt. Whitney
- Kamm State Route 33 to Interstate 5
- Manning Aqua Duct to Interstate 5
- Douglas south of Manning .1 mile
- Douglas north of Manning 1 mile
- San Diego Adams to American
- Jensen San Diego to Washoe
- Coalinga-Mendota Road
- Parkfield
- Collwell east and west
- Boone
- Alcalde Road

A.3 Biola

- Dickenson Avenue, Herndon to Barstow
- Dickenson Avenue, south of North Avenue, east side
- Belmont Avenue, Grantland to Howard Avenue, various locations
- Shields Avenue, Westlawn to Bishop Avenue, various locations
- Shields Avenue west of State Route 145, various locations
- Shaw Avenue west of State Route 145, various locations
- Dower Avenue, Shields Avenue to Shaw Avenue, various locations
- Henderson north of South Avenue, east side
- Brawley south of Lincoln
- Elm Avenue between Morton and Clayton Avenue.
- Adams-Clovis Avenue to State Route 99
- Central at Blyth to Cornelia
- Grantland south of Shaw, east side
- Grantland south of Belmont to RXR tracks, east side



A.5 Caruthers

- Floral west of Temperance
- Fowler at Davis
- McCall south of Clarkson
- Fowler north of Elkhorn
- Temperance south of Conejo
- Dewolf north of Mt. View
- Clovis north of Nebraska
- Harlan between Maple and Chestnut

A.7 Fresno-Clovis

- Copper between Minnewawa and Fowler
- Copper near Armstrong
- Armstrong between Copper and International
- International between Flower and Armstrong
- Fowler between International and Shepherd
- Behymer between Willow and Minnewawa
- Behymer between Minnewawa and Fowler
- Sunnyside between Teague and Nees
- Teague between Fowler and Armstrong
- Marion between Teague and Nees
- Shaw between McCall and Leonard
- Academy between Herndon and Shaw
- Sierra between Academy and Del Rey
- Herndon between Academy and Madsen
- Madsen between Herndon and Shepherd
- Shepherd between SH 168 and Academy
- Shepherd between Fowler and Armstrong
- Gettysburg between Van Ness and Wishon
- Sierra between Forkner and Van Ness Extension
- College between Swift and Santa Ana



A.8 Fresno-Sanger

This is not a complete list as there are many locations that pool at the shoulder or just onto the road. Large or back-to-back storms can change all.

- Jensen at Sierra Vista
- Shields/Locan
- National east of Minnewawa
- Monticeto/Rogers
- Fowler at Princeton
- Butler east of Locan
- Gettysburg/Greenwood
- McKinley west of Bethel
- McKinley at Leonard
- Indianola south of Highway 180
- Dewolf/Church
- Bond/Mayfair Drive North
- Griffith east of Clovis
- Dakota east of Highland
- Fowler at Olive
- Walling north of Kings Canyon
- Olive east of Hornet
- Temperance north of Church
- Temperance north of Jensen
- Locan north of Church
- Highland north of Jensen
- Zediker south of Belmont
- Tulare west of Zediker
- Newmark north of Belmont
- Macdonough north of Belmont
- Newmark north of Highway 180
- California east of Dockery
- McCall/Tulare
- Tulare east of McCall
- Indianola at Jensen



- Olive/Zediker
- Thompson north of Dakota
- Rancho at Butler
- Illinois west of Villa
- Madison west of Clovis
- Grant west of Clovis
- Washington west of Clovis
- Easterby Drive Southwest of Minnewawa
- Easterby Drive Northwest of Minnewawa
- Brown at Jackson

A.9 Sanger-Del Rey

- American between Academy and Armstrong
- Central between McCall and Willow
- Bethel south of Adams 100-500 feet
- Bethel between Manning and Rose
- Willow between North and Jensen
- Nebraska from Academy to city limits and at intersection of Bethel

A.10 Reedley-Dunlap

- Alta at Manning
- Zediker south of Caruthers
- South at Zediker
- Reed at Floral
- Reed at South
- Adams between Zediker and Smith
- Smith at Dinuba
- Hill between Sumner and Adams
- Monson south of Parlier (this might be the City of Orange Cove)

LEVEE FAILURE

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 man-made. A natural levee is formed when sediment settles on the riverbank, raising the level of the land around the river. To construct a man-made 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 weather events. Levees reduce, not eliminate, the risk to individuals and the structure behind them. A levee system failure or overtopping can create severe flooding and high-water velocities. It's 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.

There are three primary risks to levee integrity in Fresno County:

- Earthquake failure
- High water failure
- Dry weather failure.

EARTHQUAKE FAILURE

Seismic risk in the Fresno area is characterized as moderate-to-high because of many active faults in the area. **Figure 16. California's Fault Lines** illustrates the locations of faults in and surrounding Fresno County. Seismic risk to levees stems from the risk of liquefaction, ground settlement, and cracking.

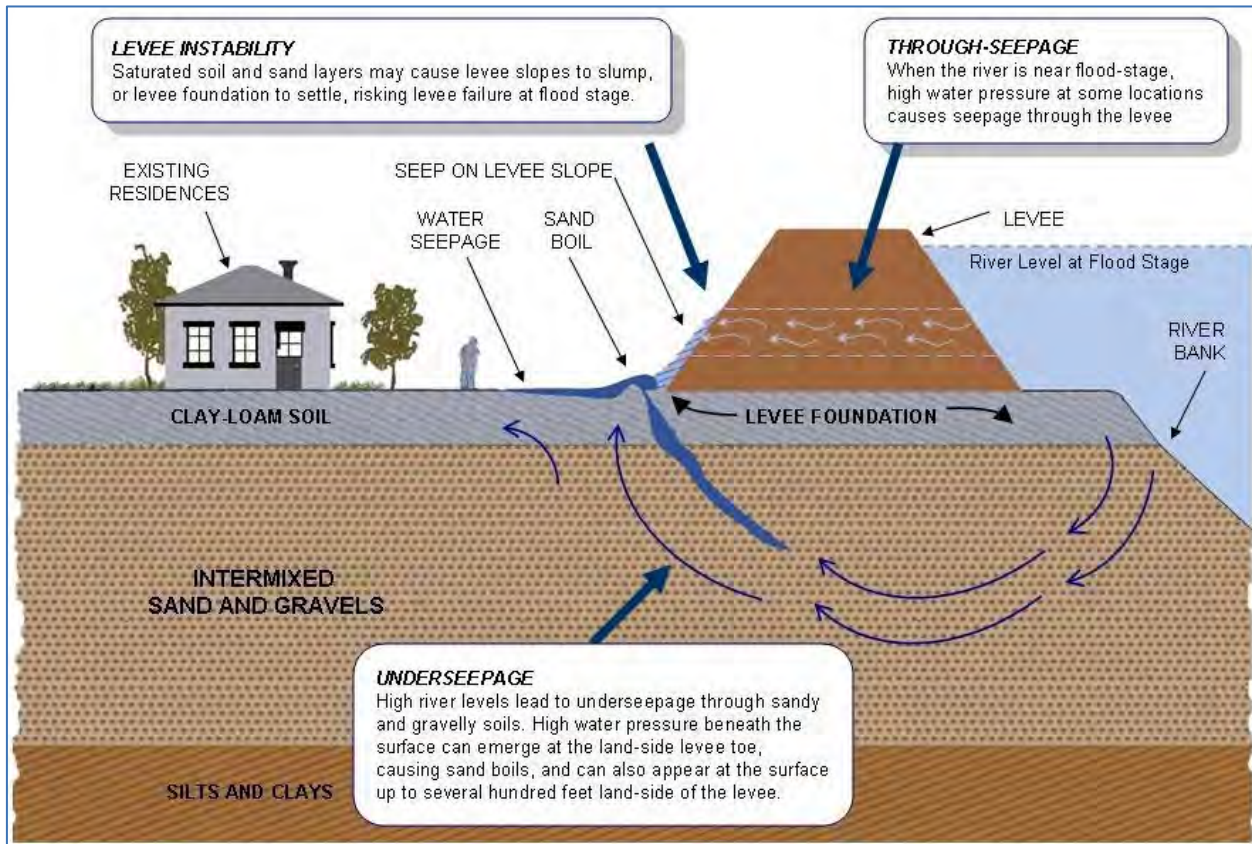
HIGH WATER FAILURE

High water in the County can overtop levees. High water also increases the hydrostatic pressure on levees and their foundations, causing instability, shown in **Figure 21. Levee Failure Process**. The risk of through-levee and under-levee seepage failures increases as well.

Under-seepage refers to water flowing under the levee through the foundation materials, often emanating from the bottom of the landside slope and ground surface and extending landward from the landside toe of the levee. Through-seepage refers to water flowing through the levee prism directly, often emanating from the landside slope of the levee. Both conditions can lead to failure by several mechanisms, including excessive water pressures causing foundation heave and slope instabilities, slow progressing internal erosion, and piping leading to levee slumping.

Overtopping failure occurs when the flood water level rises above the crest of a levee. The representation of the failure modes and the evaluation of the probability of levee failures for each mode are discussed in the remaining sections.

Figure 21. Levee Failure Process



Source: Reclamation District 1000

DRY WEATHER FAILURES

Dry weather, or sunny days, failures are levee breaches that are not flood or seismic related. These failures typically occur between the end of the late snowmelt from the Sierras, in late May, and the beginning of the rainy season, in early October. Sunny-day failures are addressed separately from flood-induced failures to differentiate between winter and summer events. Aside from seismic events, factors that can cause levee failures in the County in the summer period are different than the factors that can cause winter failures.

Burrowing animal activities and pre-existing weaknesses in the levees and foundation are the key weak links leading to levee failures. This is the case whether or not the failures occur during a high-tide condition. Burrowing animals can cause undue weaknesses by creating a maze of internal and interconnected galleries of tunnels. Tree growth on levees may cause weakness as well.

Under-seepage and through-levee seepage are slow processes that tend to work through time by removing fines from levee and foundation material during episodes of high river levels. Cumulative deterioration through the years can lead to foundations ultimately failing in dry weather by means of uncontrollable internal erosion that leads to slumping and cracking of levees.

FLOODPLAIN MAPPING

FEMA established standards for floodplain mapping studies as part of the National Flood Insurance Program (NFIP). The NFIP makes flood insurance available to property owners in participating communities adopting FEMA-approved local floodplain studies, maps, and regulations. Floodplain studies that may be approved by FEMA include federally funded studies; studies developed by state, city, and regional public agencies; and technical studies generated by private interests as part of property annexation and land development efforts. Such studies may include entire stream reaches or limited stream sections depending on the nature and scope of a study. A general overview of floodplain mapping is provided in the following paragraphs. Details on the NFIP and mapping specific to participating jurisdictions are in the jurisdictional annexes.

- **Flood Insurance Study (FIS):** The FIS develops flood-risk data for various areas of a community that is used to establish flood insurance rates and to assist the community in its efforts to promote sound floodplain management. The current Fresno County FIS is dated January 20, 2016. This study covers both the unincorporated and incorporated areas of the County.
- **Flood Insurance Rate Map (FIRM):** The FIRM is designed for flood insurance and floodplain management applications. For flood insurance, the FIRM designates flood insurance rate zones to assign premium rates for flood insurance policies. For floodplain management, the FIRM delineates 100- and 500-year floodplains, floodways, and the locations of selected cross sections used in the hydraulic analysis and local floodplain regulation.
- **Letter of Map Revision (LOMR) and Map Amendment (LOMA):** LOMRs and LOMAs represent separate floodplain studies dealing with individual properties or limited stream segments that update the FIS and FIRM data between periodic FEMA publications of the FIS and FIRM.
- **Digital Flood Insurance Rate Maps (DFIRM):** As part of their Map Modernization program, FEMA is converting paper FIRMS to digital FIRMs (DFIRMS). These digital maps: incorporate the latest updates (LOMRs and LOMAs), utilize community supplied data, verify the currency of the floodplains and refit them to community supplied base maps, Upgrade the FIRMs to a GIS database format to set the stage for future updates and to enable support for GIS analyses and other digital applications, and solicit community participation.

To describe the flood hazard areas for a specific area, FEMA uses flood zone designations which include Zone V, Zone VE and C 1-30, Zone A, Zone AE, Zone AH, Zone AO, Zone X (shaded), and Zone X (unshaded). The flood determinations and their descriptions used in floodplain mapping are described in **Table 28. Floodplain Zone Designations**.

Table 28. Floodplain Zone Designations

Zone Designation	Percent Annual Chance of Flood	Description
Zone V	1%	Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. Because hydraulic analyses have not been performed, no base flood elevations (BFEs) or flood depths are shown.
Zones VE and V1-30	1%	Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. BFEs derived from detailed hydraulic analyses are shown within these zones. (Zone VE is used on new and revised maps in place of Zones V1-30.)
Zone A	1%	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or BFEs are shown within these areas.
Zone AE	1%	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, BFEs derived from detailed analyses are shown at selected intervals within these zones.
Zone AH	1%	Areas with a 1% annual chance of flooding Where shallow flooding (usually areas of ponding) can occur with average depths between 1 – 3 feet.
Zone AO	1%	Areas with a 1% annual chance of flooding, where shallow flooding average depths are between 1 – 3 feet.
Zone X (shaded)	0.2%	Represents areas between the limits of the 1% annual chance of flooding and 0.2% chance of flooding.



Zone Designation	Percent Annual Chance of Flood	Description
Zone X (unshaded)	Undetermined	Areas outside of the 1% annual chance floodplain and 0.2% annual chance floodplain; areas of 1% annual chance sheet flow flooding where average depths are less than one (1) foot; areas of 1% annual chance stream flooding where the contributing drainage area is less than one (1) square mile, or areas protected from the 1% annual chance flood by levees. No BFE or depths are shown within this zone.

Source: FEMA

COMMUNITY RATING SYSTEM

As part of the NFIP, the Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements.

CRS communities have flood insurance premium rates discounted to reflect reduced flood risk resulting from the community's efforts that address the three goals of the program. With an updated hazard mitigation plan, lower flood insurance premiums will be provided for the jurisdictions that participate in the National Flood Insurance Program's Community Rating System.

According to the FEMA Community Status Book, accessed on March 27, 2024, Fresno County joined the CRS on May 1, 2016, and has a CRS class of 7 which provides a 15 percent SFHA discount and 0.05 percent non-SFHA discount. Additionally, the County joined the NFIP on October 1, 1991. More information on the CRS is described in **Table 29. Community Rating System (CRS) Credits and Discounts.**

Table 29. Community Rating System (CRS) Credits and Discounts

CRS Class	CRS Discount	Credit Points Required
1	45%	4,500+
2	40%	4,000-4,499
3	35%	3,500-3,999
4	30%	3,000-3,499
5	25%	2,500-2,999
6	20%	2,000-2,499
7	15%	1,500-1,999

CRS Class	CRS Discount	Credit Points Required
8	10%	1,000-1,499
9	5%	500-999
10	0%	0-499

Source: FEMA

The flood mitigation activities and their points are listed in **Table 30. Community Rating System (CRS) Mitigation Actions and Points**. The total number of points will equal to a CRS class and then determine the CRS discount for flood insurance for the community.

Table 30. Community Rating System (CRS) Mitigation Actions and Points

Series 300	Mitigation Actions	Maximum Points	Average Points
	This series of credits programs advise people about flood hazards, flood insurance, and ways to reduce flood damage. The activities also provide data insurance agents need for accurate flood insurance rating.		
310	Elevation Certificates <ul style="list-style-type: none"> Have written procedures for managing floodplain-related certificates for new constructions in the floodplain. (at a minimum, a community must maintain certificates for buildings built after the date of its CRS application) Maintain a rate of 90% accuracy 	116	36
320	Map Information Service <ul style="list-style-type: none"> Provide Flood Insurance Rate Map information to those who inquire, and publicize this service 	90	78
330	Outreach Projects <ul style="list-style-type: none"> Distribute outreach projects with messages about flood hazards, flood insurance, flood protection measures, and/or the natural and beneficial functions of floodplains 	350	87
340	Hazard Disclosure <ul style="list-style-type: none"> Real estate agents advise potential purchasers of flood-prone property about the flood hazard Regulations require notice of the hazard 	80	15
350	Flood Protection Information <ul style="list-style-type: none"> The public library and/or community's website maintains references on flood insurance and flood protection 	125	48
360	Flood Protection Assistance	110	59



Series 300	Mitigation Actions	Maximum Points	Average Points
	<ul style="list-style-type: none"> Give inquiring property owners technical advice on protecting their buildings from flooding and publicize this service 		
370	Flood Insurance Promotion <ul style="list-style-type: none"> Assess flood insurance coverage in the community; promote flood insurance through meetings, technical assistance, brochures, or other means This series credits programs that limit floodplain development or provide increased protection to new and existing development 	220	40
410	Floodplain Mapping <ul style="list-style-type: none"> Develop new flood elevations, floodway delineations, wave heights, or other regulatory flood hazard data for an area not mapped in detail by the flood insurance study Have a more restrictive mapping standard 	850	78
420	Open Space Preservation <ul style="list-style-type: none"> Guarantee that currently open public or private floodplain parcels will be kept free from development Incentivize keeping the floodplain open with zoning restrictions, lot size requirements, or other regulations 	2,870	471
430	Higher Regulatory Standards <ul style="list-style-type: none"> Limit new buildings and/or fill in the floodplain Require freeboard Require soil tests or engineered foundations Require compensatory storage Require coastal construction standards in AE Zones Have regulations tailored to protect critical facilities or areas subject to special flood hazards such as alluvial fans, ice jams, subsidence, coastal erosion 	2,462	272
440	Flood Data Maintenance <ul style="list-style-type: none"> Keep flood and property data on computer records Use better base maps Maintain elevation reference marks 	222	127
450	Stormwater Management <ul style="list-style-type: none"> Regulate new development throughout the watershed to ensure that post-development runoff is no greater than pre-development runoff. Regulate new construction to minimize soil erosion and protect or improve water quality 	755	110
510	Floodplain Management Planning <ul style="list-style-type: none"> Using a standard process, prepare, adopt, implement, and update A comprehensive flood hazard mitigation plan and/or Plan to protect natural functions within the community's floodplain and/or 	762	197

Series 300	Mitigation Actions	Maximum Points	Average Points
	<ul style="list-style-type: none"> A plan for managing substantial flood damage to properties in the community and/or A plan to serve and/or recover threatened and endangered species in the floodplain Prepare an analysis of the repetitive flood loss areas within the community <p>*** relates to hazard mitigation planning</p>		
520	Acquisition and Relocation <ul style="list-style-type: none"> Acquire and/or relocate flood prone buildings so that they are out of the floodplain, and the floodplain remains open 	2,250	176
530	Flood Protection <ul style="list-style-type: none"> Protect existing floodplain development by floodproofing, elevation, or minor flood control projects. 	1,600	64
540	Drainage System Maintenance <ul style="list-style-type: none"> Have a program for and conduct annual inspections of all channels and detention basins; remove debris as needed 	470	203
610	Flood Warning and Response <ul style="list-style-type: none"> Provide early flood warning to the public, and have a detailed flood response plan keyed to flood crest predictions Incorporate substantial damage assessment into flood operations 	365	266
620	Levees <ul style="list-style-type: none"> Annually inspect and maintain existing levees; have a system for recognizing the threat of levee failure and/or overtopping, disseminating warnings, and providing emergency response; and coordinate with operators of critical facilities 	235	111
630	Dams <ul style="list-style-type: none"> Have a high-hazard potential dam that could affect the community; have a system for recognizing the threat of dam failure, disseminating warnings, planning, and practicing emergency responses; and coordinating with operators of critical facilities. 	160	38

Source: FEMA

LEVEE MAPPING

As part of FEMA's Map Modernization program, FEMA is mapping levees within communities, with a primary focus on maps determined to provide a 100-year level of flood protection. Most of the levees are privately owned, maintained, and operated. Because of the ownership and lack of enforcement for maintenance, most of the levee systems do not meet the current standards for flood protection and are mapped as such.



As part of the flood mapping process, the Federal Emergency Management Agency (FEMA), and its State and local mapping partners, review and evaluate levee system data and documentation. Any community and/or other party seeking recognition or continued recognition of a levee system on a Flood Insurance Rate Map (FIRM) must provide FEMA with data and documentation, certified by a registered professional engineer, showing that the levee system is expected to provide 1-percent-annual-chance (base) flood risk reduction. To be mapped on a FIRM as providing base flood risk reduction, levee systems must meet and continue to meet the NFIP minimum design, operation, and maintenance requirements described in Title 44, Chapter 1, Section 65.10 of the Code of Federal Regulations (44 CFR 65.10).¹⁹

Provisionally Accredited Levee System (PAL)

In Fresno County, similar to other locations in California, levees and flood control facilities have been built and are maintained variously by public and private entities, including water, irrigation and flood control districts, other state and local agencies, and private interests.

To best address the issue of levees in the DFIRM process, FEMA provided guidance for the issuance of PAL (provisionally accredited levee) agreements that would allow for identified levees to be provisionally accredited for purposes of mapping while communities/levee owners compile and submit data and documentation necessary for full accreditation. Communities have two years from the date of FEMA's initial coordination to submit to FEMA final accreditation data for all PALs. Levees for which such agreements were signed are shown on the final effective FIRM as providing protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year and labeled as a PAL. Following receipt of final accreditation data, FEMA will revise the FIS and FIRM as warranted.

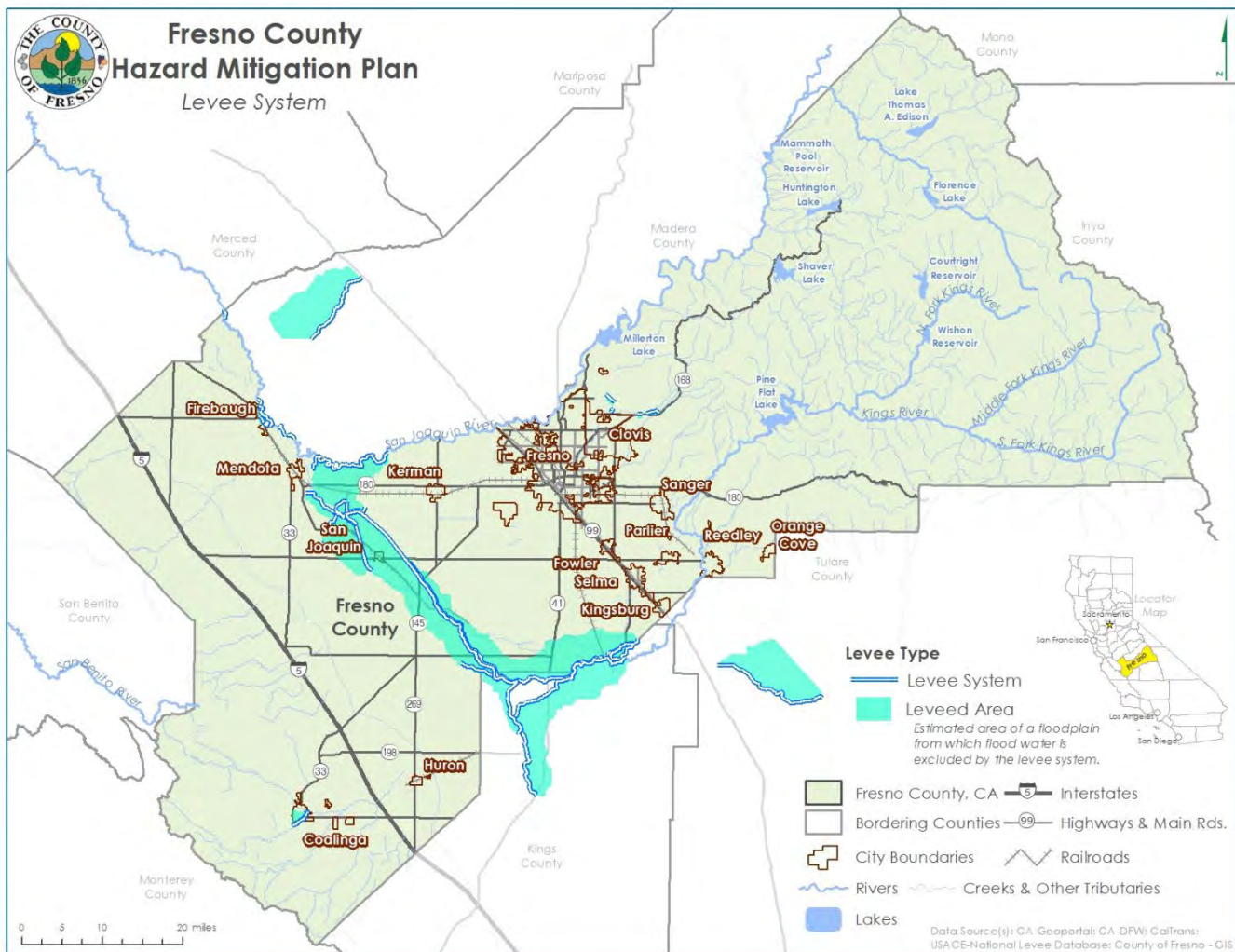
Levee Flood Protection Zone (LFPZ)

FEMA-designated 100-year and 500-year floodplains in Fresno County that were updated under the Map Modernization Program and became effective on January 20, 2016. The State of California (DWR) completed levee flood protection zone (LFPZ) maps in December 2008 of areas that may be inundated if a project levee fails (from water surface elevations at the top of the levee, which may be from a storm event even larger than the levee's design storm). The LFPZ map of the San Joaquin River shows a considerable area within Fresno County that may be inundated if the project levees fail.

A relatively broad levee flood protection zone (LFPZ) is identified along the San Joaquin River, with depths less than three feet indicated west of the river, but greater than three feet all along the east side of the river. Several areas protected by project levees in the east county would also have inundation areas that are primarily less than three feet but include some deeper areas. Fresno County's levee system can be seen in **Figure 22. Fresno County Levee System.**

¹⁹ https://www.fema.gov/sites/default/files/documents/fema_meeting-criteria-accrediting.pdf

Figure 22. Fresno County Levee System



Source: CA Geoportal; CA-DFW; Caltrans; USACE-National Levee Database; County of Fresno - GIS



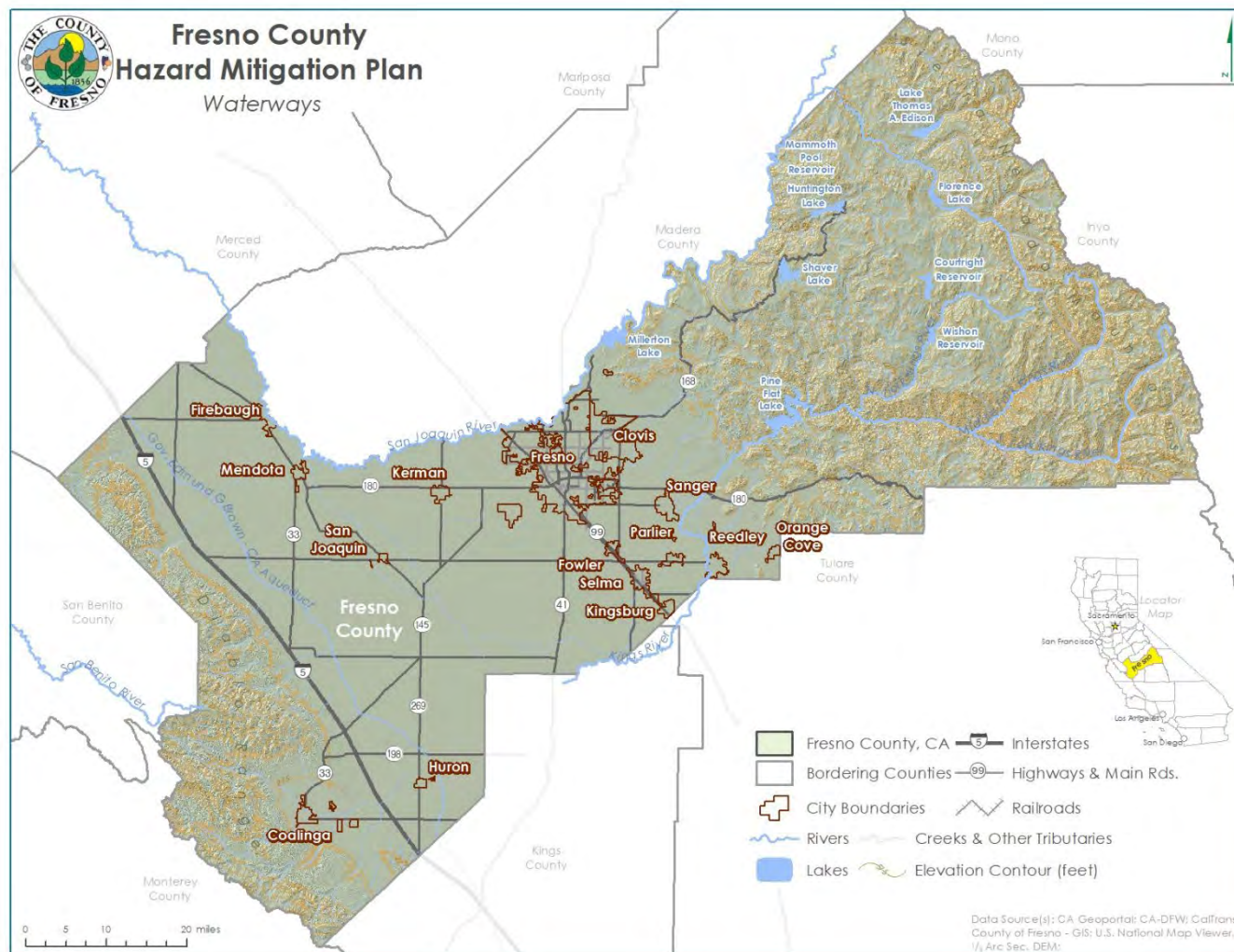
EXTENT

Small - Fresno County is large and geographically diverse. Water resources in the Fresno County planning area include several rivers and streams, artificial waterways, and groundwater sources located throughout the County. The mountainous eastern portion of Fresno County, located primarily in the Sierra Nevada, contains many small mountain lakes and streams that are tributaries to the San Joaquin and Kings rivers, which flow into the Central Valley. The arid western portion of Fresno County is characterized by larger watersheds in the Coast Range that drain stormwater eastward into the valley and the Fresno Slough. Flash floods with depths of several feet can occur in the valleys of the Sierras, while large areas of relatively shallow inundation can occur in the Central Valley.

During winter and spring months, river systems in Fresno County swell with heavy rainfall and snowmelt runoff. To prevent flooding, a wide variety of storm drainage and flood control measures are used throughout the County. These include flood control reservoirs, levee systems, and watershed treatments. In rural areas, the management of reservoir releases, canals, and levee systems reduces the likelihood of flooding and reroutes stormwater around urban areas. In developed areas, storm drainage systems composed of street gutters, inlets, underground storm drains, ponds, pumping stations, and open channels are used to collect and control stormwater runoff. The storm drainage and flood control systems are discussed further in the sections that follow.

Figure 23. Fresno County Waterways illustrates natural and manmade waterways in the County. Information on the County's more notable waterways and associated flood control facilities extracted from the Fresno County General Plan Background Report is included below by region.

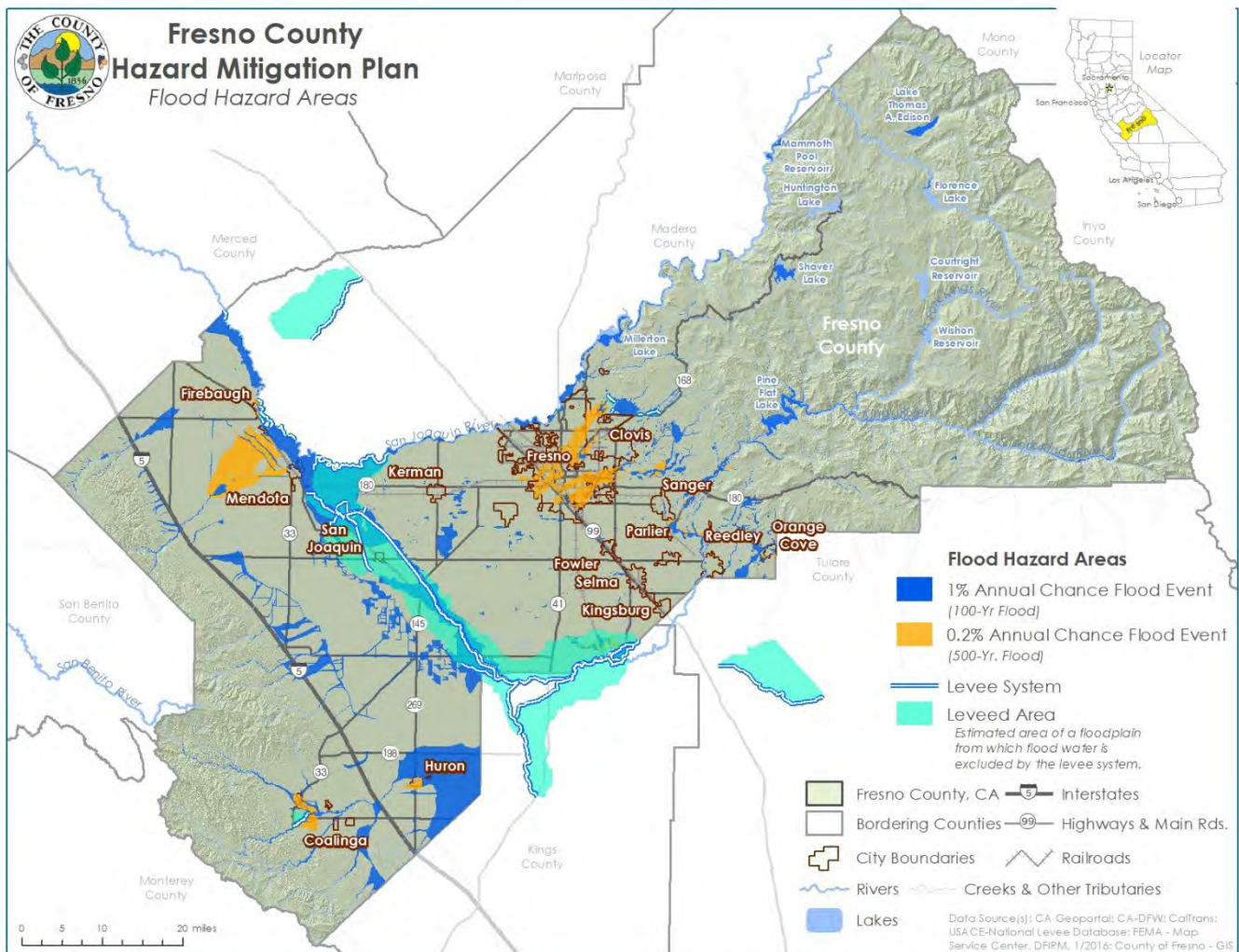
Figure 23. Fresno County Waterways



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno-GIS; U.S. National Map Viewer, 1/4 Arc Sec. FEMA

Figure 24. Fresno County Flood Hazard Areas illustrates the city's mapped flood hazard areas. Flood hazard areas periodically change to reflect improved and updated mapping techniques as well as areas that may have been altered by flood mitigation projects, typically reflected in the development of the Conditional Letters of Map Revision (CLOMR) or Letters of Map Revision (LOMR). More detailed flood hazard maps are included in this Chapter.

Figure 24. Fresno County Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database; FEMA-Map Service Center; DFIRM, 1/2016; County of Fresno - GIS



LEVEE FAILURE EXTENT

The geographic extent of the levee hazard is shown in **Figure 24. Fresno County Flood Hazard Areas** and explained further in the Vulnerability portion of this plan.

PAST OCCURRENCES

Fresno County has a long history of flooding. Historical records indicate that nine significant flood events occurred in Fresno County between the 1840s and 1900. A series of river floods during the 1980s and 1990s prompted FEMA to drastically revise its estimate of the 100-year flood flows in the San Joaquin River channel and to develop a new FIRM for the area. Construction of major detention structures in the eastern part of the County along the Fresno County Stream Group enabled FIRMs to be revised in the early 1990s to show a reduced 100-year flood risk from the San Joaquin River to the metropolitan area. Within the past 70 years, there have been 53 recorded flood incidents within Fresno County. Detailed information on each of the flood events is described below and in **Table 31. Fresno County Flood Previous Occurrences**.

- **December 1955:** A rain on snow event caused local and downstream flooding in eastern Fresno County, ultimately affecting the entire valley region. Homes were lost and roads and bridges were damaged or destroyed. Damage to some dam facilities also resulted.
- **1995:** From January to March 1995, strong storms in the County led to severe flooding, road closures, a destroyed bridge on Interstate 5, hundreds displaced, and seven fatalities, particularly affecting the western region. Damages included twenty homes, \$5 million to public facilities, over \$8.6 million to agriculture, and \$9 million in business impacts, with multiple infrastructure disruptions like road closures and compromised water systems. A local, state, and federal disaster was declared due to the extensive impact of the storms.
- **1997:** A regionwide rain on snow event in high elevations caused local flooding and flooding downstream in the valley. Homes, bridges, roads, and other infrastructure near waterways were damaged. A bridge on Interstate 5 over the Kings River was washed out. Losses to infrastructure were estimated in the hundreds of millions. Other impacts included damage to fisheries and wildlife.
- **1998 (El Niño rain event):** In 1998, Fresno County was hit by extensive rainfall over 33 days within a six-month period, causing widespread flooding and prompting local, state, and federal emergency declarations. Property and public facility damage totaled nearly half a million dollars, while the farming industry suffered a \$17 million loss, primarily impacting tree fruit and row crops. The community faced substantial economic impacts between \$38-48 million, and the agricultural workforce experienced significant unemployment and reduced work hours.
- **April 28, 2005 (Parlier Flood):** A cell of severe weather passed over the City of Parlier dropping up to three inches of rain in 20 minutes. The drainage system could not handle the flow, and approximately 25 homes and businesses were flooded. The City of Parlier declared a local disaster, as did Fresno County. Damage was estimated at \$700,000. Homeowners had little or no insurance coverage. In addition, J Street was closed for one day.
- **2005-2006:** Above average rainfall occurred between December 19, 2005, and January 1, 2006. This resulted in flooding of low-lying areas throughout the County. Flood control basins were overflowing in several areas, including the Cities of Fresno and Clovis. Property damage included damage to approximately 180 businesses and homes estimated at \$1.4 million within the unincorporated County. Damage to other jurisdictions was estimated at \$611,307. Damage to crops



was minimal due to the time of year. Flooding further resulted in several road closures, which were one to two weeks in duration.

- **April 5, 2006:** Heavy rainfall and snowmelt caused high runoff into the San Joaquin and Kings River drainages, putting levees and river channels at risk, although they ultimately held. A flood fighting team from the Department of Water Resources (DWR) and construction crews worked to reinforce the system, resulting in minimal property and crop damage, except for 200 acres in the Tranquility Irrigation District affected by a levee break. Despite the damage to the levee, canal systems, and river channels, disaster declarations were made due to the potential for more severe consequences had there been system failures.
- **July 2006:** Flash floods from thunderstorms in drainages above the north end of Huntington Lake resulted in a variety of damage. This included an estimated \$250,000 in damage to private boats and an estimated \$200,000 in damage to local infrastructure (roads, boat docks, etc.). Other impacts included loss of power for three weeks in some areas, closure of a primary summer road for one week, and closure of Huntington Lake to recreational use for one week. Cleanup costs exceeded \$150,000, and search and rescue costs were estimated at \$25,000.
- **October 29, 2007:** Newspapers and broadcast meteorologists reported several roadways flooded in Northwest Fresno. Numerous vehicles were stranded, and water rescues occurred. Heavy rain caused a roof to collapse at an industrial plant on the northwest side of the city. Damage was estimated at 250,000 to the roof structure alone. Total property damage associated with the event amounted to over \$500,000.
- **December 2007:** Heavy rain and snowstorms ravaged central California, including the San Joaquin Valley and Fresno metropolitan area. The combination of locally heavy rains and poor drainage areas within the urban and suburban land lead to over \$175,000 in property damage between December 18th and 19th.
- **December 29, 2010:** On the morning of the 29th, heavy rain across the San Joaquin Valley caused widespread urban and poor drainage flooding. Especially hard hit were the metro areas of Fresno, Visalia, and Bakersfield, and the adjacent foothills. Fresno had a record rainfall of 0.92 inch on the 28th, breaking the old record of 0.72 inch, set in 2004. The two-day total at Fresno-Yosemite International Airport was 1.54 inch, which pushed the December rainfall to 5.92 inches for the second wettest December on record for Fresno; the wettest December was in 1955, with 6.73 inches. It was also the coldest low of the year for Fresno, with temperatures dropping below 32 degrees. Property damage amounted to \$125,000.
- **November 30, 2011:** Fresno set record high minimum temperatures on the last day of the month, establishing the total record for the sixth warmest November. This was also the fourth consecutive month that Fresno ranked in the top 10 warmest months. Fresno had a record rainfall on November 30th of 0.62 inch; the old record was 0.50 inch. As a result of the heavy rainfall, some rock and mud slides occurred as the moisture weakened the soil. Law enforcement reported a rock and mud slide on Highway 168 about 15 miles northeast of Clovis, which closed the road for several hours while authorities cleaned up the debris.
- **1/07/2017:** A series of systems fed by a continued influx of very moist air was pushed into the central California interior through an atmospheric river set-up for several days. This created high snow levels between 9,000-10,000 feet and heavy rainfall for much of the San Joaquin Valley County Warning Area which in turn created flooding and flash flooding of area rivers, streams, and water supply canals. Also, debris flows, rockslides, and road ponding/flooding were reported.
- **1/20/2017:** A nearly stationary cold low-pressure system from the Pacific Northwest moved into central California and tropical moisture being fed from the Pacific with a continued atmospheric river



set-up, brought thunderstorms and heavy rainfall to the Sierra Nevada Mountains and Foothills and parts of the San Joaquin Valley over several days. Small pea-sized hail was also reported with some thunderstorms.

- **2/03/2017:** Tropical influx jet pushed into central California ahead of a cold front created heavy rains which were enhanced by orographically lifting with the Sierra Mountains.
- **2/07/2017:** Atmospheric River system brought heavy rainfall, flooding, debris flows, and high elevation snowfall to the central California region. Damages were over \$100,000 and the California Highway Patrol reported road closure due to a bridge collapse from heavy rainfall near Sugarloaf Road and Auberry Road just northeast of Meadow Lakes.
- **2/20/2017:** A series of strong low-pressure systems accompanied with tropical moisture influxes brought strong winds, heavy rainfall, flooding, debris flows, funnel cloud reports, and high elevation snows to the central California region. Precipitation was enhanced at times by orographically lifting.
- **6/19/2017:** Between June 18 and June 29, significant water releases from Pine Flat Dam caused flooding along the Kings River, prompting evacuations and levee breaches near Kingsburg, affecting homes, and prompting a large-scale sandbagging operation. The second levee breach on June 24 threatened 90 homes in Tulare County, leading to the evacuation of 300 people and damaging 7 structures. Water levels receded by June 29 after releases from the dam were reduced on June 26, ending the immediate flood threat.
- **3/21/2018:** From March 20 to 22, a surge of tropical moisture led to heavy rainfall, causing widespread flooding, road closures from rockslides and debris flows, particularly in Mariposa and Springville near recent burn scars. Thunderstorms on March 22 exacerbated conditions, prompting flash flood emergencies, evacuations, and a tornado touchdown near Dinuba. While the Southern Sierra Nevada received 4 to 8 inches of rain, the San Joaquin Valley saw 1 to 3 inches, with several feet of snow accumulating above 9000 feet.
- **10/03/2018:** On October 2, an upper-level low pressure system brought light rainfall across the San Joaquin Valley and more significant rain in the Southern Sierra Nevada, followed by scattered thunderstorms on October 3 that led to moderate to heavy rainfall and numerous flooding reports. The Ferguson Fire burn scar experienced flash flooding with debris flows and washed-out roads, while the San Joaquin Valley and Southern Sierra received one to two inches of rain. The system moved east by October 4, ending the precipitation event with snow levels remaining high at above 11000 feet, limiting snowfall to the higher peaks.
- **11/21/2018:** Following a 45-day dry spell in central California, a low-pressure system on November 21 brought light to moderate precipitation, marking the first significant winter storm with 8 to 16 inches of snow above 7000 feet in the Southern Sierra Nevada. The San Joaquin Valley received a quarter to three-quarters of an inch of rain, ending its dry streak. This weather event resulted in minor nuisance flooding reports across the region.
- **12/16/2018:** A cold front that was associated with a moist upper trough pushed across central California on December 17. This system brought moderate to locally heavy rainfall from Fresno County northward the late evening of December through the morning of December 17 where several stations reported a half inch to an inch and a quarter of rainfall, and there were several reports of mainly nuisance flooding during this time. The precipitation mainly fell as snow above 6500 feet where several stations in the Southern Sierra Nevada north of Fresno County picked up between 3 and 6 inches of new snow. Further south the rainfall was less plentiful with most locations receiving between a few hundredths of an inch to a quarter of an inch of rain by the time the precipitation ended by early afternoon on December 17.



- **2/02/2019:** On February 2, a strong low-pressure system brought high winds to the Grapevine area, extending to Bakersfield, causing tree and wind damage, followed by moderate to heavy precipitation that led to roadway flooding. The San Joaquin Valley received over an inch of rain, while mountain areas got 2 to 5 inches, mainly as snow above 5000 feet, with SNOTEL stations reporting several feet of new snow. Additional thunderstorms later in the day produced hail, more rainfall, and a small tornado south of Maricopa.
- **2/14/2019:** Between February 13 and 17, a potent low-pressure system brought heavy rainfall, strong winds, and a drop in snow levels from nearly 9000 feet to 1500 feet, causing widespread flooding and road closures in central California. Thunderstorms with hail and a small tornado followed a cold front on February 15, while the Southern Sierra Nevada received up to 20 inches of new snowfall. Overall, the San Joaquin Valley accumulated up to an inch and a half of rain, and the Tehachapi Mountains saw 1 to 2 inches of liquid precipitation.
- **3/02/2019:** A strong storm system on March 2 brought light to heavy precipitation to central California, with thunderstorms causing flooding and a tornado near Mendota. The Southern Sierra Nevada received 1 to 3 inches of liquid precipitation, while the San Joaquin Valley and Kern County Mountains accumulated up to an inch of rain. The storm, which initially held snow levels above 8000 feet, exited the region by March 3 after dropping snow levels to around 5000 feet and leaving the Kern County Deserts with up to half an inch of rainfall.
- **5/26/2019:** On May 25, a strong upper low-pressure system moved southward, bringing instability and scattered thunderstorms to the San Joaquin Valley, with one storm producing nickel-sized hail and roadway flooding near Mettler and Maricopa. The system continued through California on May 26, causing widespread rainfall, mountain snow, and gusty winds, with the Sierra Nevada receiving 2 to 5 inches of snow and some areas experiencing heavy rainfall and wind gusts over 35 mph. Record-breaking daily precipitation was recorded on May 26 across the region, reflecting the system's significant impact.
- **5/29/2019:** Following cool temperatures, the area warmed up on May 28, leading to seasonable conditions and daily afternoon showers and thunderstorms due to abundant moisture. On May 31, storms in the mountains contributed to heavy rainfall, snowmelt, and significant runoff, causing river levels in the San Joaquin Valley to rise rapidly, notably along the Kings River due to Pine Flat Dam releases. This led to flooding at Lindy's Landing campground near Reedley and the Kings River Golf and Country Club near Kingsburg from May 29, continuing beyond month's end.
- **6/01/2019:** Because of continued increased releases at Pine Flat Dam. Runoff continued to produce flooding at Lindy's Landing campground near Reedley, and the Kings River Golf and Country Club near Kingsburg well into June. The releases were cut back during the middle of the month and the flood waters receded by the evening of June 19.
- **12/08/2019:** During December 7-8, a trough brought widespread rain to California, with 1-2 inches in the Sierra and up to an inch in the San Joaquin Valley, while areas further south received less. The snow levels stayed between 7000 and 8000 feet, leading to 8-12 inches of new snow in the higher elevations. Scattered thunderstorms also caused localized heavy rainfall, roadway flooding, and small hail before the system moved eastward, ending the precipitation by late evening.
- **12/22/2019:** On December 22 and 23, a frontal system brought strong winds and substantial precipitation across central California, with gusts over 50 mph in the foothills and mountains, and some areas near Lebec experiencing winds over 75 mph. The Sierra Nevada and adjacent foothills received 1 to 1.5 inches of rain, while the San Joaquin Valley had reduced totals due to rain shadowing, and central Tulare County saw moderate to heavy rainfall as the low-pressure center



moved north. Above 5000 feet, the precipitation turned into heavy snow, with 10 to 15 inches reported in the higher Sierra regions.

- **3/25/2020:** Between March 20 and March 29, central California experienced a series of weather systems, one of which brought heavy precipitation on March 22 and 23 with up to an inch of liquid precipitation and 8 to 12 inches of snow above 7000 feet in the Sierra Nevada. Another system on March 25 and 26 triggered strong winds, thunderstorms, hail, and localized flooding, with snowfall reaching down to 4000 feet. The final system on March 29 delivered lighter precipitation, capping off a period of significant weather activity across the region.
- **4/17/2020:** On April 16-17, a low-pressure system near California's coast moved inland, bringing widespread showers and thunderstorms, causing localized heavy rainfall and some flooding through April 18. While rainfall amounts varied, some areas received nearly an inch, and most saw up to half an inch. Above 7000 feet, snowfall ranged from 2 to 5 inches in the higher Sierra Nevada.
- **5/18/2020:** A low pressure system moving across central California on May 18 brought widespread precipitation, with the Sierra Nevada receiving up to 3.25 inches of rain and snow levels dropping to around 6000 feet, leading to new snowfall at higher elevations. Thunderstorms in the afternoon triggered nuisance flooding on roadways in several communities, while areas in the Kern County Deserts and surrounding mountains experienced strong wind gusts up to 70 mph. The storm and associated effects, including the strong winds, subsided by the late morning of May 19 as the system exited the region.
- **1/28/2021:** A powerful storm system swept through central California from January 27 to January 29, bringing heavy rainfall and strong winds that resulted in significant flooding, power outages, and downed trees. The system, energized by a deep moisture surge, unloaded 4 to 7 inches of rain in the Sierra foothills and 2.5 to 4 inches in the northern San Joaquin Valley, with the southern valley and Kern County receiving up to an inch, causing roadway flooding and triggering mudslides in burn scar areas. As the storm progressed, it also dumped 4 to 6 feet of snow in higher elevations of the Sierra Nevada, leading to travel restrictions and road closures before moving out of the area by the afternoon of January 29.
- **10/25/2021:** A significant low-pressure system, fueled by tropical moisture from Typhoon Nanthu, brought intense rainfall to central California, leading to moderate to heavy precipitation and resulting in widespread flooding across the region, particularly in the San Joaquin Valley and adjacent foothills. As the storm progressed inland on October 25, it unleashed heavy rains and caused flash flooding, with snow levels above 9000 feet initially, then dropping to 6000 to 7000 feet, leading to substantial snowfall in the higher elevations. The system's impact was compounded by strong winds and thunderstorms but concluded with the precipitation and wind diminishing by the morning of October 26 as it moved eastward.
- **12/14/2021:** In mid-December, a potent low-pressure system from the Gulf of Alaska brought significant moisture to central California, leading to 2 to 4 inches of rain in the Sierra Nevada and causing widespread minor flooding and rockslides in the San Joaquin Valley and adjacent foothills. The storm's intensity resulted in heavy snowfall above 5500 feet, with snow levels dropping to 1500 feet, and strong winds that led to road closures and travel restrictions. High winds with gusts over 50 mph, and up to 70 mph near Grapevine, exacerbated the hazardous conditions, adding to the storm's impact on infrastructure and travel.
- **12/23/2021:** In late December, a deep upper trough delivered rain and snow to central California, with the Sierra Nevada receiving 1 to 3 inches of liquid precipitation and snow levels hovering between 8000 to 9000 feet. Rain shadow effects resulted in varying rainfall in the San Joaquin Valley, while cooler air later introduced showery conditions and lowered snow levels to 5500 feet.



High elevation areas estimated 18 to 24 inches of new snow before the weather system gradually receded.

- **12/10/2022:** In December, central California experienced a strong low-pressure system that brought substantial snowfall, accumulating 18 to 30 inches above 5000 feet and significant rain in the Sierra Nevada and foothills. Snow levels dropped to 3000 feet, leading to 3 to 6 inches of fresh snow in higher elevations and up to 5 inches of rain in lower areas, with the San Joaquin Valley and Tehachapi Mountains receiving up to an inch of rain. The system abated by midday on December 12 after diminishing the previous evening.
- **12/27/2022:** A potent low-pressure system traversing California on December 27 drew in substantial tropical moisture, causing widespread heavy rainfall and triggering a fatal rockslide in Yosemite National Park. The storm blanketed the higher Sierra Nevada with 18 to 30 inches of snow above 7500 feet, while the foothills and valleys received 1 to 1.5 inches of rain, leading to reports of nuisance flooding. Accompanying the precipitation, strong winds gusted over 40 mph in mountainous areas, amplifying the storm's impact before it subsided early on December 28.
- **12/31/2022:** At the close of December, a strong upper trough carrying tropical moisture swept through California, culminating in significant rainfall and flooding on the 31st, with many areas experiencing road closures. High winds battered the region, particularly the West Side Hills and Tehachapi Mountains, where gusts surpassed 60 mph, while lower Sierra Nevada elevations and adjacent foothills received 2 to 7 inches of rain. The intense precipitation added substantially to the existing snowpack, with high-elevation areas recording up to 30 inches of new snow, exacerbating the already heightened winter conditions.
- **1/05/2023:** In early January, an atmospheric river brought significant rainfall and snow, with 18 to 30 inches of snow above 8000 feet in the Sierra Nevada and extensive flooding in the San Joaquin Valley. The Tehachapi Mountains saw powerful wind gusts over 60 mph, causing damage and leading to numerous weather advisories. These events disrupted infrastructure due to the combined impact of heavy precipitation and strong winds.
- **1/09/2023:** A strong low-pressure system traversed central California on January 9 and 10, delivering 3 to 6 inches of rain in the Sierra Nevada and causing widespread flooding, with over 150 incidents reported. High snow levels resulted in significant runoff, while strong downslope winds caused power outages and damage; evacuations and road closures were necessary, including the inundation of Planada. The storm subsided by January 11, but the aftermath of flooding and wind damage persisted, prompting extensive emergency responses.
- **1/14/2023:** The system that swept through central California on January 14 delivered heavy rain and snow, with the Sierra Nevada receiving 2 to 4 inches of liquid precipitation and the foothills getting 1.5 to 3 inches. Snowfall accumulated 1.5 to 3 feet above 6000 feet elevation, with snow levels dropping to 4500 feet by evening. Flooding became the primary concern as the heavy rains fell on already saturated soils, exacerbating runoff from previous storms.
- **1/16/2023:** A subsequent storm on January 15-16 brought less precipitation but more wind damage to Central California, with gusts over 60 mph in the Tehachapi Mountains and West Side Hills causing power outages and tree falls. The San Joaquin Valley and Sierra foothills experienced wind gusts exceeding 40 mph, toppling power infrastructure, and blocking roads. The storm's effects persisted until January 17, with gradual wind reduction but persistent rainfall due to the already saturated ground from prior storms.
- **2/24/2023:** A potent low-pressure system moved down the California coast on February 24-25, bringing heavy precipitation and causing snow levels to drop dramatically, leading to significant snowfall and road closures in the mountains. The Sierra Nevada and adjacent areas received 1.5 to



3 inches of rain, while the snowfall at higher elevations ranged between 2 to 4 feet, resulting in extensive road closures. As the system passed, it caused flooding in the San Joaquin Valley and lower foothills, with the weather clearing as the low moved out of the area by the morning of February 26.

- **2/27/2023:** Another cold upper trough moved across central California on February 27 and 28 which resulted in another period of widespread precipitation across the area. The snow level was between 3000 and 4000 feet or much of this event which resulted in heavy snowfall for the Sierra Nevada where several SNOTELs picked up an estimated 2 to 3 feet of new snowfall. Below the snow line, much of the San Joaquin Valley picked up between a quarter to a half inch of additional rainfall over already saturated soil while the Sierra foothills picked up between a half inch and an inch of combined liquid precipitation. Several roads in the mountains remained closed because of the continued snowfall across the area. The precipitation ended by the morning of March 1 as a colder and drier airmass pushed into central California.
- **3/10/2023:** A deep moisture surge from the Pacific led to 4-8 inches of rain in the Sierra Nevada and significant flooding across the San Joaquin Valley and nearby foothills on March 9 and 10, exacerbated by high snow levels and saturated ground. Flash flood emergencies were declared in Tulare and Kern counties as runoff from the mountains threatened communities. Evacuations were enacted, and roads were shut down due to the extensive flooding and damage necessitating substantial repairs.
- **3/11/2023:** Following the departure of the warm and moist storm which produced widespread flooding across the area on March 9 and 10, another moist system moved through central California on March 11 and 12. While precipitation amounts were generally much lower with this system with most of the Sierra Nevada picking up between 1 and 2 inches of liquid precipitation and adjacent foothills picking up between a half inch and an inch of rainfall, the cooler unstable airmass on the back side of this system produced afternoon and evening thunderstorms across the lower elevations resulting in widespread flooding and wind damage across the San Joaquin Valley.
- **4/17/2023:** Increased releases at Pine Flat dam due to heavy snow melt runoff resulted in flooding near the Kings River downstream of Pine Flat Dam. The increased runoff produced flooding at Lindy's Landing campground near Reedley, and the Kings River Golf and Country Club near Kingsburg.
- **5/09/2023:** An upper trough moved across Central California on May 9. This system provided for enough instability for scattered thunderstorms to break out along the West Side Hills and the Sierra Nevada during the afternoon. One thunderstorm produced heavy rainfall near Coalinga which resulted in a brief closure of SR 198 just to the southwest of Coalinga as rocks and mud impacted the highway.
- **6/10/2023:** A strong closed upper low-pressure system approached the southern California coast on June 10. This system pushed a surge of moisture northward into central California and provided for enough instability for showers thunderstorms to develop across the area during the afternoon. While precipitation was generally light with most locations receiving less than a tenth of an inch, a few thunderstorms produced locally heavy rainfall. One thunderstorm produced localized roadway flooding in western Fresno County.



Table 31. Fresno County Flood Previous Occurrences

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Eastern Fresno County	December 1955	0	0	0	0	0
Interstate 5 West Fresno County	January 1995	0	~14 M	~8.6 M	7	0
Interstate 5 Kings River	1997	0	0	0	0	0
Fresno County	2/01/1998 – June 1998	0	458,000	17 M	0	0
City of Parlier	4/28/2005	0	700,000	0	0	0
Fresno / Clovis	12/19/2005 – 1/01/2006	0	1.4 M	0	0	0
Fresno County	4/05/2006	0	0	0	0	0
Huntington Lake	July 2006	0	0	0	0	0
Northwest Fresno	10/29/2007	0	500,000	0	0	0
Fresno Metropolitan Area	12/18/2007	0	175,000	0	0	0
Fresno / Visalia / Bakersfield	12/29/2010	0	125,000	0	0	0
Fresno County	11/30/2011	0	0	0	0	0
Raisin City	1/07/2017	0	0	0	0	0
Panoche Junction	1/20/2017	0	0	0	0	0
Herndon	2/03/2017	0	0	0	0	0
Meadow Lakes	2/07/2017	0	100,000	0	0	0
Squaw Valley	2/20/2017	0	0	0	0	0
Belmont Ave.	6/19/2017	0	0	0	0	0
Lakeshore	3/21/2018	0	0	0	0	0
Ora	10/03/2018	0	0	0	0	0
Chandler	11/21/2018	0	0	0	0	0
Oxalis	11/16/2018	0	0	0	0	0
Parlier	2/02/2019	0	0	0	0	0
Huron	2/14/2019	0	0	0	0	0
Friant	3/02/2019	0	0	0	0	0
Selma	5/26/2019	0	0	0	0	0
Sanger	5/29/2019	0	0	0	0	0
Piedra	6/01/2019	0	0	0	0	0
Melvin	12/08/2019	0	0	0	0	0
Malaga	12/22/2019	0	0	0	0	0
Lacjac	3/25/2020	0	0	0	0	0



Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Oro Loma	4/17/2020	0	0	0	0	0
Riverdale	5/18/2020	0	0	0	0	0
Oro Loma	1/28/2021	0	0	0	0	0
Old Fig Garden	10/25/2021	0	0	0	0	0
Clarks Corner	12/14/2021	0	0	0	0	0
Glorietta	12/23/2021	0	0	0	0	0
Clovis	12/10/2022	0	0	0	0	0
Big Creek	12/27/2022	0	0	0	0	0
Ockenden	12/31/2022	0	0	0	0	0
Coalinga	1/05/2023	0	0	0	0	0
Pine Ridge	1/09/2023	0	500,000	0	0	0
Herndon	1/14/2023	0	0	0	0	0
Alder Springs	1/16/2023	0	0	0	0	0
Three Forks	2/24/2023	0	1,000	0	0	0
Squaw Valley	2/27/2023	0	0	0	0	0
Hammond	3/01/2023	0	9,000	0	0	0
Squaw Valley	3/10/2023	0	0	0	0	0
Reedley	3/11/2023	0	0	0	0	0
Sanger	4/17/2023	0	0	0	0	0
Sanger	5/01/2023	0	0	0	2	0
Coalinga	5/09/2023	0	0	0	0	0
Coalinga	6/10/2023	0	0	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

LOCALIZED FLOODING

In addition to the major historical flood events described above, as previously described, the Fresno County planning area remains at risk of annual localized flooding.

LEVEE FAILURE PAST OCCURRENCE

- February 18, 2017:** Dry weather debilitated a levee located in the Fresno Slough, where the San Joaquin River and Kings River meet. The levee experienced several small breaks for a few days, posing a danger to nearly 80 homes in the vicinity, forcing hundreds of people to evacuate. Repairs and monitoring led by Fresno County Public Works and Emergency Management stopped the levee breach.
- June 22, 2017:** A 15-foot-wide breach opened along the Kings River, leading to mandatory evacuations. The Kings River began to flood 25 miles north of Fresno. The levee failure occurred after a prolonged period of warmer-than-average temperatures led to a surge in snowmelt from the nearby Sierra Nevada Mountains.



- **March 27, 2023:** A levee broke near Floral Avenue and Highway 145 south of Kerman Monday morning. According to a news report, no structures were threatened by the water and the land is all for agricultural use.²⁰

LIKELIHOOD OF FUTURE OCCURRENCES

Likely - Based on historical data, it is likely that flood events will occur in the future.

CLIMATE CHANGE CONSIDERATIONS

Overall, Increasing, and warmer rainfall and less snow from major storms will result in decreasing and shifting snowmelt to earlier in the season and most snow melting by early spring are expected. Freezing elevations in the San Joaquin River will increase and snow accumulation decreasing.

Heavy precipitation events that lead to flooding occur at the short-term time scales of weather, rather than the multi-year time scales of climate that most climate models examine. However, extreme events are, by their very nature, uncommon. New research suggests that by the end of the century, due to climate change impacts, storms will generate 200 to 400 percent more water flow in the Sierra Nevada mountains due to increased precipitation in the form of rain and not snow. The study suggests that some locations could get over 100 inches of water in a month period plus the snow accumulation in higher elevations. This would have major impacts in Central Valley.²¹ According to the Central Valley Flood Protection Plan 2022, by 2072 climate change is predicated to increase peak flood flows up to five times in the Central Valley compared to past recorded events. The Central Valley already has one of the highest flood risks in the United States and is anticipated to increase, devastating properties, communities, and the agricultural industry. While the climate is warming, extreme weather events such as atmospheric rivers, the primary source of major flooding, will become more intense as they become wetter, longer, and wider, increasing their potential to cause catastrophic events.

Within the State of California, including the San Joaquin Valley, projections show that rainstorms during the wet winter months will likely become more extreme, with more water falling in shorter periods of time and potentially creating flood. Increased rainfall causes floods when rain falls on top of snow in the mountains. The resulting rapid snowmelt has historically been a reason for major floods.²²

Globally, precipitation extremes and their hydrological impacts (e.g., the magnitude of 100-year floods) are expected to get larger because in most places, higher temperatures will result in increased atmospheric water vapor available to form precipitation. The 100-year flood of today might become a more frequent event in the future (i.e., a 50-year event), meaning that current design levels and regulatory practices might be less adequate in the future.

²⁰ <https://kmph.com/news/local/levee-breaks-monday-morning-along-hwy-145-in-eastern-fresno-county-san-joaquin-helm-kerman>

²¹ <https://www.yourcentralvalley.com/digital-exclusive/fresno-would-be-underwater-warns-ucla-catastrophic-flood-study/>

²² https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Flood-Management/Flood-Planning-and-Studies/Central-Valley-Flood-Protection-Plan/Files/CVFPP-Updates/2022/a0000-CVFPP_U22_layout_Highlights_vFINAL_online.pdf

HUMAN HEALTH HAZARDS: EPIDEMIC/PANDEMIC

HAZARD/PROBLEM DESCRIPTION

Epidemics occur when an infectious disease spreads beyond a local population, lasting longer and reaching people in a wider geographical area. When that disease reaches global proportions, it is considered a pandemic. Pandemics are large-scale outbreaks of infectious disease that can greatly increase morbidity and mortality over a wide geographic area and cause significant economic, social, and political disruption. The most recently pandemic, Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) as known as COVID-19, resulted in an unprecedented global health crisis which significantly impacted all sectors and communities. Several factors determine whether an outbreak will explode into an epidemic or pandemic: the ease with which a microbe moves from person-to-person and the behavior of individuals and societies.

A pandemic flu occurs when a new influenza virus emerges for which people have little or no immunity, and for which there is no vaccine. This disease spreads easily person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. In continuation to the efforts made during the COVID-19 pandemic, the U.S. Centers for Disease Control and Prevention (CDC) has been working closely with other countries and the World Health Organization to strengthen systems to detect outbreaks of influenza that might cause a pandemic and to assist with future pandemic planning and preparation.

Pandemics can last for a long period of time, encompassing a several years, compared to other natural hazards. The recent COVID-19 pandemic lasted for 3 years, from January 2020-May 2023, with the ending of the emergency proclamation. While pandemics may end, the virus still circulates. For example, the Spanish Flu that caused a pandemic in early 1900s is now the seasonal flu. The COVID-19 and its variants are still persistent globally and new variations continue to evolve. The Pandemic Intervals Framework (PIF) describes the progression of an influenza pandemic using six intervals described in **Table 32. CDC Pandemic Intervals Framework (PIF)**.

AVIAN INFLUENZA

Due to the possibility that bird flu viruses could mutate and gain the ability to spread easily between people, avian influenza poses a significant pandemic threat to birds and humans. The U.S. Centers for Disease Control and Prevention (CDC) has been monitoring for illness among humans exposed to infected birds. Historical HPAI outbreaks have occurred all around the world since 1878 when it was first discovered in Northern Italy. HPAI continued to spread throughout the 20th century and in 1996 a new strain of HPAI subtype H5N1 was introduced to poultry in the Guangdong province of China resulting a mortality of greater than 40 percent in aquatic birds. In 2003, two humans were diagnosed with HPAI H5N1 after returning from China and human cases continued to be reported resulting in hundreds of deaths. However, bird flu transmission from human-to-human is very rare and when it has occurred it has only spread to a few people. While the transmission from human to human is rare, the pandemic risk associated with HPAI is high due to the rapid mutations and increased risk of HPAI spillover from poultry to humans is a cause for significant concern. Recently, HPAI outbreaks have occurred in the United States in 2022 and 2023. While no human-to-human transmission has occurred with avian influenza that is currently circulating in the U.S., the CDC is closely monitoring to indicate increased risk of infection for the general public.²³

²³ <https://asm.org/articles/2022/july/avian-influenza-past,-present,-future>

Table 32. CDC Pandemic Intervals Framework (PIF)

Interval Number	Interval Name	Description
1	Investigation	Investigation of cases of a novel influenza A virus infection in humans. Public health actions focus on targeted monitoring and investigation.
2	Recognition	Recognition of increased potential for ongoing transmission of a novel influenza A virus. public health actions focus on control of the outbreak, including treatment of sick persons.
3	Initiation	Initiation of a pandemic wave. A pandemic occurs when people are easily infected with a novel influenza A virus that has the ability to spread in a sustained manner from person-to-person
4	Acceleration	The acceleration (or “speeding up”) is the upward epidemiological curve as the new virus infects susceptible people. Public health actions at this time may focus on the use of appropriate non-pharmaceutical interventions in the community (e.g. school and child-care facility closures, social distancing), as well the use of medications (e.g. antivirals) and vaccines, if available. These actions combined can reduce the spread of the disease and prevent illness or death.
5	Deceleration	The deceleration (or “slowing down”) happens when pandemic influenza cases consistently decrease in the United States. Public health actions include continued vaccination, monitoring of pandemic influenza A virus circulation and illness, and reducing the use of non-pharmaceutical interventions in the community (e.g. school closures).
6	Preparation	When pandemic influenza has subsided, public health actions include continued monitoring of pandemic influenza A virus activity and preparing for potential additional waves of infection. It is possible that a 2nd pandemic wave could have higher severity than the initial wave.

Source: CDC

It has long been recognized that human influenza viruses and the like occur in temperate climate during the winter season and have low activity during the summer months. The onset of pandemics is likely to occur during the winter months as the weather becomes colder and more and more people congregate inside with poor indoor air quality. Additionally, ongoing pandemics are likely to increase in activity around the winter months for similar reasons as experienced with the COVID-19 pandemic.

Pandemics can occur relatively quickly, usually over several months, but comparatively to natural hazards, it can be a long time. However, the first deaths from a pandemic will not be known until perhaps weeks after infection, delaying response from public health and government leaders. The spread of disease can occur rather quickly due to international transportation such as air travel. The World Health Organization is responsible for closely monitoring infectious disease on a global scale, its activity, and spread. There are different thresholds that define the spread of disease by scale described in **Table 33. Infectious Disease Severity and Scale**.

Table 33. Infectious Disease Severity and Scale

Term	Definition
Outbreak	An outbreak is an occurrence of cases of disease that is more than expected, or cases clustered by time, space, or common behaviors.

Term	Definition
Epidemic	Epidemic is described as an unexpected increase in the number of disease cases in a specific geographical area.
Endemic	A disease outbreak is endemic when it is consistently present but limited to a particular region. This makes the disease spread and rates predictable.
Pandemic	An epidemic that has spread over several countries or continents and affects many people.

Source: WHO

Pandemics in nature are destructive, causing major disruptions to the economy, the public health and health care system, and population health. Pandemic impacts are not felt equally across populations, certain populations including people of color, children, the elderly, individuals with disabilities, and individuals with chronic health conditions. Previously, the magnitude of a pandemic was measured by the Pandemic Severity Index (PSI) which has been phased out by the Pandemic Severity Assessment Framework (PFAS). There are two main factors that can be used to determine the impact of a pandemic and guide decisions.

1. **Clinical Severity:** how serious is the illness associated with the infection.
2. **Transmissibility:** how easily the pandemic virus spreads from person-to-person.

Guidance from the CDC states that health officials should perform at least two assessments when using the PSAF. The first assessment is appropriately called an “initial assessment,” and health officials should complete this assessment early on during a pandemic. At this point, activity may be detected in pockets or certain communities across the country so information and understanding about the pandemic virus may be limited. The initial assessment is intended to help health officials develop a preliminary understanding of the potential impact of the pandemic. Once quality data becomes available, health officials can perform a “refined assessment” which provides a more detailed and accurate picture of pandemic impact, including assessments of the impact by age group. **Table 34. CDC Pandemic Severity Assessment Framework (PFAS)** describes scaled measures of transmissibility and clinical severity for refined assessments of pandemic influenza effects.

Table 34. CDC Pandemic Severity Assessment Framework (PFAS)

Parameter No. and Description ²⁴	Scale						
	1	2	3	4	5	6	7
Transmissibility							
Symptomatic attack rate, community, %	<10	11-15	16-20	21-24	>25	-	-

²⁴ ²⁴ Reed, Carrie, Matthew Biggerstaff, Lyn Finelli, Lisa M. Koonin, Denise Beauvais, Amra Uzicanin, Andrew Plummer, Joe Bresee, Stephen C. Redd, and Daniel B. Jernigan. “Novel Framework for Assessing Epidemiologic Effects of Influenza Epidemics and Pandemics - Volume 19, Number 1—January 2013 - Emerging Infectious Diseases Journal - CDC.” Accessed August 28, 2023. <https://doi.org/10.3201/eid1901.120124>.

Parameter No. and Description ²⁴	Scale						
	1	2	3	4	5	6	7
Symptomatic attack rate, school, %	<20	21-25	26-30	31-35	>36	-	-
Symptomatic attack rate, workplace, %	<10	11-15	16-20	21-24	>25	-	-
Household secondary attack rate, symptomatic, %	<5	6-10	11-15	16-20	>21	-	-
R ₀ : basic reproductive number	<1.1	1.2-1.3	1.4-1.5	1.6-1.7	>1.8	-	-
Peak % outpatient visits for influenza-like illness	1-3	1-3	1-3	1-3	1-3	-	-
Clinical Severity							
Case-fatality ratio, %	<0.02	0.02-0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	>1
Case-hospitalization ratio, %	<0.5	0.5-0.8	0.8-1.5	1.5-3	3-5	5-7	>7
Ratio, deaths: hospitalization, %	<3	4-6	7-9	10-12	13-15	16-18	>18

Source: CDC

Federal, state, and local public health agencies provide instructions to all organizations and individuals based on the severity of a pandemic and the infectious diseases' transmission methods. The worst-case scenario for the City of Carson would be a disease with high clinical severity (7) and high transmissibility (5) in the CDC's PSAF.

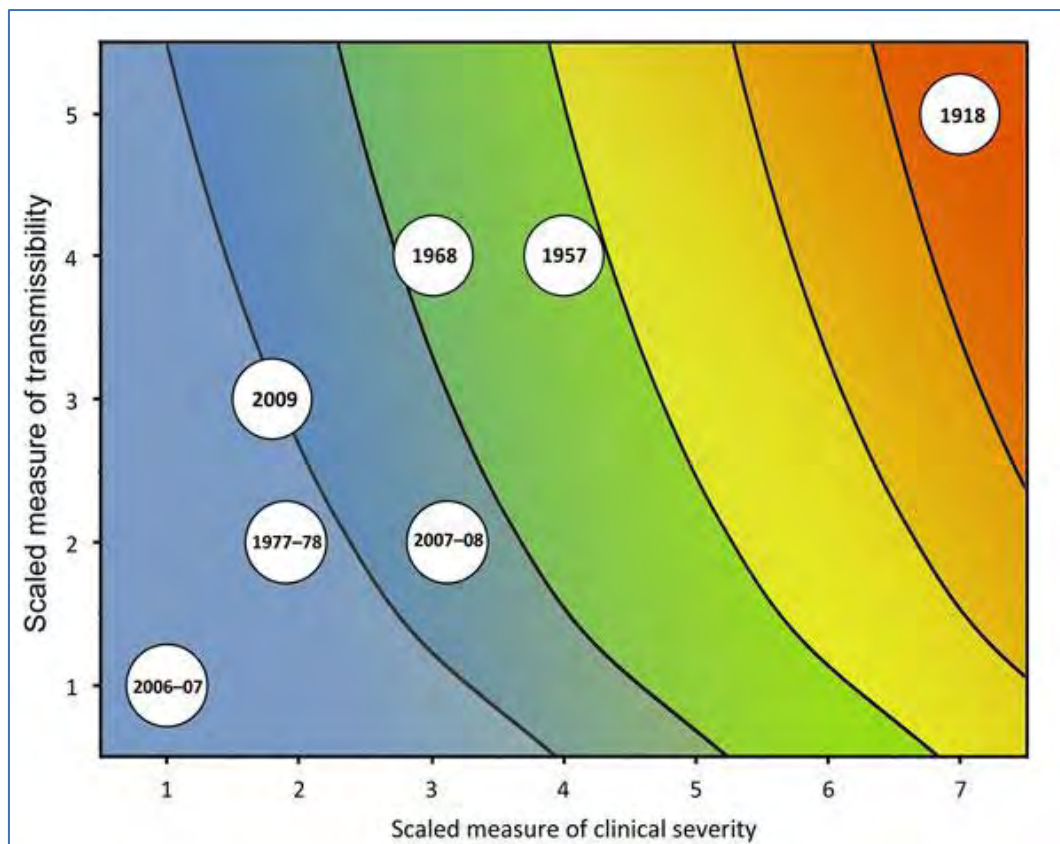
EXTENT

Large - An especially severe influenza pandemic could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Since the hazard can affect 50-100 percent of the planning area it was given an extensive geographic extent rating.

PAST OCCURRENCES

Since 1918, there have been six epidemics or pandemics over the span of 105 years. Using the PSAF developed by the CDC, each prior epidemic or pandemic has been measured by their transmissibility and clinical severity score shown in **Figure 25. Previous Pandemics and Epidemics using PSAF** and text below.

Figure 25. Previous Pandemics and Epidemics using PSAF



Source: CDC

- 1918-19 Spanish flu (H1N1):** This flu is estimated to have sickened 20-40 percent of the world's population. Over 20 million people lost their lives. Between September 1918 and April 1919, 500,000 Americans died. The flu spread rapidly; many died within a few days of infection, others from secondary complications. The attack rate and mortality were highest among adults 20-50 years old; the reasons for this are uncertain. By late September 1918, over 35,000 people throughout California had contracted influenza. According to state officials, influenza was most prevalent in the southern part of California, but the death toll was high across the state.
- 1957-58 Asian flu (H2N2):** This virus was quickly identified due to advances in technology, and a vaccine was produced. Infection rates were highest among school children, young adults, and pregnant women. The elderly had the highest rates of death. A second wave developed in 1958. In total, there were about 70,000 deaths in the United States. Worldwide deaths were estimated between 1 and 2 million.



- **1968-69 Hong Kong flu (H3N2):** This strain caused approximately 34,000 deaths in the United States and more than 700,000 deaths worldwide. It was first detected in Hong Kong in early 1968 and spread to the United States later that year. Those over age 65 were most likely to die. This virus returned in 1970 and 1972 and still circulates today.
- **2009 H1N1 flu:** This new H1N1 virus was first detected in the United States and has genes not previously identified in people or animals. From April 2009 – April 2010, the CDC estimates about 60.8 million cases, 274,304 hospitalizations and 12,469 deaths in the United States. About 151,700 to 575,400 people worldwide are estimated to have died from the flu, and most deaths occurred in people under age 65. This is because younger people were less likely to have had prior exposure to a similar H1N1 virus, unlike older generations.
- **2019 COVID-19 Pandemic:** The coronavirus disease 2019 (COVID-19) pandemic is a global outbreak of coronavirus – an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The pandemic caused millions of deaths, hospitalizations, and infections across the United States and even more globally. Cases of novel coronavirus (nCoV) were first detected in China in December 2019, with the virus spreading rapidly to other countries across the world. This led WHO to declare a Public Health Emergency of International Concern (PHEIC) on January 30, 2020, and to characterize the outbreak as a pandemic on 11 March 2020. On March 13, 2020, the President declared the ongoing Coronavirus Disease 2019 (COVID-19) pandemic of sufficient severity and magnitude to warrant an emergency declaration for all states, tribes, territories, and the District of Columbia pursuant to section 501 (b) of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, 42 U.S.C. 5121-5207 (the “Stafford Act”). The emergency declaration lasted until May 2023.

THE COVID-19 PANDEMIC

The most recent and notable pandemic that has occurred is the COVID-19 pandemic which has been the deadliest pandemic in history. On March 11, 2020, The World Health Organization (WHO) officially declared the Coronavirus disease 2019 (COVID-19) outbreak a pandemic due to the global spread and the severity of the disease. COVID-19 is a respiratory illness that can spread from person to person and is highly contagious. Soon after, stay-at-home orders were issued across the country to keep people safe against contracting the virus, then COVID-19 testing sites opened and were a critical tool in informing individuals if they had COVID-19 or not in order to minimize and reduce the spread of the virus.

December 2020 marked a historical moment in the pandemic as COVID-19 vaccines were developed to be distributed under emergency use to protect people against adverse health effects from COVID-19, especially for older adults, who were passing at a higher rate than other age groups. The pandemic response efforts expanded into vaccine distribution and administration. In the beginning of the vaccine response, due to high demand and low supply, vaccine was prioritized for older adults, healthcare workers and other groups that were identified as high risk by state and local health departments.

Since 2020, the virus has mutated, and different variants have emerged throughout the three years since the beginning of the pandemic. Some symptoms of COVID-19 include cough, difficulty breathing, fever, fatigue, muscle pain, and loss of taste or smell. Severe cases resulted in hospitalizations, death, or chronic conditions from long-COVID. Individuals at high risk of adverse health outcomes included the elderly, people with underlying medical conditions and those who are immunocompromised.

The pandemic highlighted existing health disparities among communities resulting in disproportionate impacts in COVID-19 case rates, hospitalizations, and deaths. Those without health insurance and

access to healthcare, people of color, people with disabilities, and low socioeconomic status bared the burden of COVID-19 from physical impacts in contracting the virus to financial burdens such as unemployment. ²⁵

Specifically in the state of California, people of color and low-income communities were disproportionately impacted by COVID-19 as case, hospitalizations, and deaths rates were significantly higher. According to the California's COVID-19 disparity data, death rate for Latino people is 8 percent higher than the rate for all Californians, case rate for Pacific Islander people is 82 percent higher, death rate for black people is 19 percent higher, and case rate for communities' median income less than \$40,000 is 14 percent higher. ²⁶Due to the COVID-19 emergency declaration ending in May of 2023, there has been a sharp decrease in COVID-19 reporting and surveillance, especially at the local level. As of May 2023, there have been 12,251,820 COVID-19 cases and 111,554 deaths since the start of the pandemic in California State. Within Fresno County, as of May 2023, there have been 333,200 COVID-19 cases and 2,909 deaths.

LIKELIHOOD OF FUTURE OCCURRENCES

Possible— Due to the recent COVID-19 pandemic, there have been studies trying to understand and predict how likely a similar pandemic is to occur in the future and we can better prepare for the next one. According to one study, the probability of a pandemic similar to COVID-19 is about a two-percent chance of occurring in any year. Based on the increasing rate at which novel pathogens such as SARS-CoV-2 have broken loose in human populations in the past 50 years, the study estimates that the probability of novel disease outbreaks will likely grow three-fold in the next few decades.

Historical modeling suggests that the frequency and severity of epidemics caused by zoonotic disease are increasing, driven by human activities and their impact on the environment. They estimate that the probability of a future zoonotic event resulting in a pandemic of COVID-19 magnitude or larger is between 2.5-3.3 percent annually. In other words, there is a 22-28 percent chance that another outbreak on the magnitude of COVID-19 will occur within the next 10 years, and a 47-57 percent chance that it will occur within the next 25 years. It is likely for a future epidemic or pandemic occurring and impacting the planning area in a similar manner as the COVID-19 pandemic.

CLIMATE CHANGE CONSIDERATIONS

This is overwhelming evidence that climate change is fueling disease outbreaks and epidemics and that it is not a matter of if, but when. Climate change can influence the risk of disease outbreak through several ways both directly and indirectly. These include the slow rise in temperatures, changes in environmental conditions that increase the dispersal of disease vectors such as mosquitos, rodents, and ticks; and the sudden appearance of extreme events such as floods, which can contaminate drinking water sources and trigger the displacement of humans and animals, which can carry and transmit pathogens.

Climate conditions can influence the spread of infectious diseases, and changes to these conditions can lead to new patterns. Temperature differences can affect where insect populations live and the diseases they may carry. Insects such as fleas, ticks, and mosquitoes can carry diseases like Lyme,

²⁵ Inequity and the Disproportionate Impact of COVID-19 on Communities of Color in the United States: The Need for a Trauma-Informed Social Justice Response - PMC (nih.gov) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8243721/>

²⁶ <https://covid19.ca.gov/equity/>



West Nile, malaria, and Zika. Additionally, changes in climate can increase the likelihood of new viruses occurring or mutating in different animal species and infecting humans. Many countries across the world have experienced new outbreaks in infections varying from mosquito-borne dengue virus and chikungunya virus infection. In addition to the impacts from climate change, extreme climate events and disasters can increase the rise in epidemics. For example, a major flood event can cause the spread of infectious diseases such as cholera. ²⁷

²⁷

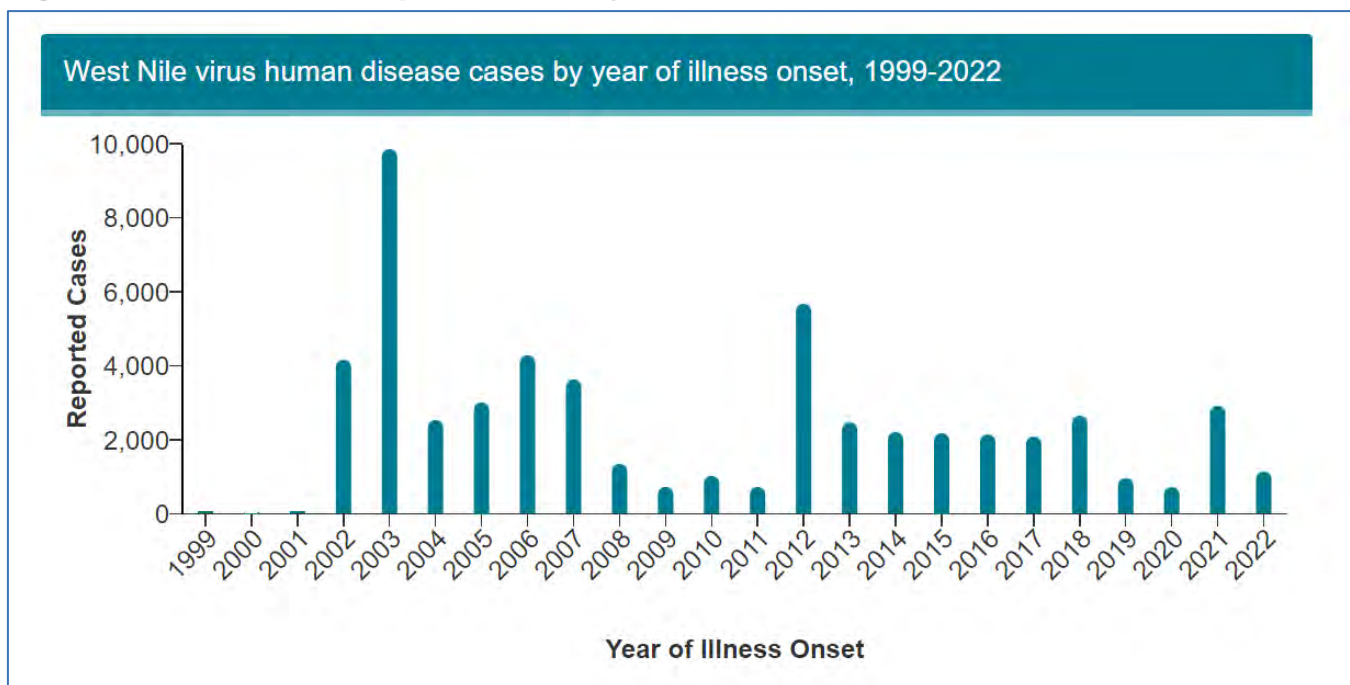
<https://www.science.org/doi/10.1126/science.adk4500#:~:text=However%2C%20there%20is%20overwhelming%20evidence,diseases%2C%20both%20directly%20and%20indirectly.>

HUMAN HEALTH HAZARDS: WEST NILE VIRUS

HAZARD/PROBLEM DESCRIPTION

The impact to human health that wildlife, and more notably, insects, can have on an area can be substantial. Mosquitoes transmit the potentially deadly West Nile virus to livestock and humans alike. West Nile virus first struck the western hemisphere in Queens, New York, in 1999 and killed four people. Since then, the disease has spread across the United States. The highest number of reported cases were in 2003 and 2012 from 1999-2022. Since 1999, there have been 56,575 cases, 25,777 hospitalizations, and 2,776 deaths. West Nile Virus cases from 1999 to 2022 are described in **Figure 26. U.S. West Nile Reported Cases by Year.**

Figure 26. U.S. West Nile Reported Cases by Year



Source: CDC

In assessing this hazard, the HMPC also discussed Zika virus, which is recently invasive, with the first reported cases in the U.S. occurring in Florida during the summer of 2016, and 5102 Zika cases reported across all 50 states by the end of 2016.

Most humans infected by the West Nile virus have no symptoms. A small proportion develop mild symptoms that include fever, headache, body aches, skin rash, and swollen lymph glands. Less than 1 percent of those infected develop more severe illnesses such as meningitis or encephalitis, symptoms of which include headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. Of the few people who develop encephalitis, fewer than 1 out of 1,000 infected dies as a result. People over 50 and those with compromised immune systems are the most vulnerable to the virus. Those with Zika virus are highly unlikely to develop serious illness requiring a hospital visit, however Zika virus can cause severe brain defects in infants such as microcephaly along with other morbidity including miscarriage, stillbirth, and other types of birth defects.



There is no specific treatment for Zika or West Nile virus infection, nor a vaccine to prevent the viruses. Treatment of severe illness includes hospitalization, use of intravenous fluids and nutrition, respiratory support, prevention of secondary infections, and good nursing care. Medical care should be sought as soon as possible for people who have symptoms suggesting severe illness. People over 50 years of age appear to be at high risk for the severe aspects of the disease.

The West Nile virus is a concern in the Fresno County planning area in part because of the agricultural nature of the County and the large areas of standing water created through farming operations. Excess standing water provides a breeding area for mosquitoes. Also contributing to the mosquito population in the County are the beaver dams and ponds, which are large pools of standing water. The Zika virus is of minimal concern to the County given that there is no record of Zika virus being transmitted in or near Fresno County.

Within the Fresno County planning area, several mosquito abatement and control districts operate to prevent the spread of the virus through focused efforts on reducing the mosquito population and educating the public. Several types of preventive methods lower mosquito populations to levels that reduce chances for the spread of disease. The County also has an active surveillance program and maintains records for all identified cases of the virus.²⁸

EXTENT

Large - An especially severe mosquito-borne illness outbreak could lead to high levels of illness, death, social disruption, and economic loss. Impacts could range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Since the hazard can affect 50-100 percent of the planning area it was given an extensive geographic extent rating.

PAST OCCURRENCES

The virus first appeared in California in 2002 with the identification of one human case. In 2003, three human cases occurred in California, and the virus was detected in six southern California counties. By 2004, the virus was in all 58 counties in California; 830 human infections were identified. Since 2003, there have been more than 7,500 human cases and over 300 deaths reported in California. Recently, the Fresno County Department of Public Health has confirmed its first human death this year caused by West Nile Virus in November 2023.²⁹ **Table 35. California West Nile Cases by Year** shows West Nile cases in humans, birds, mosquitos, horses, and sentinel flock.

Table 35. California West Nile Cases by Year

Year	Humans		Birds		Mosquitos		Horse		Sentinel Flock	
	CA	FC	CA	FC	CA	FC	CA	FC	CA	FC
2004	830	15	3,232	116	1,136	14	540	21	805	25
2005	935	68	3,046	97	1,242	71	456	33	1,053	85

²⁸ <https://www.fresnocountyca.gov/Departments/Public-Health/Community-Health/Communicable-Disease-Investigation-Program/Mosquito-Borne-Illness>

²⁹ <https://abc30.com/west-nile-virus-death-fresno-county-mosquito-sickness/14003501/>

4. Risk Assessment



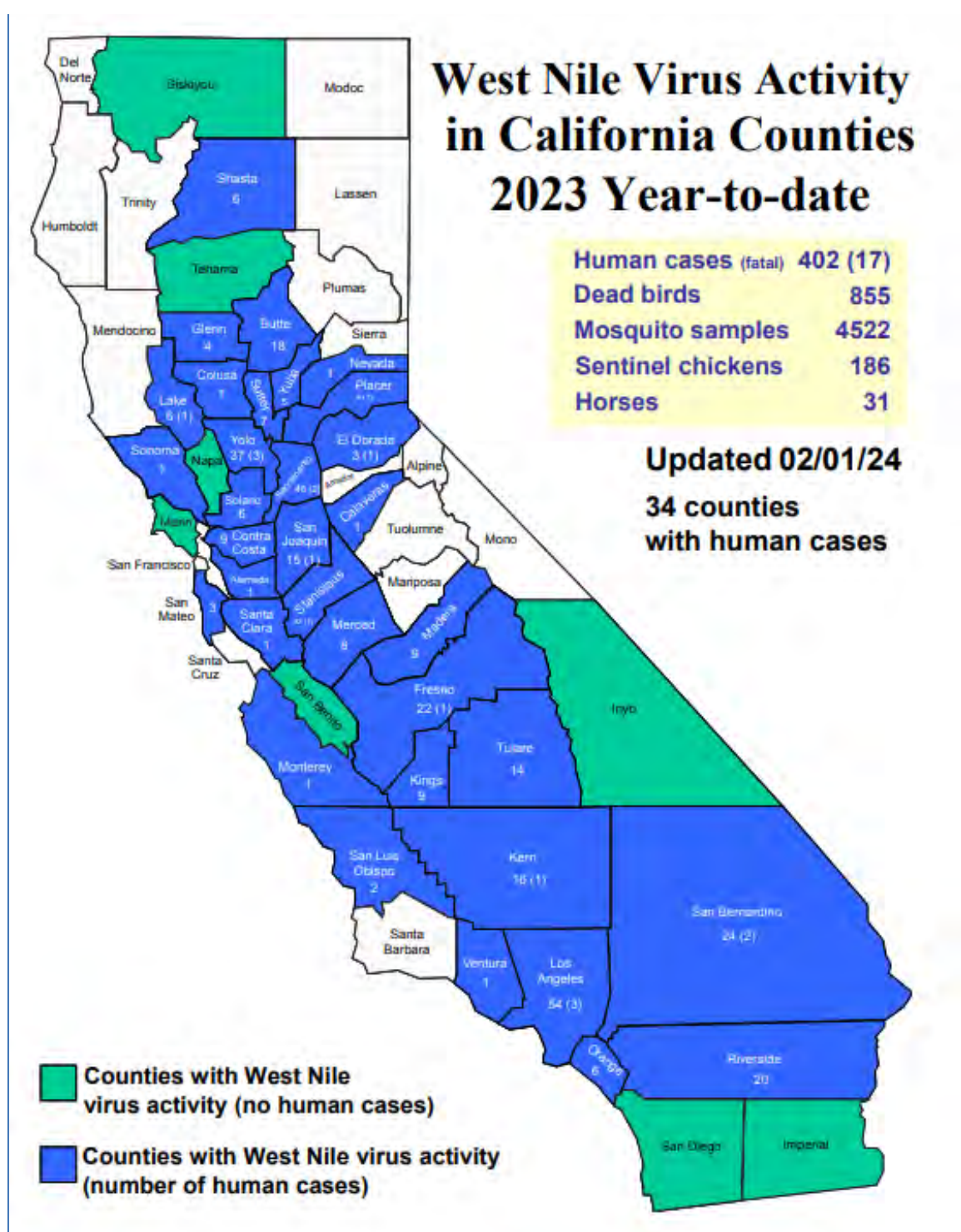
Year	Humans		Birds		Mosquitos		Horse		Sentinel Flock	
	CA	FC	CA	FC	CA	FC	CA	FC	CA	FC
2006	278	11	1,446	2	832	40	58	5	640	37
2007	380	17	1,395	114	1,007	61	28	1	510	46
2008	445	3	2569	44	2,003	53	32	1	585	24
2010	111	23	416	22	1,305	130	19	4	281	7
2011	158	9	688	15	2,087	123	15	5	391	0
2012	479	24	1,644	25	2,849	147	22	3	540	0
2013	379	7	1,251	12	2,528	66	23	N/A	458	0
2014	801	43	2,442	9	3,304	138	15	2	443	0
2015	782	8	1,349	3	3,329	108	19	N/A	449	0
2016	442	14	1,352	6	3,528	185	21	2	343	0
2017	87	1	264	3	2,545	136	21	1	155	0
2018	217	14	501	0	1,963	N/A	11	N/A	163	N/A
2019	225	51	226	10	3,288	N/A	15	N/A	139	N/A
2020	235	10	343	5	2,628	322	20	N/A	144	N/A
2021	129	14	210	0	2,263	219	13	2	90	N/A
2022	207	30	189	2	3,165	296	16	N/A	145	N/A
2023	397	22	855	1	4,512	232	31	2	186	N/A

Source: California West Nile Virus Web Site, www.westnile.ca.gov/

*As of January 25, 2024

West Nile virus activity in California (and Fresno County) for 2023 year to date is illustrated in **Figure 27. California West Nile Cases by County.**

Figure 27. California West Nile Cases by County



Source: WestNile.ca.gov



The Zika Virus is another well-known virus that, along with the West Nile Virus, is a mosquito-borne disease. These viruses are transmitted to humans through mosquito bites. Unlike the West Nile Virus, the Zika virus is primarily transmitted by Aedes mosquitoes while the West Nile Virus is transmitted by Culex mosquitoes. From 2015 to March 2024, there have been 761 total Zika Virus infections in the State of California. **Table 36. Fresno County Zika Cases (2015-2024)** shows the number of cases for Fresno County from 2015 to 2024.

Table 36. Fresno County Zika Cases (2015-2024)

County	2015-2016	2017	2018	2019	2020	2021	2022	2023	2024
Fresno County	7	1	0	0	0	0	0	0	0

LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely—Based on historical data, the Fresno County planning area has experienced 384 human cases of West Nile virus since 2004. This is an average of 19 cases per year. The agricultural nature of much of the planning area combined with the great potential for standing water to be present throughout the County puts the planning area at future risk of West Nile virus.

Likelihood of Zika virus transmission is very low due to several factors, including mosquito abundance, number of travels associated cases, population, and distance from the U.S.-Mexico border. Taking these factors into consideration, CDPH concludes that current conditions in Fresno County present a very low risk for local transmission. As a result, vulnerability to Zika virus is not considered further.

CLIMATE CHANGE CONSIDERATIONS

In the aftermath of the 2015 pandemic of Zika virus (ZIKV), concerns over links between climate change and emerging arboviruses have become more pressing. Milder weather in the current “cold” seasons and warmer weather in the summer could make the county a more suitable habitat for new mosquito species, increasing the potential for additional cases of some mosquito-borne diseases that are already established in the county. At the same time, increases in the precipitation associated with extreme events could increase the habitat suitable for supporting mosquitoes. Drawing definitive conclusions about public health risk changes associated with vector-borne illnesses as a result of climate change are complicated by the need to also account for any associated changes in human behavior that would accompany the associated impacts to seasonal and daily weather conditions. For example, increased temperatures could result in more time spent indoors during extreme heat days, which could potentially reduce exposure to disease carrying vectors. In 2023, the World Health Organization (WHO) warned that climate change is causing a surge in Mosquito-Borne diseases. WHO cited a study which finds the incidence of infection caused by mosquito-borne illnesses which thrive in tropical and subtropical climates, have grown dramatically in recent decades. While globally, Zika cases are declining from its peak in 2015, 2016, and 2017, down to about 30-40,000 reported cases every year which occur mostly in the United States, Zika is still circulating and a threat as our climate changes.³⁰

³⁰ <https://www.voanews.com/a/who-warns-climate-change-causing-surge-in-mosquito-borne-diseases/7043700.html>

LANDSLIDE

HAZARD/PROBLEM DESCRIPTION

Landslides refer to a wide variety of processes that result in the perceptible downward and outward movement of soil, rock, and vegetation under gravitational influence. Common names for landslide types include slump, rockslide, debris slide, lateral spreading, debris avalanche, earth flow, and soil creep. Landslides may be triggered by both natural and human-induced changes in the environment that result in slope instability.

The susceptibility of an area to landslides depends on many variables, including steepness of slope, type of slope material, structure and physical properties of materials, water content, amount of vegetation, and proximity to areas undergoing rapid erosion or changes caused by human activities. These activities include mining, construction, and changes to surface drainage areas.

Landslides often accompany other natural hazard events, such as floods, wildfires, or earthquakes. Landslides can occur slowly or very suddenly and can damage and destroy structures, roads, utilities, and forested areas and cause injuries and death.

Landslides are often triggered by precipitation and as a result are sensitive to local climate conditions. Due to climate change, precipitation patterns worldwide and therefore will likely have a strong influence on landslide activity in the next couple of decades. A study found that during 2015 to 2020 that landslides in both the wet regions in northwestern California and dry regions in southern California moved faster than average during wet years and slower than average during dry years.³¹ The warning time for hazards such as landslides and debris flow are often very short and may occur very quickly. Identifying the area in which these events are likely to occur can assist with hazard preparedness when triggering types of events like heavy rainfall occurs. However, in some cases, landslides can occur very slowly, even extremely slowly and building on these landscapes may remain in use for hundreds of years with only minimal damage and repair costs.³²

The severity of a landslide or mudflow depends on many factors including local bedrock, soil conditions, moisture content, slope, and vegetation. Landslide velocities vary over ten orders of magnitude from extremely slow (a few millimeters a year) to extremely rapid (more than 5 millimeters a second), shown in **Table 37. Landslide Velocity Class**. Many human activities can make the earth's materials less stable, therefore increasing the chance of ground failure. Human activities contribute to soil instability through grading of steep sloped or overloading them with artificial fill, by extensive irrigation, construction of impermeable surface, excessive groundwater, withdrawal, and removal of stabilizing vegetation. Some of the natural non-seismic causes of ground instability include heavy rainfall and poor-quality natural materials.

Table 37. Landslide Velocity Class

Velocity Class	Description	Velocity (mm/s)	Typical Velocity	Response
7	Extremely Rapid	5×10^3	5 m/s	N/A
6	Very Rapid	5×10^1	3 m/min	N/A

³¹ Handwerger, Alexander L., et al. "Landslide sensitivity and response to precipitation changes in wet and dry climates." *Geophysical Research Letters*, vol. 49, no. 13, 2022, <https://doi.org/10.1029/2022gl099499>.

³² Social and environmental impacts of landslides | Innovative Infrastructure Solutions (springer.com) <https://link.springer.com/article/10.1007/s41062-018-0175-y>



Velocity Class	Description	Velocity (mm/s)	Typical Velocity	Response
5	Rapid	5×10^{-1}	1.8 m/h	Evacuation
4	Moderate	5×10^{-3}	13 m/month	Evacuation
3	Slow	5×10^{-5}	1.6 m/year	Maintenance
2	Very	5×10^{-7}	16 mm/year	Maintenance
1	Extremely Slow			N/A

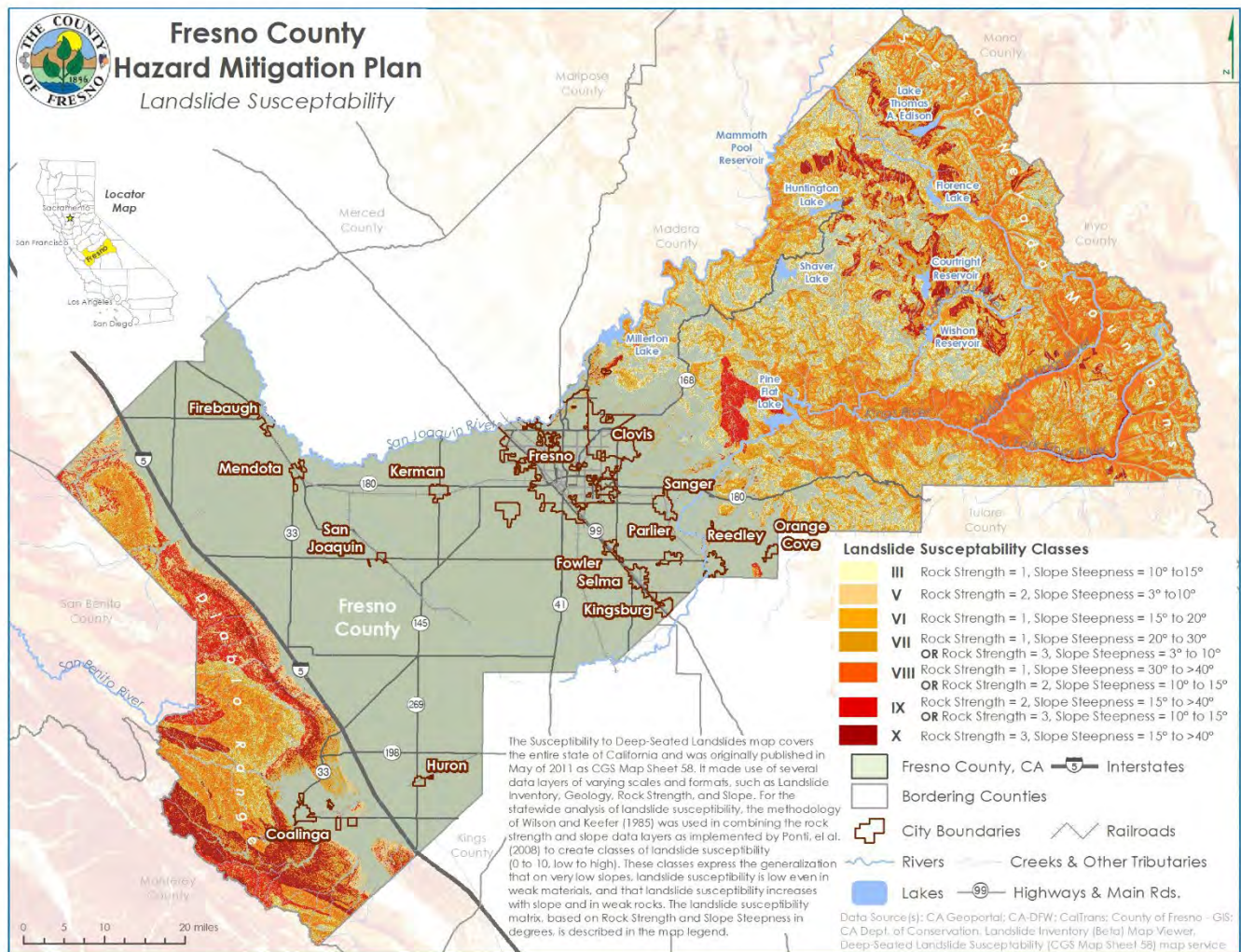
Source: WP/WLI 1995 and Cruden and Varnes 1996

EXTENT

The Fresno County General Plan Background Report describes areas in Fresno County that are particularly prone to landslides. Landslide hazard areas include foothill and mountain areas where fractured and steep slopes are present (i.e., the Sierra Nevada), areas where less consolidated or weathered soils overlie bedrock (e.g., the Coast Range), and areas where inadequate ground cover accelerates erosion (e.g., along the San Joaquin River). According to the background report, areas where steep slopes are present are not generally heavily populated and most are in federal or state lands. The report further identified State Route 168 in eastern Fresno County and State Route 198 in western Fresno County as areas that could be affected by landslides caused by earthquakes or heavy rains. It also concludes that there is no risk of large landslides in the valley area of the County due to its relatively flat topography. However, there is the potential for small slides and slumping along the steep banks of rivers and creeks.

Figure 28. Fresno County Landslide Susceptibility is a landslide hazard map from the background report. It indicates that the central and eastern portions of Fresno County are at low risk for landslides and the far west side of the County along the Coast Range is at moderate risk for landslides.

Figure 28. Fresno County Landslide Susceptibility



Source: California Department of Conservation, Landslide Inventory (Beta) Map Viewer

PAST OCCURRENCES

Landslides occur in every state and can occur in any area composed of very weak or fractured materials resting on a steep slope can and will likely experience landslides. Areas vulnerable to landslides include the following: ³³

Areas more prone to landslides

- On existing old landslides
- On or at the base of slopes
- In or at the base of minor drainage hollows
- At the base or top of an old fill slope
- At the base or top of a steep cut slope
- Burn area and canyon, hillside, mountain, and other steep areas are vulnerable
- Develop hillsides where leach field septic systems are used

Areas less prone to landslides

- On hard, non-jointed bedrock that has not moved in the past
- On relatively flat-lying areas away from sudden changes in slope angle
- At the top or along the nose of ridges, set back from the tops of slopes

There have been no disaster declarations associated with landslides in Fresno County. Notable landslides of record are included in **Table 38. Notable Past Landslides Events** and described below:

- **1995:** Following a large storm event, a large landslide occurred on Los Gatos Road, a significant local access road west of Coalinga. State geologists determined that catastrophic failure was unlikely, but long-term road maintenance could be compromised due to undercutting of the slope by the creek below the road.
- **5/13/2019:** An area of Huntington Lake Road in Fresno County was subject to an extended closure because of a landslide, a recurring issue in that region known as the "beaver slide." This incident is part of a history of similar geological disturbances affecting the area.
- **12/30/2022 - 1/10/2023:** Fresno County experienced multiple landslide incidents due to rockslides and mudslides that impacted various roadways, including State Routes 168 and 180. The California Highway Patrol (CHP) reported significant obstructions from rockslides on SR-168, near lower vista and east of Prather, and mudslides at the junctions of SR180 with Silver Lane and Millwood Road. These incidents caused extensive road blockages with mud, dirt, rocks, and even large boulders, necessitating road closures and emergency responses.
- **March 2023:** California Highway Patrol dealt with landslides that led to road obstructions on Auberry Road and SR-63, while a significant rockfall on Trimmer Road caused extensive

³³ Landslide Basics | U.S. Geological Survey (usgs.gov) <https://www.usgs.gov/programs/landslide-hazards/landslide-basics>

blockages. By mid-March, Caltrans had to close an 8-mile section of State Route 180 due to multiple slides impeding the road, demonstrating the ongoing geological instability in the region.

Table 38. Notable Past Landslides Events

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Los Gatos Road	1995	N/A	N/A	N/A	N/A	N/A
Huntington Lake Road	5/13/2019	N/A	N/A	N/A	N/A	N/A
SR-168 and SR-180	12/30/2022 – 1/10/2023	N/A	N/A	N/A	N/A	N/A
Dunlap	March 2023	N/A	N/A	N/A	N/A	N/A

Source: CA Department of Conservation

LIKELIHOOD OF FUTURE OCCURRENCES

Possible--Based on data provided by the HMPC, minor landslides have occurred in the past, probably over the last several hundred years, as evidenced both by past deposits exposed in erosion gullies and recent landslide events. With significant rainfall, additional failures are likely within the identified landslide hazard areas. Given the nature of localized problems identified within the County, minor landslides will likely continue to impact the area when heavy precipitation occurs, as they have in the past.

CLIMATE CHANGE CONSIDERATIONS

Climate change projections for more intense precipitation events have the potential to increase landslide incidence. In fact, during extended drought periods, soil loses its ability to absorb water and when rain occurs landslide risk increases. During period of prolonged water crisis, soils dry out and lose their drainage capacity. California experiences long prolonged drought periods which can increase the risk and incidence of landslides when major rain events do occur. Additionally, California's drought has also helped fuel major wildfires in recent years, and post-wildfire slopes are especially susceptible to mudslides. Plants destroyed by wildfires weaken the roots and therefore reduce soil stability.



SOIL HAZARD: EROSION

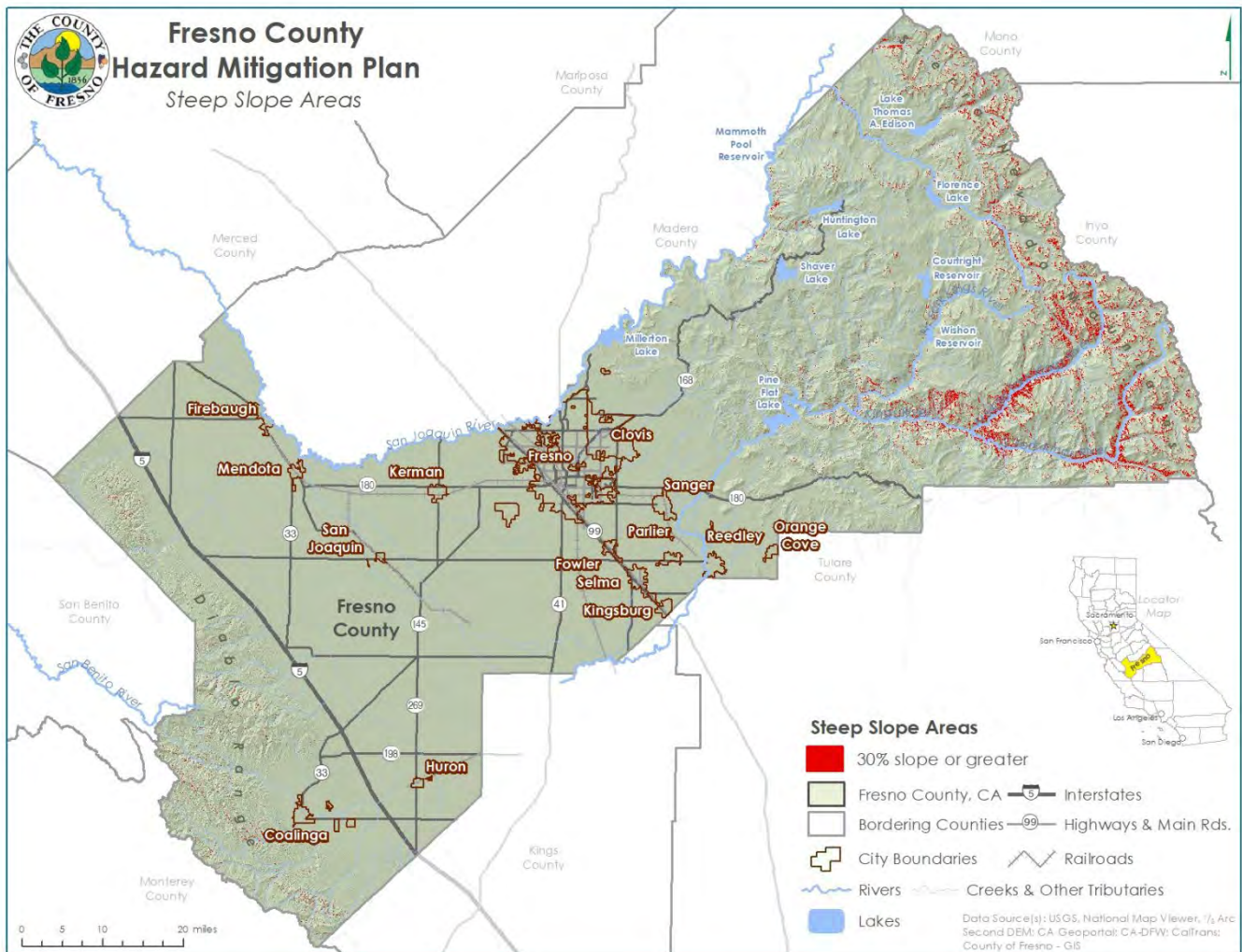
HAZARD/PROBLEM DESCRIPTION

Erosion is the general process whereby rocks and soils are broken down, removed by weathering, or fragmented and then deposited in other places by water or air. The rate of erosion depends on many variables, including the soil or rock texture and composition, soil permeability, slope, extent of vegetative cover, and precipitation amounts and patterns. Erosion increases with increasing slope and precipitation and with decreasing vegetative cover, which includes areas where protective vegetation has been removed by fire, construction, or cultivation. Significant erosion can cause degradation and loss of agricultural land, degradation of streams and other water habitats, and rapid silting of reservoirs.

EXTENT

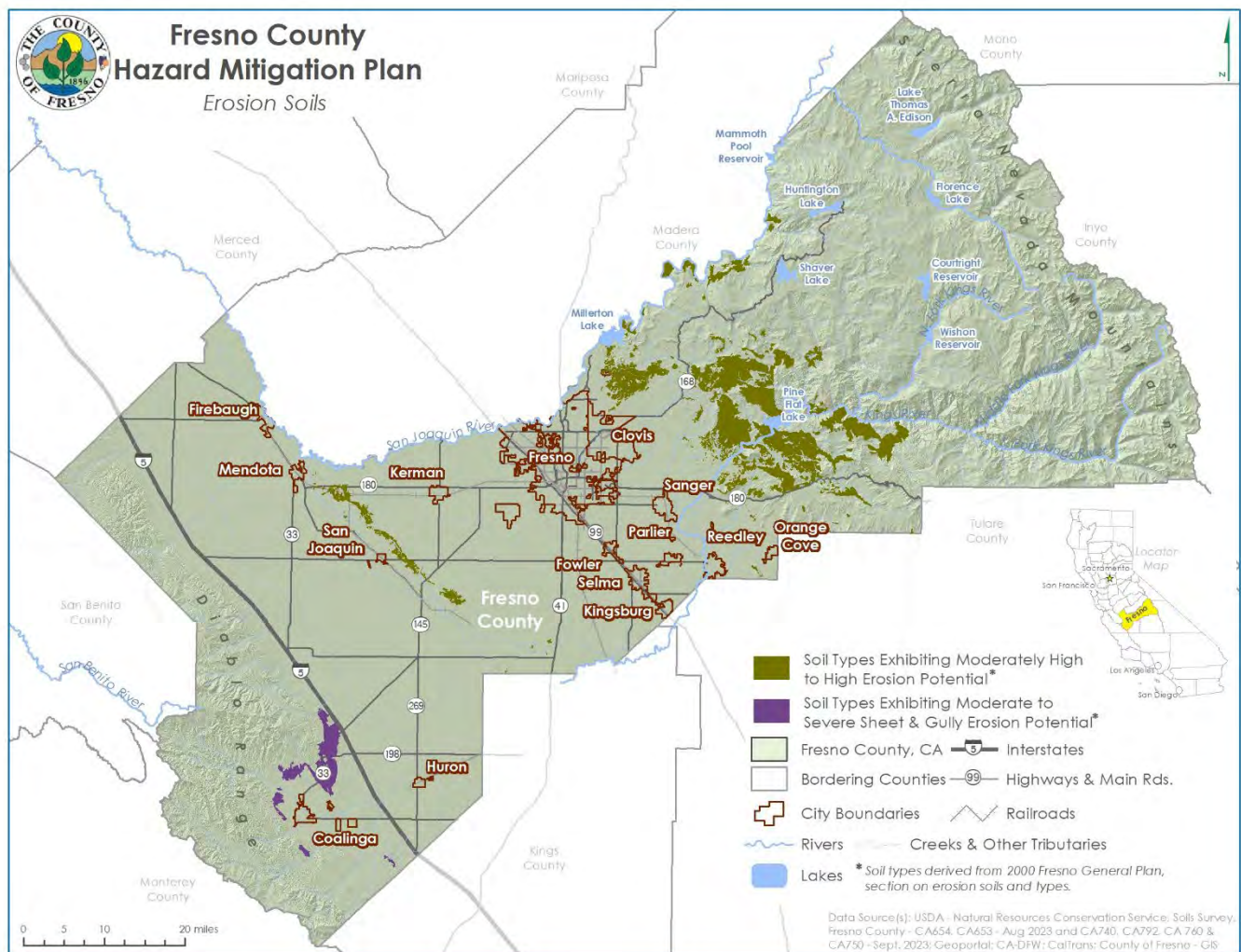
The Fresno County General Plan Background Report identifies those areas with moderately high to high erosion potential. These include areas of certain soil types in the Sierra Nevada and the foothills that generally coincide with slopes that exceed 30 percent (see **Figure 29. Fresno County Steep Slope Areas** and **Figure 30. Fresno County Erosion Soils**). However, many of these identified areas are located within the boundaries of the Sierra National Forest, Sequoia National Forest, or Kings Canyon National Park, which limits their availability for intensive development.

Figure 29. Fresno County Steep Slope Areas



Source: USGS, National Map Viewer, 1/2 Arc Second DEM; CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

Figure 30. Fresno County Erosion Soils



Source: USDA National Resources Conservation Service, Soils Survey

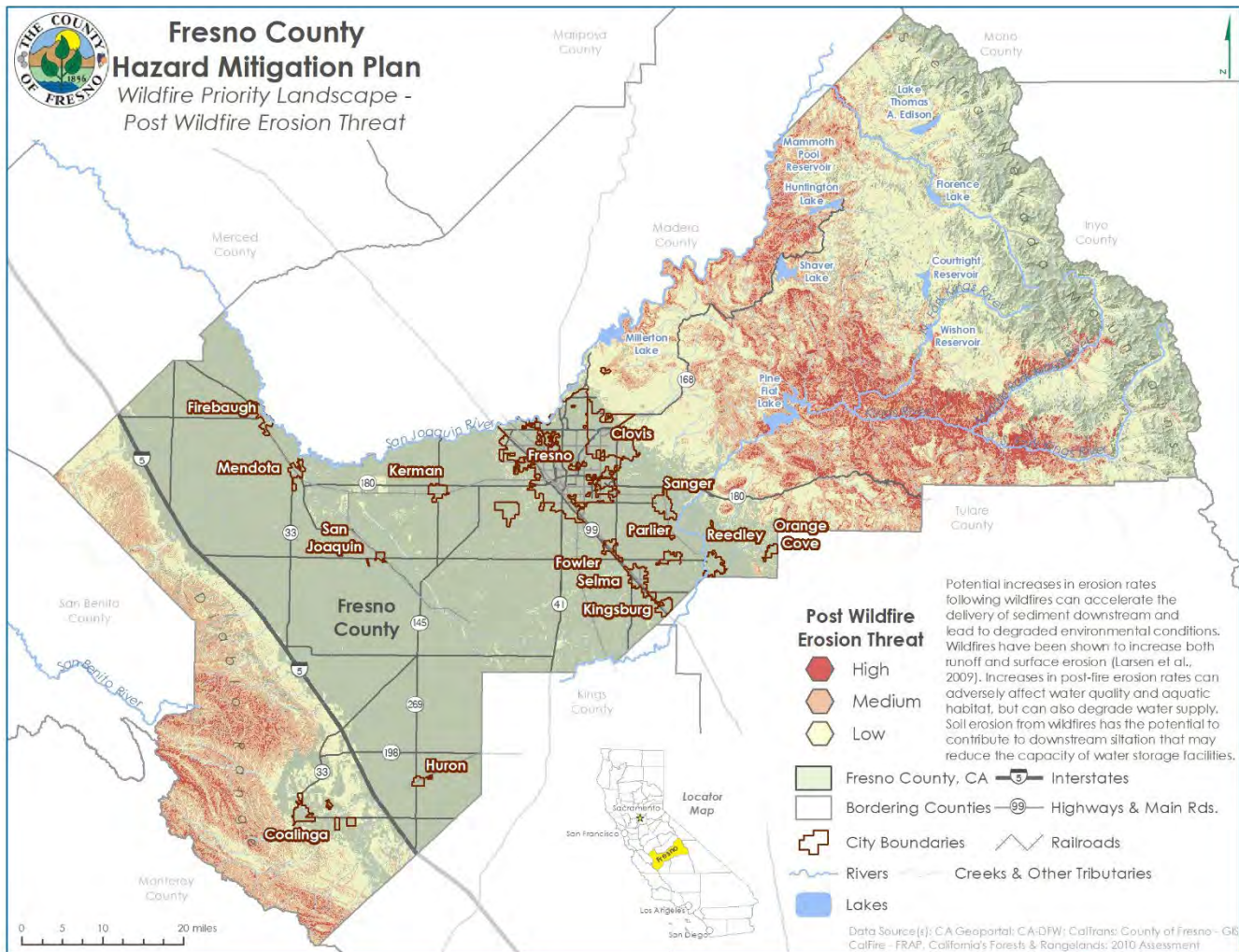


Erosion within the valley area is generally not a large concern, with the exception of areas containing Rossi soil east of the Fresno Slough from approximately Mendota to Fish Slough near Helm. Severe erosion potential has also been identified along the San Joaquin River Bluff. Also, along the main bypass floodway of the Fresno Slough, widely spaced gullies in a trellis pattern have eroded the soils where subsiding floodwaters drain back into the deeper main flood channel.

In western Fresno County, most soil associated with the Kettleman series appears to be subject to moderate to severe sheet and gully erosion potential. These include areas located primarily west of Interstate 5 in the Coast Range foothills. Also, in the western portion of the County, Panoche and Panhill soils, which under natural conditions do not exhibit erosion potential, are susceptible to erosion as a result of human activity. These soils are located extensively throughout the western part of the County and are prevalent in areas on recent alluvial fans in the central part of the region.

One of the main concerns associated with erosion is related to wildfire as a fire burns it destroys plant material. Plants such as shrubs, grasses, and trees provide roots that stabilize the soil. Fires destroy soil protection, leading to increased vulnerability to erosion, in addition to increased risk of flood hazard. The amount of erosion after a burn is determined by the severity of the burn, the slope, soil type and condition of the watershed before the burn. Using information provided by Cal Fire, **Figure 31. Fresno County Wildfire Priority Landscape - Post Wildfire Erosion Threat** outlines the post fire erosion threat for Fresno County.

Figure 31. Fresno County Wildfire Priority Landscape - Post Wildfire Erosion Threat



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS, CalFIRE – FRAP, California's Forests and Rangelands: 2010 Assessment



PAST OCCURRENCES

Historically, there have been no significant erosion events within the County. However, recently during the 2022-2023 season, the United States Forest Service warned visitors to the Sierra National Forest to avoid the Jose Basin Area. The Sierra National Forest officials reported roads in that area experiencing “significant erosion issues” caused primarily by local topography, erosive soils, and lingering effects of the Creek fire.³⁴ due to the increasing precipitation and flood events in the 2022 water year. Other areas in Fresno County experienced erosion as well during the same period of time.

LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely—Based on input from the HMPC, erosion does occur in the planning area. Given the nature of erosion problems identified within the County, erosion will continue to be an issue.

CLIMATE CHANGE CONSIDERATIONS

The primary climate related drivers affecting erosion, on both inland and coastal areas, are changes in temperature, water levels, precipitation, vegetation loss or changes, and weather. Climate is a major driver of erosion, however changes in land use and land cover, due to development and land management, can dramatically affect exposure of sediments to erosion. Erosion involves the breakdown, detachment, transport, and redistribution of soil particles by forces of water, wind, or gravity.

³⁴ <https://www.yourcentralvalley.com/news/local-news/stay-out-of-the-jose-basin-area-warns-sierra-national-forest/>

SOIL HAZARDS: EXPANSIVE SOILS

HAZARD/PROBLEM DESCRIPTION

Expansive (swelling) soils or soft bedrock are those that increase in volume as they get wet and shrink as they dry. They are known as shrink-swell, bentonite, expansive, or montmorillinitic soils. Swelling soils contain high percentages of certain kinds of clay particles that are capable of absorbing large quantities of water, expanding up to 10 percent or more as the clay becomes wet. The force of expansion is capable of exerting pressures of 20,000 pounds per square foot or greater on foundations, slabs, and other confining structures. Soils composed only of sand and gravel have no potential for volume changes. Soils are generally classified into three expansive soils classes with low, moderate, and high potential for volume changes:

- **Low:** This soils class includes sands and silts with relatively low amounts of clay minerals. Sandy clays may also have low expansion potential if the clay is kaolinite. Kaolinite is a common clay mineral.
- **Moderate:** This class includes silty clay and clay textured soils, if the clay is kaolinite, and includes heavy silts, light sandy clays, and silty clays with mixed clay minerals.
- **High:** This class includes clays and clay with mixed montmorillonite, a clay mineral which expands and contracts more than kaolinite.

Soils with relatively high clay content are considered expansive due to the capacity of clay minerals to take in water and expand to greater volumes. Highly expansive soils can cause structural damage to foundations and roads without proper structural engineering and require detailed geologic investigations and costlier grading applications. This makes highly expansive soil less suitable for development. Expansive soils can be found predominantly in the eastern part of the county in a northwest trending belt approximately parallel to the Friant-Kern Canal foothills in Kings Canyon National Park. Another expansive soil formation is located along the Fresno Slough from Madera County to Kings County ³⁵

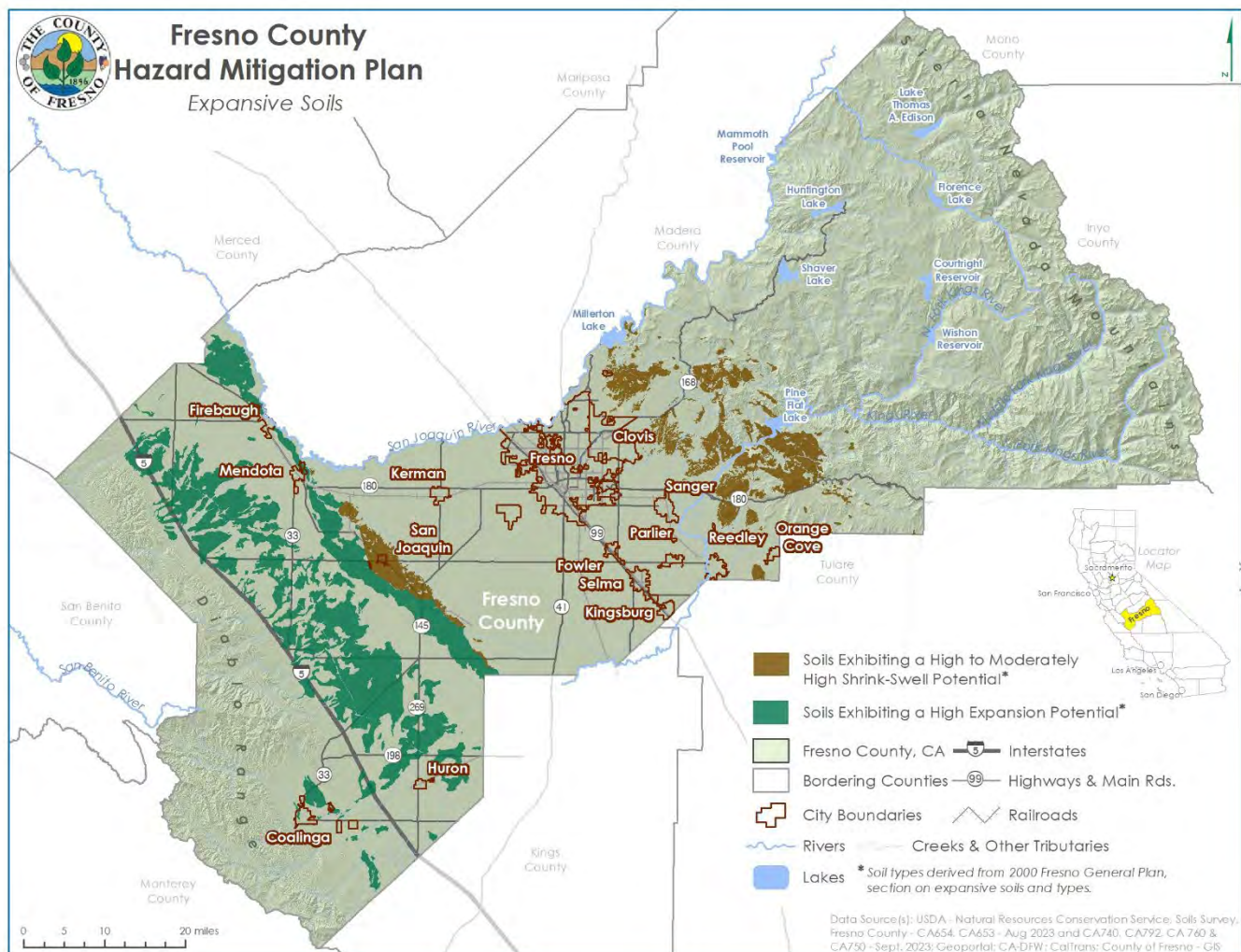
Damage can include severe structural damage, cracked driveways and sidewalks, heaving of roads and highway structures, and disruption of pipelines and other utilities. Destructive forces may be upward, horizontal, or both. Building in and on swelling soils can be done successfully, although more expensively, as long as appropriate construction design and mitigation measures are followed.

EXTENT

Small - According to the Fresno County General Plan Background Report, expansive soils within Fresno County generally occur in a northwest-trending belt approximately parallel to the Friant-Kern Canal foothills in Kings Canyon National Park in the Sierra Nevada, along the Fresno Slough from Madera County to Kings County, and roughly parallel to the San Luis Drain west of Tranquility and San Joaquin. **Figure 32. Fresno County Expansive Soils** from the Fresno County General Plan Background Report illustrates the area's most susceptible to expansive soils.

³⁵ Fresno County General Plan Background Report 2042

Figure 32. Fresno County Expansive Soils



Source: USDA – Natural Resources Conservation Service, Soils Survey, Fresno County – CA654, CA653 – August 2023 and CA740, CA792, CA760 & CA750 – September, 2023; Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

PAST OCCURRENCES

Expansive soils are present in the County. However, due to the ability to successfully mitigate the hazard by adhering to sound design and construction practices, the HMPC was unable to find examples of historical expansive soil problems in the planning area.

LIKELIHOOD OF FUTURE OCCURRENCES

Possible—Based on the soil types found in Fresno County, the potential exists for expansive soil to be a future issue in the Fresno County planning area.



CLIMATE CHANGE CONSIDERATIONS

There is potential for more severe wet and dry cycles in future climate, which may have an effect on the frequency and intensity of expansive soils in Fresno County.

SOIL HAZARDS: LAND SUBSIDENCE

HAZARD/PROBLEM DESCRIPTION

Land subsidence is defined as the vertical sinking of the land over manmade or natural underground voids. Subsidence, usually as a direct result of groundwater withdrawal or oil and gas withdrawal is common in several areas of California, including parts of the Central Valley. Weight, including surface developments such as roads, reservoirs, and buildings, and manmade vibrations from such activities as blasting and heavy truck or train traffic can accelerate the natural processes of subsidence. According to the California State Hazard Mitigation Plan 2023, by 1970, significant land subsidence had affected about half of the San Joaquin Valley, covering around 5,200 square miles, with more than 1 foot of subsidence observed. In specific localized regions, the ground had subsided by as much as 28 feet.

Subsidence can result in serious structural damage to buildings, roads, irrigation ditches, canals, streams, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Improper use of land subject to subsidence can result in excessive economic losses: direct economic losses as well as indirect losses (e.g., increased taxes and decreased property values).

In California, the floor of the arid Central Valley is sinking due to groundwater pumping for agricultural and drinking water. According to a Stanford University study, land subsidence will likely continue for decades to centuries. Reducing or slowing the rate of land subsidence may be difficult at points due to periods of drought straining the water supply and system.³⁶ Other research suggests that groundwater depletion has been mainly propelled by the rapidly expanding estates of perennial, water-intensive crops such as almonds, citrus, and wine grapes. Additionally, non-drought years and years where California experiences extensive rainfall, may not even cause significant changes in land subsidence as this issue has been going on for one hundred years. Much of the groundwater depletion has occurred in the San Joaquin Valley and over the past two decades, the central valley has consumed nearly 36 million acre-feet of groundwater, translating to 11.7 trillion gallons of our most precious resource.³⁷

EXTENT

In the San Joaquin Valley, farmers rely heavily on surface-water diversions to meet irrigation water demand, but the recent droughts have induced substantial increases in groundwater pumping. Unfortunately, this excessive water extraction from the unconsolidated deposits of the San Joaquin Valley causes land subsidence.

According to the Fresno County Background Report 2000, in some areas along the valley trough and in parts of western Fresno County, groundwater pumping has caused subsidence of the land surface. Historically, this has occurred in areas where the groundwater basin has been subject to overdraft and long-term recharge is inadequate to maintain the water table elevation, leaving underground voids.

One study suggests that land subsidence is located in areas where the water demand for agriculture and the density of groundwater wells is the highest, whereas the rate of subsidence is strongly affected the amount of local and imported surface water and by groundwater resources.³⁸

There are two main subsidence bowls covering hundreds of square miles that grew wider and deeper between spring 2015 and fall 2016. The geographic extent and magnitude of subsidence in the San

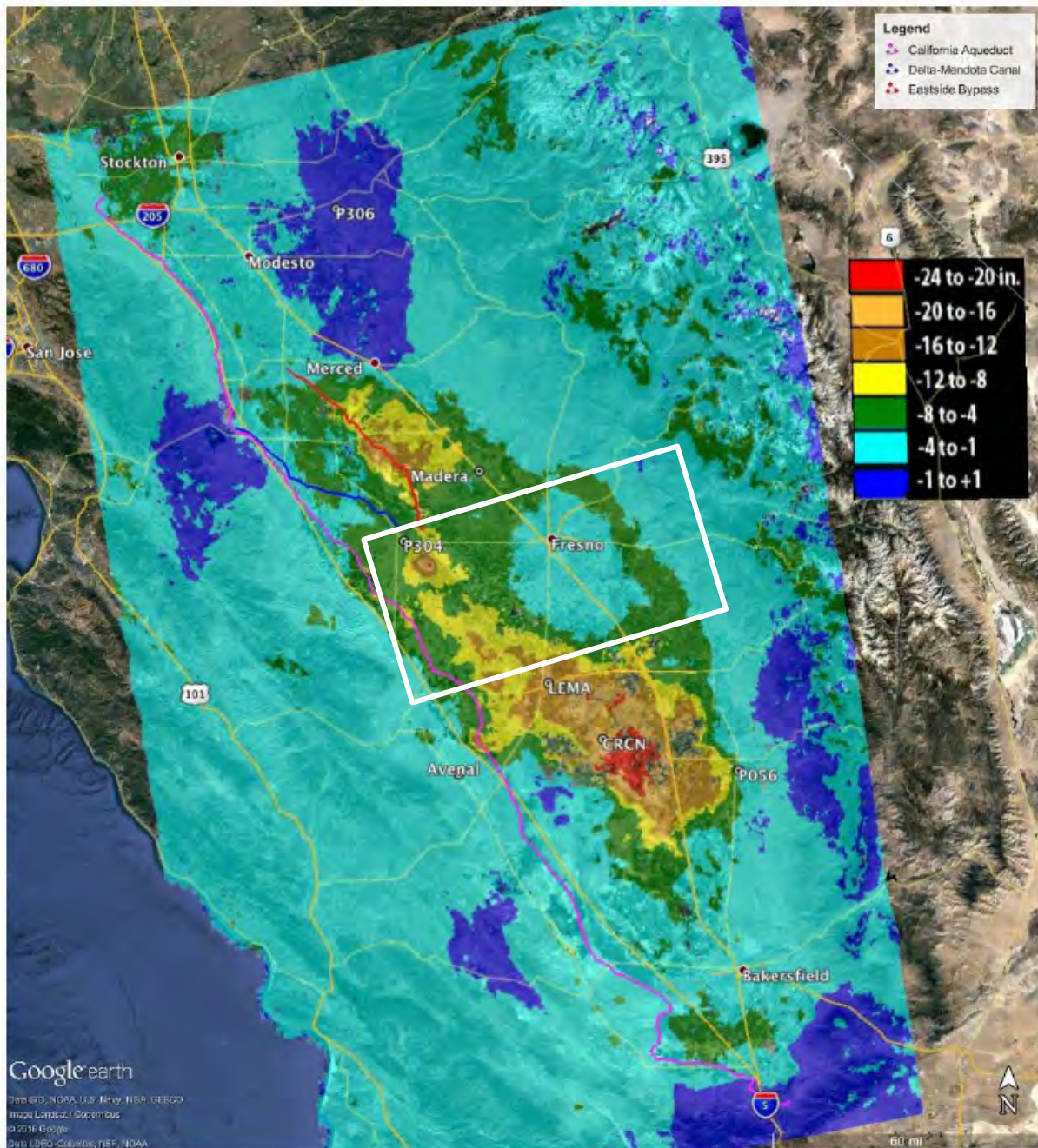
³⁶ <https://news.stanford.edu/2022/06/02/will-californias-san-joaquin-valley-stop-sinking/>

³⁷ <https://fresnoalliance.com/central-valley-groundwater-sinking-faster-than-ever/>

³⁸ <https://www.sciencedirect.com/science/article/abs/pii/S0022169418309661>

Joaquin Valley is displayed below in **Figure 33. Subsidence in the San Joaquin Valley, May 7, 2015 – September 10, 2016.**

Figure 33. Subsidence in the San Joaquin Valley, May 7, 2015 – September 10, 2016





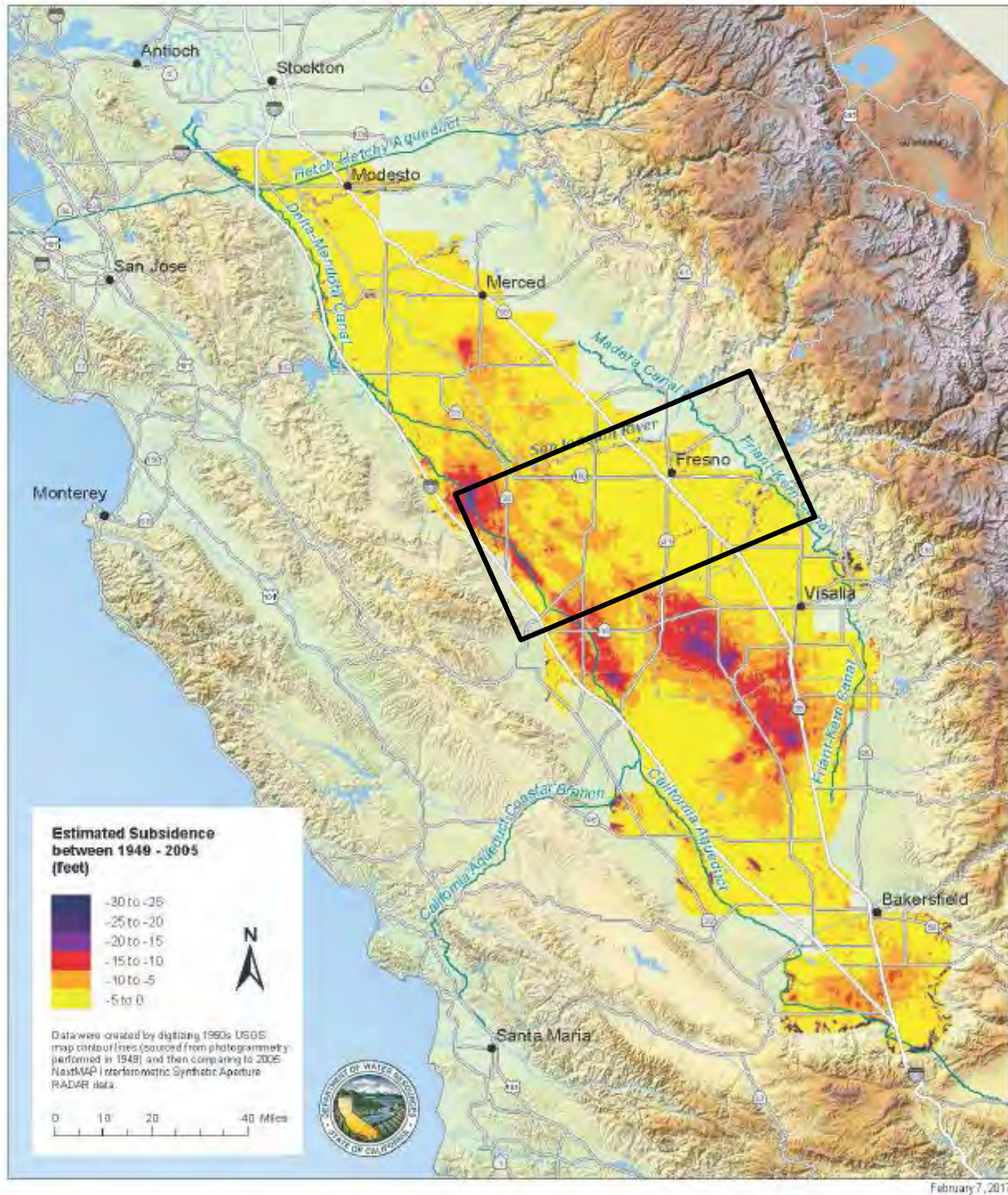
Geospatial analysis indicates that subsidence risk is concentrated in the western portion of the County. While subsidence rates fall in the -4 to -1-inch range in the east, NASA's survey technology shows subsidence reaching up to -16 inches in some pockets along the San Joaquin Valley corridor. Effected jurisdictions include Firebaugh, Mendota, Coalinga, and Huron.

Additionally, a significant area of concern is the Eastside Bypass, a system designed to carry flood flow off the San Joaquin River. Subsidence also intensified at a third area, near Tranquility, where the land surface has settled up to 20 inches in an area that extends seven miles. Specific areas where subsidence has been a problem include the Westlands Water District and the Pleasant Valley Water District. The increased subsidence rates have the potential to damage levees, bridges, and roads. Over time, subsidence can permanently reduce the underground aquifer's water storage capacity.

PAST OCCURRENCES

Subsidence caused by groundwater pumping in the Central Valley has been a problem for decades. Long-term subsidence already has destroyed thousands of public and private groundwater well casings in the San Joaquin Valley. NASA has been using radar satellite maps to document rates of subsidence in the San Joaquin Valley since 2014. The NASA analysis evaluated the Eastside Bypass system and found that the land surface had fallen between 16 inches and 20 inches since May 2015 – on top of several feet of subsidence measured between 2008 and 2012. Though recent technology and resources has brought this problem to light, the San Joaquin Valley subsidence due to groundwater extraction was observed as early as the 1920s. Extensive monitoring and research related to subsidence in the Valley was carried out in the 1950s through the 1970s because of concerns about subsidence-related damage to the state and federal water projects. **Figure 34. Estimated Subsidence Between 1949 and 2005** below documents 50-years of estimated subsidence rates in the San Joaquin Valley. Similar to the estimates, the eastern portion of the County has historically seen the most subsidence, potentially reaching up to 30-feet in the north-east.

Figure 34. Estimated Subsidence Between 1949 and 2005





In 1963, DWR initiated construction of the State Water Project's 444-mile-long California Aqueduct. Subsidence mitigation was integrated into the project design; however, subsidence has required repairs such as the raising of canal linings, bridges, and water control structures on the Aqueduct and on the Central Valley Project's Delta-Mendota and Friant-Kern canals. In recent years, a five-mile reach of the Eastside Bypass was raised in 2000 because of subsidence, and DWR estimates that it may cost in the range of \$250 million to acquire flowage easements and levee improvements to restore the design capacity of the subsided area.

LIKELIHOOD OF FUTURE OCCURRENCES

Occasional—Land subsidence has been a constant issue affecting Fresno County for decades. This hazard is ongoing and is certain to continue in the future. However, legislation passed in 2014 requires local governments to regulate pumping and recharge to better manage groundwater supplies. Groundwater-dependent regions are required to halt overdraft and bring basins into sustainable levels of pumping and recharge by the early 2040s. Though occurrence may be inevitable, the magnitude of subsidence rates is dependent on the mitigation actions and pumping regulations initiated by Fresno County. Excess groundwater pumping is more likely to occur during times of drought.

CLIMATE CHANGE CONSIDERATIONS

The most likely impact that climate change will have on land subsidence risk is the potential for extended and severe drought, which could likely result in more groundwater pumping and human-induced subsidence. During periods of drought, water levels may be drawn too low, which results in an irreversible compaction of aquitards. The water cannot recharge the layers, causing permanent subsidence and diminishment of groundwater storage capacity.

SEVERE WEATHER: GENERAL

Severe weather is generally any destructive weather event, but usually occurs in the Fresno County planning area as localized thunderstorms that bring heavy rain, hail, lightning, and strong winds.

The National Oceanic and Atmospheric Administration's National Center for Environmental Information (NCEI) has been tracking severe weather since 1950. The Storm Events Database contains data on the following: all weather events from 1993 to 2023. This database contains over 3,000 severe weather events that occurred in Fresno County between 1950 to 2023. **Table 39. NCEI Hazard Event Reports for Fresno County (1950-2023)** summarizes these events.

Table 39. NCEI Hazard Event Reports for Fresno County (1950-2023)

Type	# of Events	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Dense Fog*	1,509	24,136,000	0	24	72
Flash Floods	48	87,000	0	0	0
Floods	420	583,281,000	124,190,000	12	8
Funnel Clouds	47	0	0	0	0
Hail	73	1,020,000	2,100,500	0	4
Heavy Rain	151	2,179,000	95,690,000	0	0
High Winds**	111	402,518,000	30,000	1	0
Lightning	38	1,770,000	300,000	2	3
Severe Thunderstorms/Wind	73	4,224,500	43,085,000	2	15
Tornado**	35	6,480,050	26,000	0	3
Wildfires*	662	1,847,706,500	119,918,000	5	112

Source: National Center for Environmental Information Storm Events Database, www.ncdc.noaa.gov/stormevents/

*Hazards with wide extents have losses which reflect larger zones that extend beyond Fresno County

**Source is NOAA Storm Events Database GIS data

The NCEI table above summarizes severe weather events that occurred in Fresno County. A few of the events resulted in state and federal disaster declarations. It is further interesting to note that different data sources capture different events during the same time period, and often different information specific to the same events. While the HMPC recognizes these inconsistencies, they see the value this data provides in depicting the County's "big picture" hazard environment.

In the previous plan, all of Fresno County's state and federal disaster declarations have been a result of natural hazards, mostly caused by severe weather. Since the 2018 update, state and federal declarations resulted from the COVID-19 pandemic, which has been the exception for the county regarding causes of state and federal declarations. For this plan, severe weather is broken down as follows:

- Extreme Temperatures (Extreme Cold/Freeze and Extreme Heat)
- Fog

4. Risk Assessment



- Heavy Rain/Thunderstorm/Hail/Lightning/Wind
- Winter Storm
- Tornado

Due to the size of the County and changes in elevation and climate, weather conditions can vary greatly across the County. The profiles that follow provide information, where possible, from three weather stations in different parts of the County: Huntington Lake (elevation: 7,000 feet) in east Fresno County, Fresno WSO AP (elevation: 33 feet) in central Fresno County, and Coalinga (elevation: 66 feet), in west Fresno County.

SEVERE WEATHER: EXTREME TEMPERATURES

HAZARD/PROBLEM DESCRIPTION

Extreme temperature events, both cold and hot, can have severe impacts on human health and mortality, natural ecosystems, and agriculture and other economic sectors.

EXTREME COLD/FREEZE

Extreme cold or freeze is largely accompanied by a winter storm or weather system that produces cold temperatures. What is considered an excessively cold temperature varies according to the normal climate for that region. However, when temperatures are far below normal, with higher wind speeds, heat leaves the human body more rapidly, which increases the possibility of negative effects from these extreme temperatures.³⁹

The greatest danger from extreme cold is to people, as prolonged exposure can cause frostbite or hypothermia, and can become life threatening. When someone is suffering from hypothermia, body temperatures can become so low that they affect the brain, making it difficult for the victim to think clearly or move well. In the case of frostbite, the frozen tissue becomes numb, and the victim may be unaware that anything is wrong until someone else notices. This makes hazards from extreme cold particularly dangerous, as people may not understand what is happening to them or what to do about it.⁴⁰

The primary hazards from extreme cold are frostbite and hypothermia. Frostbite is caused by freezing of the skin and underlying tissue. It causes a loss of feeling and color in the affected areas of the body, and most often affects the nose, chin, fingers, or toes. It can be permanently damaging if not treated promptly and can lead to infection, nerve damage, or amputation in severe cases. The risk of frostbite is increased in people with preexisting conditions, the elderly, people with reduced blood circulation, and people who are not dressed warmly enough for the conditions.

Hypothermia occurs when the body loses heat faster than it can produce heat, causing a dangerously low body temperature. A normal body temperature is around 98.6° F. Hypothermia occurs when your body temperature falls below 95° F.⁴¹ As this happens, the heart and other essential organs cannot work properly. If hypothermia is not treated, it can lead to heart failure, respiratory failure, and eventually to death.⁴¹

Excessive or extreme cold can accompany severe winter weather, or it can occur without severe weather. For this reason, extreme cold is considered a separate hazard from severe winter storms. The effects of freezing temperatures on agriculture in Fresno County are discussed further in the Agricultural Hazards section.

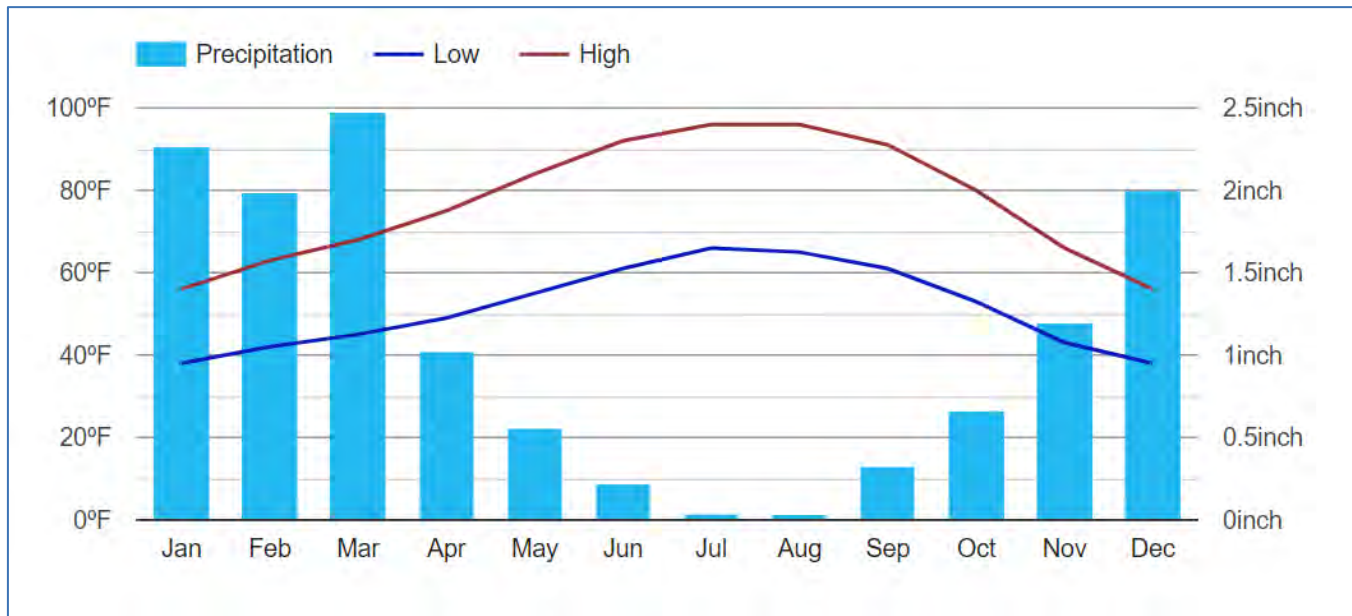
In Fresno County, the average low temperatures in the winter months range from 53 to 38 degrees. Therefore, it is likely that since the average low in the month of January specifically, is 38 degrees that there are days in which temperatures are below freezing, shown in **Figure 35. Fresno County Average Temperatures and Precipitation.**

³⁹ National Weather Service. *Stay Safe in the Extreme Cold*. Retrieved 12.07.23 from: <https://www.weather.gov/dlh/extremecold>

⁴⁰ Centers for Disease Control and Prevention. *Extreme Cold: A Prevention Guide to Promote Your Personal Health and Safety*. Retrieved 12.07.23 from: <https://www.cdc.gov/nceh/toolkits/winterweather/default.html>

⁴¹ Mayo Clinic. *Hypothermia: Overview*. Retrieved 12.07.23 from <https://www.mayoclinic.org/diseases-conditions/hypothermia/symptoms-causes/syc-20352682>

Figure 35. Fresno County Average Temperatures and Precipitation



Source NWS

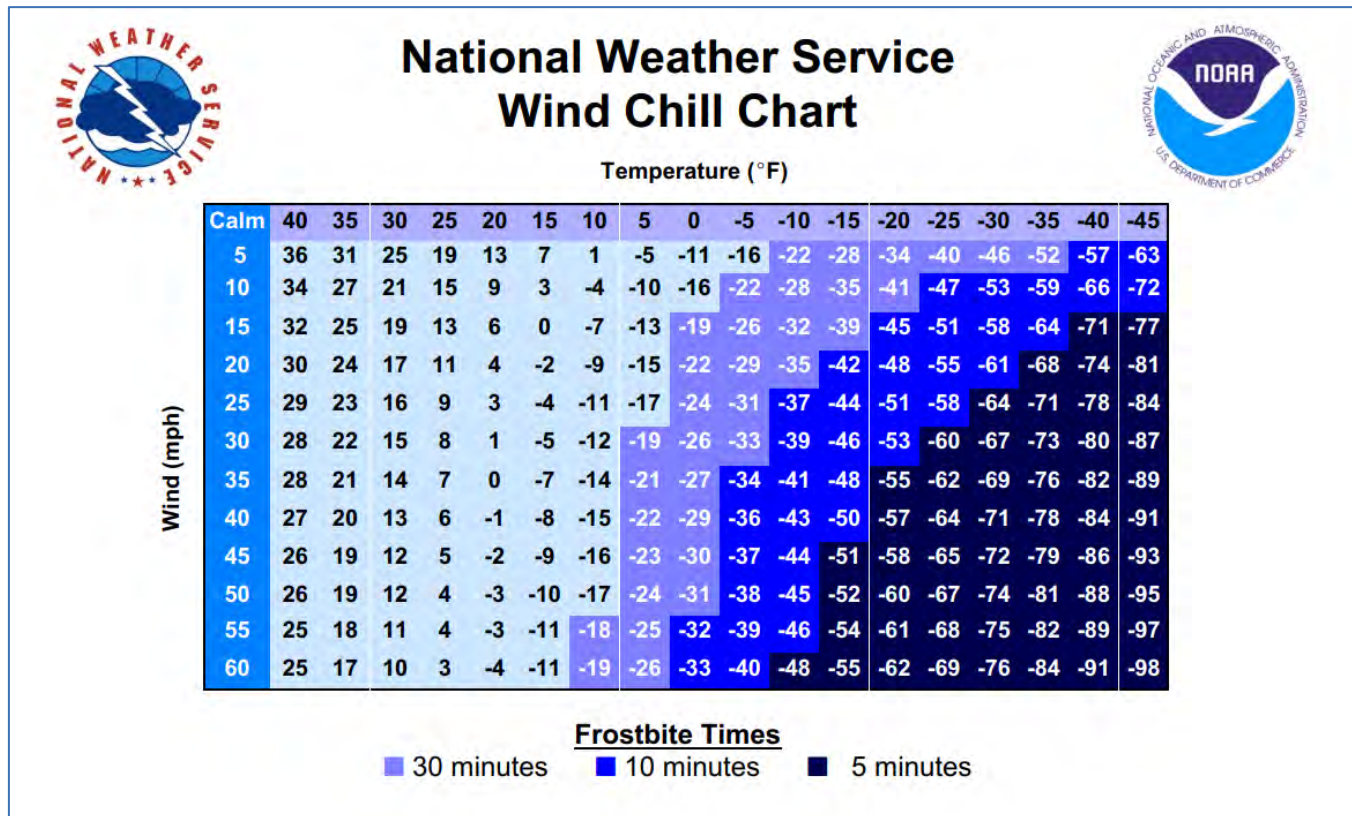
WIND CHILL

The National Weather Service Issues Extreme Cold Warnings when the temperature feels like it is -30° F or colder across a wide area for a period of at least several hours. When possible, these advisories are issued a day or two in advance of the conditions.

The most common extent/severity marker for extreme cold is the Wind Chill scale. **Figure 36. NWS National Weather Service Wind Chill Chart** depicts the National Weather Service's methodology for determining the wind chill, using wind speed and actual temperature. Although wind chill is not necessarily related to extreme cold as a single cause, the advisory system that the NWS currently uses relies on wind chill to relay warning and advisory information to the public. Extreme cold severity is a function of wind chill and other factors, such as precipitation amount (rain, sleet, ice, and/or snow).⁴²

⁴² Climate Fresno - California and Weather averages Fresno (usclimatedata.com)
<https://www.usclimatedata.com/climate/fresno/california/united-states/usca2234>

Figure 36. NWS National Weather Service Wind Chill Chart



Source: NWS

EXTREME HEAT

Extreme heat, as per the guidance provided by the Fresno County Public Health, is considered a period of high heat and humidity with temperatures above 90 degrees for at least two to three days. In extreme heat your body works extra hard to maintain a normal temperature, which can lead to death. These episodes, often referred to as "heat waves," lack a universal definition but are typically delineated by the potential for dangerously hot weather conditions capable of causing heat-related illnesses and even fatalities.³⁰

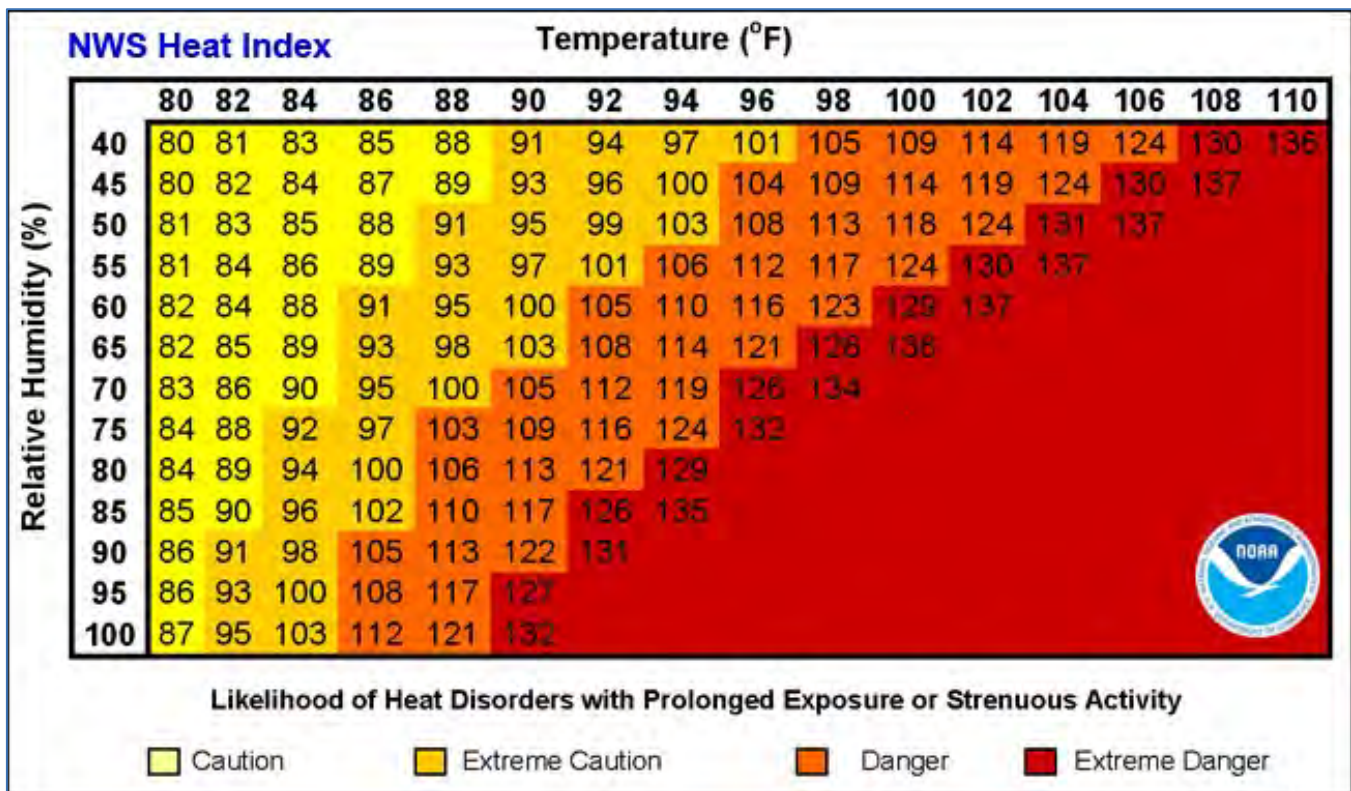
Remarkably, heat-related issues pose a significant threat and constitute one of the foremost weather-related causes of mortality in the United States. Annually, they claim the lives of over a thousand individuals. Those most susceptible to the adverse effects of extreme heat span a diverse spectrum and include, but are not limited to, vulnerable populations such as infants and young children, older adults, individuals with chronic medical conditions, pregnant women, and those with disabilities.³¹

Furthermore, the United States, with particular emphasis on the Los Angeles region, is confronting an ominous trajectory regarding extreme heat events. This trajectory is inexorably linked to the ongoing and anticipated shifts in our climate. As climate change continues to unfold, it is expected that both the frequency and severity of extreme heat events will escalate, heightening the urgency for proactive measures to protect communities and mitigate the associated risks. Therefore, it is imperative for regions like Los Angeles to prepare for these impending challenges and enact robust strategies to safeguard the health and well-being of their residents in the face of rising temperatures.

Heat Index

The Heat Index is a metric that considers both the actual air temperature and the relative humidity, providing a more accurate reflection of how hot it feels. Relative humidity represents the amount of moisture in the air compared to what it would contain if fully saturated, which depends on both moisture content and temperature. There exists a clear correlation between air temperature, relative humidity, and the heat index, such that as air temperature and relative humidity rise, the heat index follows suit, and conversely, it drops when they decrease. The National Weather Service has created a Heat Index Chart, denoted in **Figure 37. NWS Heat Index**, which illustrates how the Heat Index classifications change and intensify from "Caution" to "Extreme Danger" as both temperature and relative humidity increase.³⁴

Figure 37. NWS Heat Index



Source: NWS

The classifications of the Heat Index describe the risk of heat disorders with prolonged exposure or strenuous activity. As the heat index increases the heat index classification increases as well and darkens from light yellow to red. This also increases the likelihood for individuals to experience adverse effects on the body. The description of the heat index can affect the body is described in **Table 40. Extreme Heat Health Impacts Using the Heat Index.**

Table 40. Extreme Heat Health Impacts Using the Heat Index

Classification	Heat Index	Effect on the Body
Caution (Light Yellow)	80F-90F	Fatigue possible with prolonged exposure and/or physical activity
Extreme Caution (Yellow)	90F-103F	Heat stroke, heat cramps, or heat exhaustion possible with prolonged exposure and/or physical activity
Danger (Orange)	103F-124F	Heat cramps or heat exhaustion likely, and heat stroke possible with prolonged and/or physical activity
Extreme Danger (Dark Red)	125F or higher	Heat stroke highly likely

Source: NWS

Wet Bulb Globe Temperature

The Wet Bulb Globe Temperature (WBGT) is a comprehensive meteorological metric that encompasses several vital weather parameters, including temperature, humidity, wind, solar radiation, and more. This multi-faceted index plays a pivotal role in assessing the risk of heat stress, particularly for populations engaging in outdoor activities, such as outdoor workers and athletes.

WBGT serves as a crucial tool for making informed decisions when its comes to safeguard individuals or entire communities during hot and potentially hazardous weather conditions. Its application extends to various scenarios, where mitigating the effects of extreme heat is paramount.

For instance, in the context of outdoor work, WBGT can guide recommendations for necessary modifications. These may involve advising outdoor laborers to curtail strenuous activities during periods of elevated WBGT, suggesting shifts that begin earlier or later in the day when conditions are less oppressive, and ensuring the availability of shaded areas to allow for periodic relief from the heat.

By factoring in a comprehensive range of meteorological elements, the WBGT not only provides a more nuanced understanding of heat stress but also empowers decision-makers to proactively protect the well-being of those exposed to the elements, ultimately enhancing safety, and minimizing the risks associated with extreme heat.

Heat Risk

The National Weather Service (NWS) HeatRisk prototype is a color-numeric-based index that provides a forecast of the potential level of risk for heat-related impacts to occur over a 24-hour period. That level of risk is illustrated by a color/number along with identifying the groups potentially most at risk at that level. Each HeatRisk level is also accompanied by recommendations for heat protection and can serve as a useful tool for planning for upcoming heat and its associated potential risk. Based on the NWS high resolution national gridded forecast database, a daily HeatRisk value is calculated for each location from the current date through seven days in the future.

The HeatRisk prototype takes into consideration:

- How unusually above normal the temperatures are at your location (is it warmer than the top 5 percent of hottest days in the period of record for this date?)



- The time of the year (for example, is this early season heat that you likely haven't become used to, typical mid-summer heat, or late season heat that you may have become more used to?)
- The duration of unusual heat (for example, are temperatures overnight at levels that would lower heat stress, maintain it, or will unusually warm overnight low temperatures add to heat stress into the next day)
- If those temperatures are at levels that pose an elevated risk for heat complications, such as heat stress, based on peer-reviewed science and heat-health thresholds supported by the Centers for Disease Control and Prevention (CDC) national data sets.

The Heat Risk tool can be used to protect communities and individuals from potential risks of extreme heat. Adverse impacts from weather events generally affect historically underserved communities and the Heat Risk tool seeks to provide support for those communities and be better prepared. Groups that are heat-sensitive or heat vulnerable face a higher risk of heat-related illnesses and adverse impacts than others. This groups include:

- The elderly and very young
- People experiencing homelessness
- Individuals on certain medications and/or those with pre-existing conditions that increase heat sensitivity
- Outdoor workers, especially new workers, temporary workers, workers that are not yet accustomed to working outdoors, and those working in non-cooled spaces
- Individuals exercising or engaging in strenuous activities outdoors during the heat of day, especially those that are not accustomed to the level of heat, not drinking enough fluids, and those new to that type of activity.
- Individuals without adequate cooling mechanisms or proper hydration
- Individuals not acclimated to the level of heat expected, especially those that are new to a warmer climate
- Individuals sensitive to poor air quality, which can be exacerbated by heat waves
- Individuals living in low-income communities

Heat Tools and the National Weather Service Heat Products

The National Weather Service (NWS) uses the various tools described including the Wet Bulb Globe Temperature tool, Heat Risk tool, and the Heat Index to inform the issuance of NWS official heat watches, warnings, and advisories. Each tool provides a different perspective beyond what the actual air temperature is and can provide a deeper level of understanding.

EXTENT

Large - Both extreme heat and extreme cold cover greater than 25 percent of the planning area.

EXTREME HEAT

The NWS has in place a system to initiate alert procedures (advisories, watches, and warnings) when high temperatures are expected to have a significant impact on public safety. The expected severity of the heat determines which type of alert is issued, described in **Table 41. NWS Heat Related Product**.

Table 41. NWS Heat Related Product

Heat-Related Product	Description
Excessive Heat Warning (Dark Purple)	An Excessive Heat Warning is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Warning is when the maximum heat index temperature is expected to be 105° or higher for at least 2 days and night-time air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas not used to extreme heat conditions. If you don't take precautions immediately when conditions are extreme, you may become seriously ill or even die.
Excessive Heat Watches (Dark Red)	Heat watches are issued when conditions are favorable for an excessive heat event in the next 24 to 72 hours. A Watch is used when the risk of a heat wave has increased but its occurrence and timing is still uncertain.
Heat Advisory (Orange)	A Heat Advisory is issued within 12 hours of the onset of extremely dangerous heat conditions. The general rule of thumb for this Advisory is when the maximum heat index temperature is expected to be 100° or higher for at least 2 days, and night-time air temperatures will not drop below 75°; however, these criteria vary across the country, especially for areas that are not used to dangerous heat conditions. Take precautions to avoid heat illness. If you don't take precautions, you may become seriously ill or even die.
Excessive Heat Outlooks (Light Yellow)	The outlooks are issued when the potential exists for an excessive heat event in the next 3-7 days. An Outlook provides information to those who need considerable lead-time to prepare for the event.

Source: NWS

A common guideline for the issuance of excessive heat alerts in Fresno County is when the maximum daytime high is expected to equal or exceed 110°F and a nighttime minimum high of 80°F or above is expected for two or more consecutive days.

Fresno County begins to experience hot weather in May or June of each year, and the heat continues throughout the summer months. The Fresno County Heat Emergency Contingency Plan provides a two-phase approach to mitigate and reduce the effects of extreme heat. Phase I calls for a heat awareness campaign to be initiated at the beginning of the heat season. Phase II calls for an operational area response to a heat emergency. The County Health Officer may determine that a Heat Emergency exists based on the threat to public health and safety. This may include:

- Excessive Heat Warning or Heat Wave issued by the NWS.
- Heat-related illnesses and deaths are above average.
- Abnormal amounts of heat related deaths occur in local animal populations.

- Successive days when daytime temperature exceeds normal ranges, and the nighttime heat index does not drop below 80 degrees.
- The California Independent System Operator (CALISO) issues a Stage 3 Electrical Emergency.
- High heat is accompanied by electrical blackouts or rotating power outages.
- Two or more jurisdictions within the County “declare” heat emergencies.
- The state “declares” a heat emergency.

EXTREME COLD

Similar to Extreme Heat, the National Weather Service (NWS) has in place a system to initiate alert procedures (advisories, watches, and warnings) when low temperatures are expected to have a significant impact on public safety. The expected severity of the cold determines which type of alert is issued, described in **Table 42. NWS Winter Storm Weather Products**.

Table 42. NWS Winter Storm Weather Products

Winter Storm Product	Description
Winter Weather Advisory (Light Purple)	Wintry weather expected. Light amounts of wintry precipitation or patchy amounts of wintry precipitation or patchy blowing snow will cause slick conditions and could affect travel if precautions are not taken.
Winter Storm Watch (Light Blue)	Snow, sleet, or ice possible. Confidence is medium that a winter storm could produce heavy snow, sleet, or freezing rain and cause significant impacts.
Winter Storm Warning (Pink)	Snow, sleet, or ice expected. Confidence is high that a winter storm will produce heavy snow, sleet, or freezing rain and cause significant impacts.

Source: NWS

The National Weather Service (NWS) developed the Wind Chill Temperature (WTC) index to provide a formula to calculate the dangers from winter winds and freezing temperatures shown in **Table 43. NWS Extreme Cold Weather Products**. Additionally, the NWS produces frost and freeze advisory, watch, and warning to communicate when temperatures can pose a risk.

Table 43. NWS Extreme Cold Weather Products

NWS Product	Description
Frost Advisory (Light Blue)	A frost advisory means areas of frost are expected or occurring, posing a threat to sensitive vegetation.
Freeze Watch (Blue)	NWS issues a freeze watch when there is a potential for significant, widespread freezing temperatures within the next 24-36 hours. A freeze watch is issued in the autumn until the end of the growing season and in the spring at the start of the growing season.
Freeze Warning (Dark Blue)	When temperatures are forecasted to go below 32°F for a long period of time, NWS issues a freeze warning. This temperature threshold kills some types of commercial crops and residential plants.



NWS Product	Description
Hard Freeze Warning (Light Purple)	NWS issues a hard freeze warning when temperatures are expected to drop below 28°F for an extended period of time, killing most types of commercial crops and residential plants.

Source: NWS

Overall, extreme temperature impacts would likely be limited in the planning area, at least 25 percent of the planning area affected, which is extensive. Extreme cold can occasionally cause problems with communications facilities and utility transmission lines. Danger to people is highest when they are unable to heat their homes and when water pipes freeze. Extreme cold and extreme heat can also impact livestock and even crops if the event occurs during certain times of the year.

PAST OCCURRENCES

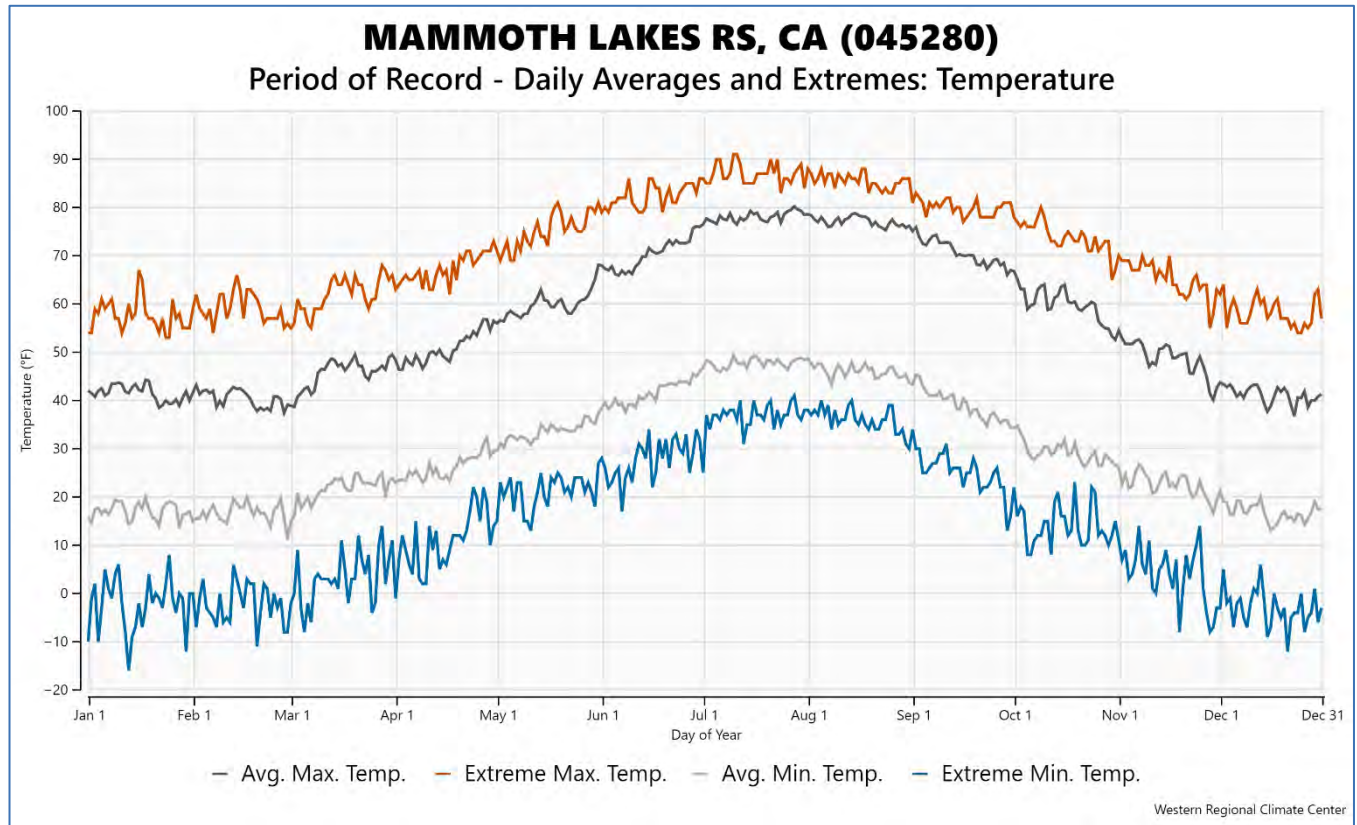
Information from the three representative weather stations introduced in the Severe Weather: General section, is summarized below.

FRESNO COUNTY—EAST (MAMMOTH LAKE, INYO COUNTY, PERIOD OF RECORD 12/01/1993 - 08/31/2020)

The previous plan included weather data from the Huntington Lake weather station, however data from that weather station has not been updated since 2016. Therefore, the Mammoth Lake weather station was used in Inyo County, which is just outside of the northeastern portion of Fresno County, to provide an understanding of averages for the eastern portion of the jurisdiction. While the period of record only captures up until August of 2020, it is the closest weather station to the eastern portion of Eastern Fresno County that has a similar environment.

Monthly average maximum temperatures in the warmest months (May through October) range from the mid-50s to low 80s, shown in **Figure 38. Mammoth Lakes Daily Averages and Extremes: Temperatures**. Monthly average minimum temperatures from November through April range from the high 20s to low 10s. July 11 had the highest extreme maximum temperature of 91 degrees. January 13 had the lowest extreme minimum temperature of -16 degrees.

Figure 38. Mammoth Lakes Daily Averages and Extremes: Temperatures

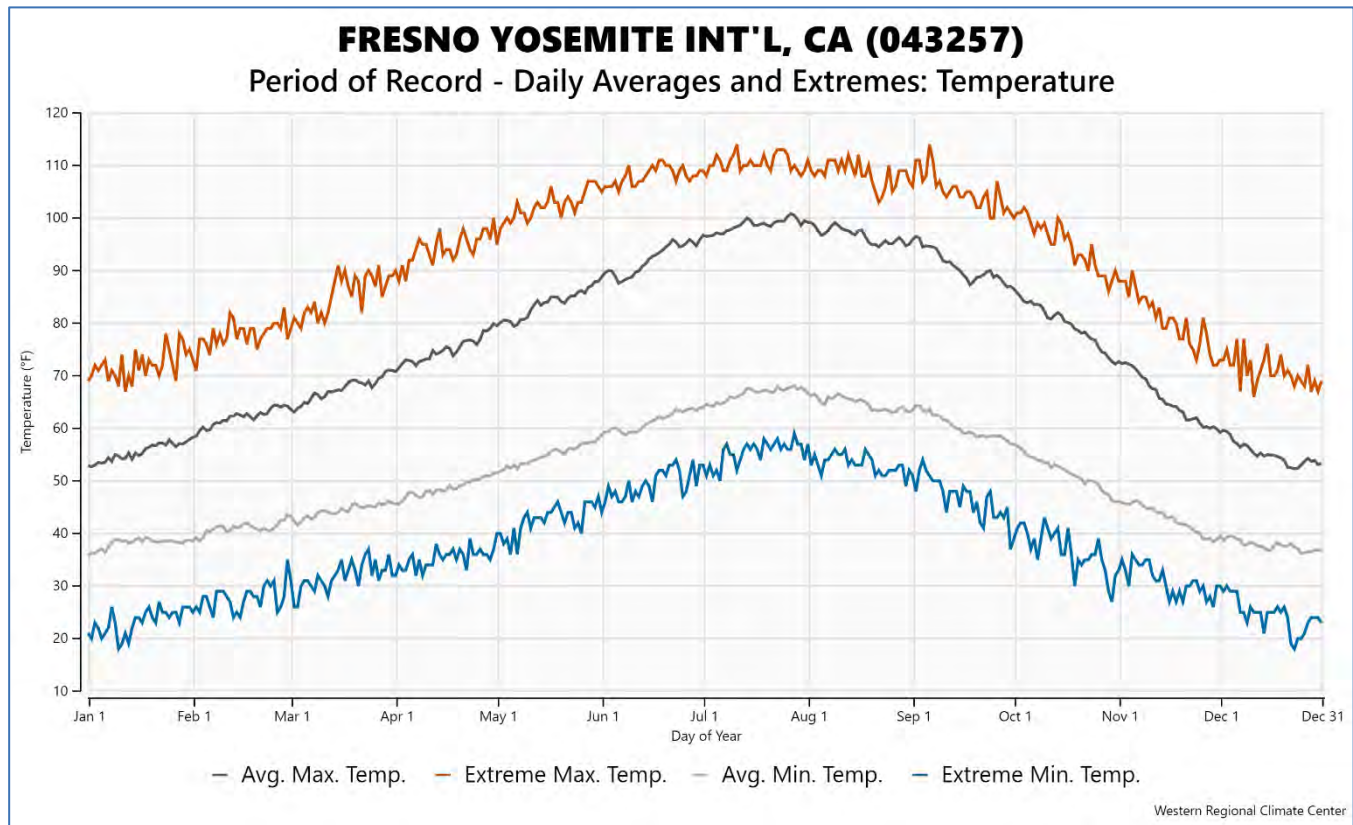


Source: Western Regional Climate Center, www.wrcc.dri.edu/

FRESNO COUNTY—CENTRAL (FRESNO YOSEMITE INTERNATIONAL, PERIOD OF RECORD 01/01/1948 - 02/04/2024)

Monthly average maximum temperatures in the warmest months (May through October) range from the high 70s to low 100s, shown in **Figure 39. Fresno Yosemite International Daily Averages and Extremes: Temperatures**. Monthly average minimum temperatures from November through April range from the mid-30s to mid-40s. September 6 had the highest extreme maximum temperature of 114 degrees. December 23 and January 10 had the lowest extreme minimum temperature of 18 degrees.

Figure 39. Fresno Yosemite International Daily Averages and Extremes: Temperatures

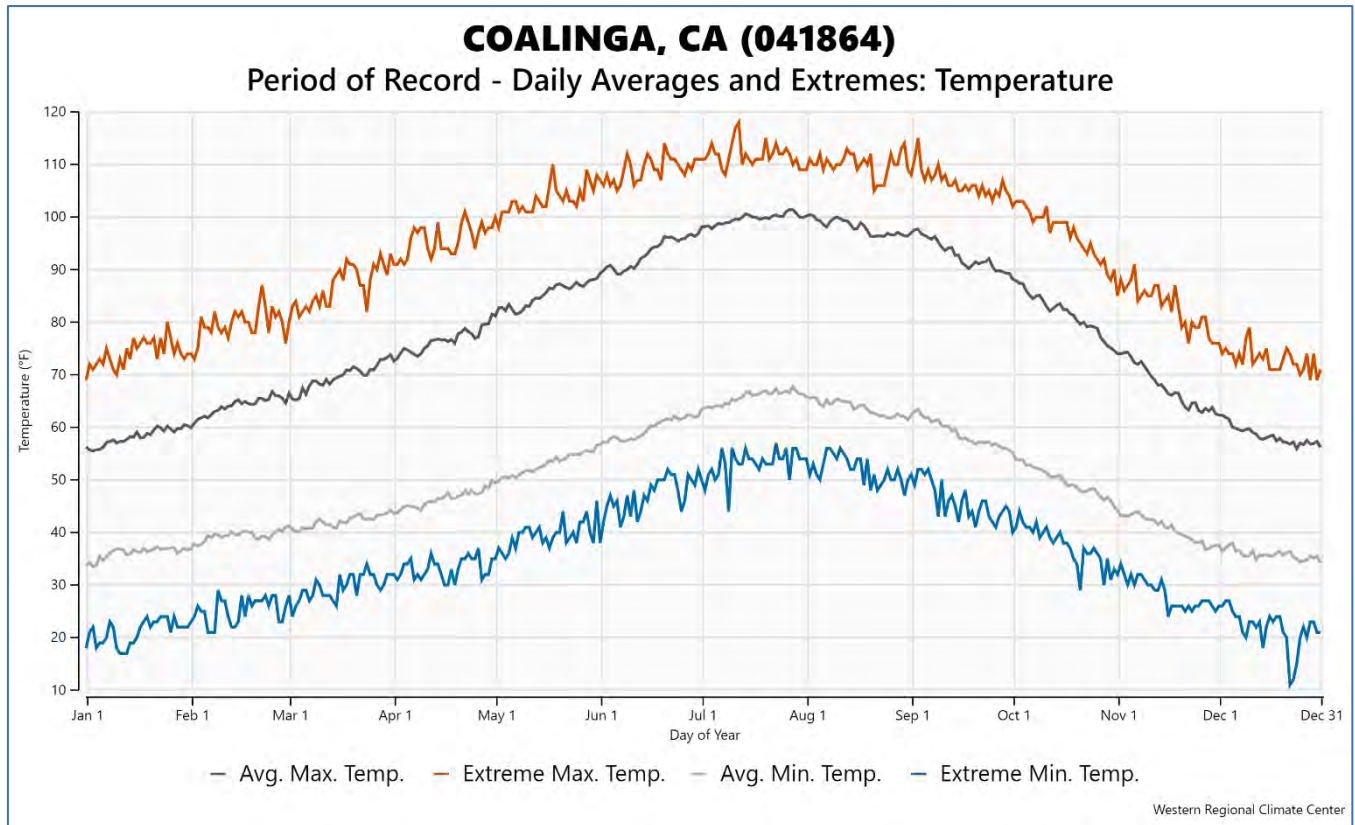


Source: Western Regional Climate Center, www.wrcc.dri.edu/

FRESNO COUNTY—WEST (COALINGA WEATHER STATION, PERIOD OF RECORD 1942 TO 2023)

Monthly average maximum temperatures in the warmest months (May through October) range from the high 70s to low 100s, shown in **Figure 40. Coalinga Daily Averages and Extremes: Temperature**. Monthly average minimum temperatures from November through April range from the high 40s to 100s. July 12 had the highest extreme maximum temperature of 118 degrees. December 22 had the lowest extreme minimum temperature of 11 degrees.

Figure 40. Coalinga Daily Averages and Extremes: Temperature



Source: Western Regional Climate Center, www.wrcc.dri.edu/

The HMPC identified the following events related to extreme temperatures in the Fresno County planning area below and in **Table 44. Fresno County Previous Occurrences: Extreme Cold** and **Table 45. Fresno County Previous Occurrences: Extreme Heat**.

EXTREME COLD/FREEZE

- **1990:** This freeze event is on record as the most economically devastating freeze event to date due to the loss of production citrus trees, not just the loss of the fruit crop.
- **December 20-28, 1998:** Extreme low temperatures adversely affected agricultural crops in the County. Citrus crops were impacted the most, but winter vegetables were also damaged. Total crop damage was estimated at \$74 million. The loss to crops also resulted in unemployment and loss of income to small towns and industry throughout the planning area. An estimated 14,000 or more agricultural workers were out of work. Estimated economic impacts to the community were \$220 million. This freeze resulted in local, state, and federal declarations (2/9/99). The County also incurred \$223,700 in damage to government facilities and roads. Statewide, \$2.5 million was paid out in claims.
- **January 2007:** Freezing temperatures destroyed citrus crops and put many people out of work. Within the agricultural citrus belts, temperatures ranged from 19-24°F during the morning. Damage to County facilities was estimated at \$15,000. Crop damage was estimated at roughly \$128 million. Residual effects from loss of sales and resulting unemployment were three times the cost of the crop damage (\$383 million). Local, state, and federal disasters were declared. The state provided monies for mortgage and rental assistance. Federal and state donations to local food banks were increased. Unemployment insurance benefits were also increased. Central and South Valley estimated combined property damage was \$250,000, and agricultural damage was \$710 million.

Table 44. Fresno County Previous Occurrences: Extreme Cold

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Fresno County	1990	0		0	0	0
Fresno County	12/20/1998 – 12/28/1998	0	223,700	74 M	0	0
Fresno County	January 2007	0	250,000	128 M	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

EXTREME HEAT

- **July 2006:** The planning area experienced six days of triple digit temperatures. The state declared a heat emergency for Fresno County. Cooling centers were opened by the state and some local jurisdictions. 24 people died between July 14 and August 1. 16,500-25,000 dairy cattle died in the Central Valley, and up to 700,000 poultry died. Milk production was down 30 percent, with dairy losses estimated to exceed \$80 million. Residual effects from loss of sales and resulting unemployment were three times the cost to the livestock industry. A local declaration was also declared to dispose of dead livestock at the County landfill. Federal/state disaster relief included \$16 million for lost milk production. Federal loans were made available to farmers.



- **July 2007:** Extreme, prolonged heat caused a mass die-off of farm animals such as dairy cattle and poultry. An estimated 50,000 turkeys, weighing up to 40 pounds each, died, which created a disposal issue. Zacky Farms was hit hardest, but other losses were incurred at various locations throughout the County. A local emergency was declared to legally dispose of these animals at the local landfill.
- **July 2008:** An intense heatwave gripped Interior Central California starting July 8 due to a high-pressure system, with temperatures soaring to 105-112 degrees and minimum heat index values staying above 80 degrees at night. Record-breaking minimum temperatures were observed in Bakersfield and Fresno, exacerbating conditions already critical due to concurrent wildfires which led to significant air quality issues and advisories. This extreme weather claimed the lives of two farm workers in Kern County, highlighted the vulnerability of sensitive groups, and resulted in substantial poultry losses in Kings County, prompting a local state of emergency.
- **August 2011:** In late August, a robust high-pressure system caused a severe heatwave in southeast California, with temperatures in Joshua Tree National Park surpassing 110 degrees from Tuesday through Saturday. The extreme conditions resulted in the tragic deaths of two European tourists, whose bodies were discovered near Black Eagle Mine Road, indicating they suffered from exposure after leaving their vehicle in a challenging area of the park. Authorities concluded that the victims, found a mile apart, had entered the park before noon and their vehicle was left in a location unsuitable for passenger vehicles.
- **July 2013:** A record-setting ridge of high pressure (600 dm over northern New Mexico) built in over the Great Basin and desert Southwest, beginning around June 29th, lasting through approximately July 7, when it hit another peak in temperatures. This resulted in extreme high temperatures, well above normal, across the region during this period. The hottest days in July were the 1st through the 3rd, during which several record high minimums were set, as well as highs well over 100 degrees. Prolonged heat in the higher terrain was a significant impact, like in San Diego County.
- **June 2016:** Strong high pressure over the four corners region retrograded westward over southern and central California bringing a period of high temperatures over the 110-degree mark to locations in the Kern County Desert.
- **June 2017:** A prolonged heatwave caused by a high-pressure ridge resulted in extreme temperatures, particularly in desert regions where Palm Springs hit 122 degrees on the 20th, 24th, and 25th of the month. The intense heat triggered Flex Alerts for energy conservation and led to a local emergency in Fresno County due to delays at a rendering facility that impacted livestock carcass processing. Measures were taken to implement alternative disposal methods as per Fresno County health and agricultural authorities.
- **August 2017:** Upper-level high pressure brought record heat to the area. A plume of subtropical moisture promoted the growth of isolated afternoon thunderstorms with large hail. A 13-year-old was hospitalized Tuesday after suffering heat stroke during tryouts for the freshman football team at Lincoln High School on August 1. Temperatures at Lincoln Airport reached 100 degrees between 4 and 7 pm PDT.
- **September 2017:** A persistent large upper ridge centered over the Great Basin provided the area with an extended period of much warmer than normal temperatures between August 26 and September 3. High temperatures ranged mainly from 106 to 112 degrees at many locations each day between August 26 and September 3 across the San Joaquin Valley, the southern Sierra foothills, and the Kern County Deserts while morning lows ranged from the mid 70's to the lower 80's.



- **June 2019:** A large area of high pressure prevailed over California between June 10 and June 12 which resulted in much warmer than normal temperatures across the area during the period. High temperatures generally ranged between 102 and 107 degrees each day across much of the San Joaquin Valley prompting the first Excessive Heat Warning of the season. As a result of the heat, emergency cooling centers were opened each afternoon in several municipalities in the San Joaquin Valley during this period.
- **May 2020:** A large area of high pressure built into California on May 25 and May 26. This resulted in much above normal daytime temperatures on both days with some locations setting new daily records on May 26. The high then strengthened on May 27 and May 28 resulting in widespread record heat over the region on both days with highs in the San Joaquin Valley mainly between 103 and 107 on both days. Triple digit heat was also observed across portions of the Sierra foothills and Kern County Deserts. Temperatures cooled by several degrees on May 29 and lowered to below seasonal averages by May 30 as the large area high pressure broke down, and a cold front pushed through the area.
- **August 2020:** On August 14, a dominant high-pressure system over the Desert Southwest extended its reach over central California, leading to extreme heat and triggering Excessive Heat Warnings for multiple regions, including the San Joaquin Valley and Kern County Deserts. Record-breaking temperatures were observed on August 16 and 17, exceeding 110 degrees F, prompting several local emergencies due to livestock fatalities and the opening of cooling centers. This prolonged heat event subsided on August 21 as a northwesterly flow ushered in cooler air, offering a respite from the searing temperatures.
- **June / July 2021:** In June 2021, a large upper ridge over the four corners area expanded westward, bringing extreme heat to central California from June 15 to 18, with Kern County Deserts feeling the surge by June 15 and temperatures climbing over 110°F in several areas by June 19. Relief came between June 20 and 22 as the ridge moved east, reducing the scorching temperatures. The following month, from July 7 to 13, another intense high-pressure system settled over the region, causing several days of near-record temperatures, and marking the most severe heat spell since July 2006, albeit with lower humidity levels that mitigated the overall impact. The heat moderated across the area by July 14 as the ridge shifted eastward.
- **September 2021:** A large upper high-pressure center strengthened over the Great Basin during the Labor Day weekend (September 4 to September 6) resulting in temperatures rising to much above normal levels over the San Joaquin Valley, West Side Hills, and Kern County Deserts on September 6. The dangerous heat remained prevalent over the area through September 9 prompting the issuance of heat highlights as the large upper high produced a pronounced southeast flow over the area. A trough moved into northern California during the morning of September 10 bringing an end to the dangerous heat as afternoon highs remained below the century mark at most stations.
- **September 2022:** A large area of high pressure that was centered over the Great Basin area built westward into California on August 31st and brought a period of hot and dry weather to the area which prevailed across the area through much of early September. An Excessive Heat Warning was issued for a large portion of the area including all the San Joaquin Valley, the West Side Hills, the Sierra Foothills, Yosemite Valley, The Kern River Valley, and the Kern County desert areas and remained in effect until the evening hours of September 9. The large high-pressure area finally broke down on September 9 and temperatures remained below dangerous levels on September 10.
- **July 2023:** California experienced multiple waves of high pressure, starting with record-high temperatures on the 1st and 2nd, which cooled slightly on the 3rd as the pressure system shifted eastward. Mid-month, from the 13th to the 17th, another high-pressure build-up over the Desert

4. Risk Assessment



Southwest pushed temperatures near record highs, prompting an Excessive Heat Warning across the region, sparing only the Sierra Nevada above 7000 feet where a Heat Advisory was declared. The pattern repeated with even stronger high pressure from the 21st to the 23rd, inducing a dangerous heat period until a diminishing ridge brought a mild cooling trend by the 25th, with temperatures staying above normal but below hazardous levels in the days following.

Table 45. Fresno County Previous Occurrences: Extreme Heat

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Fresno County	7/16/2006 – 7/22/2006	0	0	0	0	0
Fresno County	July 2007	0	0	0	0	0
Fresno County	July 2008	0	0	0	2	0
Joshua Tree National Park	August 2011	0	0	0	2	0
Fresno County	July 2013	0	0	0	0	0
Fresno County	June 2016	0	0	0	0	0
Fresno County	June 2017	0	0	0	0	0
Fresno County	August 2017	0	0	0	0	1
Clovis	9/01/2017	0	0	0	0	0
Coalinga, Mendota, Firebaugh	6/10/2019	0	0	0	0	0
Coalinga, Mendota, Firebaugh	5/26/2020	0	0	0	0	0
Coalinga, Mendota, Firebaugh	8/14/2020	0	4M	0	0	0
Tollhouse, Pine Ridge	6/17/2021	0	0	0	0	0
Coalinga, Mendota, Firebaugh	7/09/2021	0	0	0	0	0
Coalinga, Avenal	9/09/2021	0	0	0	0	0
Hanford, Corcoran, Lemoore	9/01/2022	0	0	0	0	0
Coalinga, Lemoore, Hanford	July 2023	0	0	0	0	0
Coalinga, Lemoore, Hanford	7/15/2023	0	0	0	0	0
Hanford, Corcoran, Lemoore	7/21/2023	0	0	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

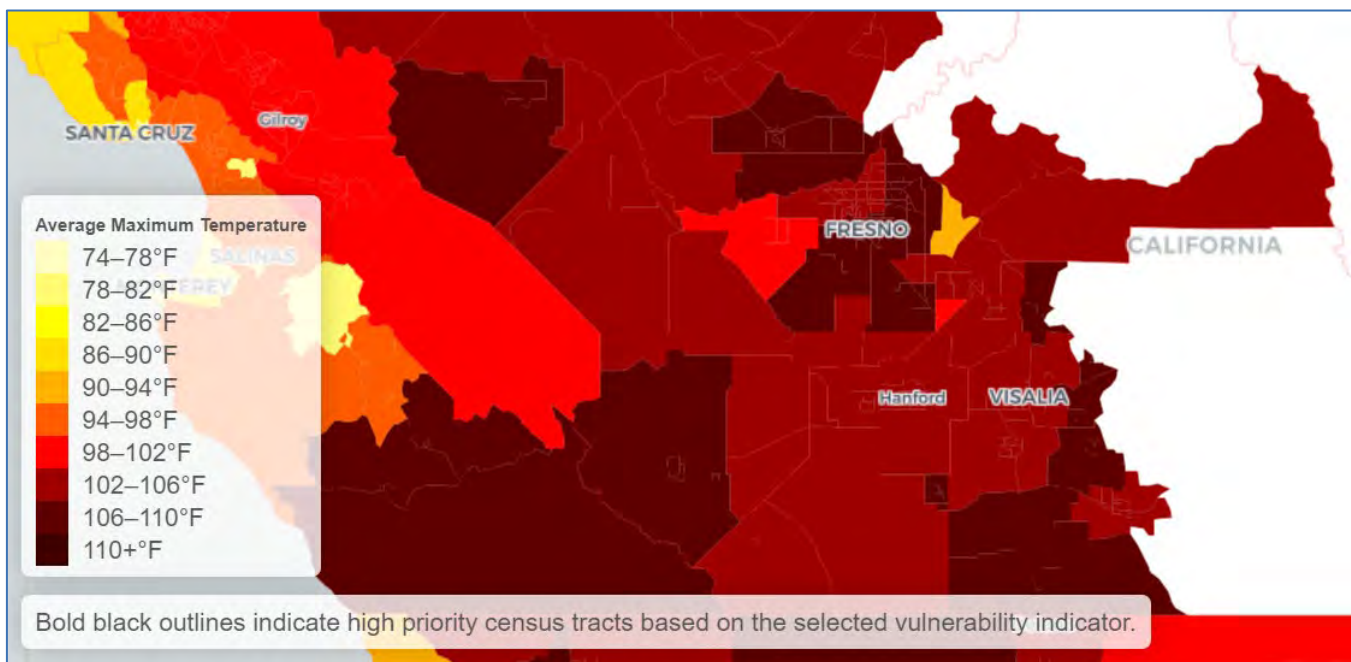
LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely—Temperature extremes are likely to continue to occur annually in the Fresno County planning area.

EXTREME HEAT

The California Heat Assessment Tool (CHAT) was funded and developed to better understand heat vulnerability driven by climate changes to support mitigating public health impacts of extreme heat events in the future. According to CHAT, the projected Average Maximum Temperature during future Heat Health Event (HHEs) for Fresno County, areas within the jurisdiction are projected to reach 90-94 to 106-110 degrees Fahrenheit are shown in **Figure 41. Fresno County California Heat Assessment Tool (CHAT) Heat Health Event Projections.**

Figure 41. Fresno County California Heat Assessment Tool (CHAT) Heat Health Event Projections



Source: California Heat Assessment Tool (CHAT)

CLIMATE CHANGE CONSIDERATIONS

Although heat waves will likely become more frequent, there is also the potential for continued cold outbreaks in winter, even in an overall warmer climate. This could have direct impacts on human health in terms of heat related illness. With the general trend of increased warming of average temperatures, extreme high temperatures will likely increase as well. Cascading impacts include increased stress on



water quantity and quality, degraded air quality, and increased potential for more severe or catastrophic natural events such as heavy rain, droughts, and wildfire. Another cascading impact includes increased duration and intensity of wildfires with warmer temperatures.

Temperatures in the State of California are projected to increase overall. As a part of the California's Changing Climate 2018 report, by 2100 the average annual maximum daily temperature is projected to increase by 5.6-8.8 degrees Fahrenheit. As a result, heat waves are expected to increase in frequency, duration, and magnitude. Los Angeles County will experience an average of nine days of extreme heat per year, growing to 12 days per year, by the final decades of the century.

SEVERE WEATHER: FOG

HAZARD/PROBLEM DESCRIPTION

Fog results from air being cooled to the point where it can no longer hold all the water vapor it contains. For example, rain can cool and moisten the air near the surface until fog forms. A cloud-free, humid air mass at night can lead to fog formation, where land and water surfaces that have warmed up during the summer are still evaporating water into the atmosphere. This is called radiation fog. A warm moist air mass blowing over a cold surface also can cause fog to form, which is called advection fog.

TULE FOG

The interior California valleys have a unique fog problem called tule fogs. The tule fog is a radiation fog, which condenses when there is a high relative humidity, typically after a heavy rain, calm winds, and rapid cooling during the night. The longer nights during the winter months create this rapid ground cooling and results in a pronounced temperature inversion at a low altitude, creating a thick ground fog. Above the cold, foggy layer, the air is typically warm and dry. Once the fog has formed, turbulent air is necessary to break through the inversion. Daytime heating can also work to evaporate the fog in some areas. The tule fogs get their name from the tule reeds, which grew around the swamps and deltas of the great Tulare Lake that once covered the southern end of the San Joaquin Valley.

The tule fog season in Fresno County is typically in the late fall and winter (November through March) but can occur as late as May. Fog typically forms rapidly in the early morning hours. Tule fog can last for days, sometimes weeks. Fog can have devastating effects on transportation corridors in the County. Nighttime driving in the fog is dangerous and multi-car pileups have resulted from drivers using excessive speed for the conditions and visibility.

The San Joaquin Valley is hemmed in on three sides by mountain ranges, with resulting inversion layers trapping cooler air on the valley floor. This predisposes the Fresno area to severe episodes of fog in winter months, when barometric pressures are high, humidity is increased, and ambient temperatures are low. **Table 46. Average Number of Dense Fog Days (October-April)** shows the monthly and total average number of days with dense fog from 1910-2024. The number of dense fog days per year has decreased in the past several decades, **Figure 42. Average Number of Dense Fog Days Per Year (1910-2024)** shows the average number of dense fog days per year.⁴³

⁴³ Number of Days With Dense Fog by Cool Season FAT.pdf (weather.gov) <https://www.weather.gov/media/hnx/>

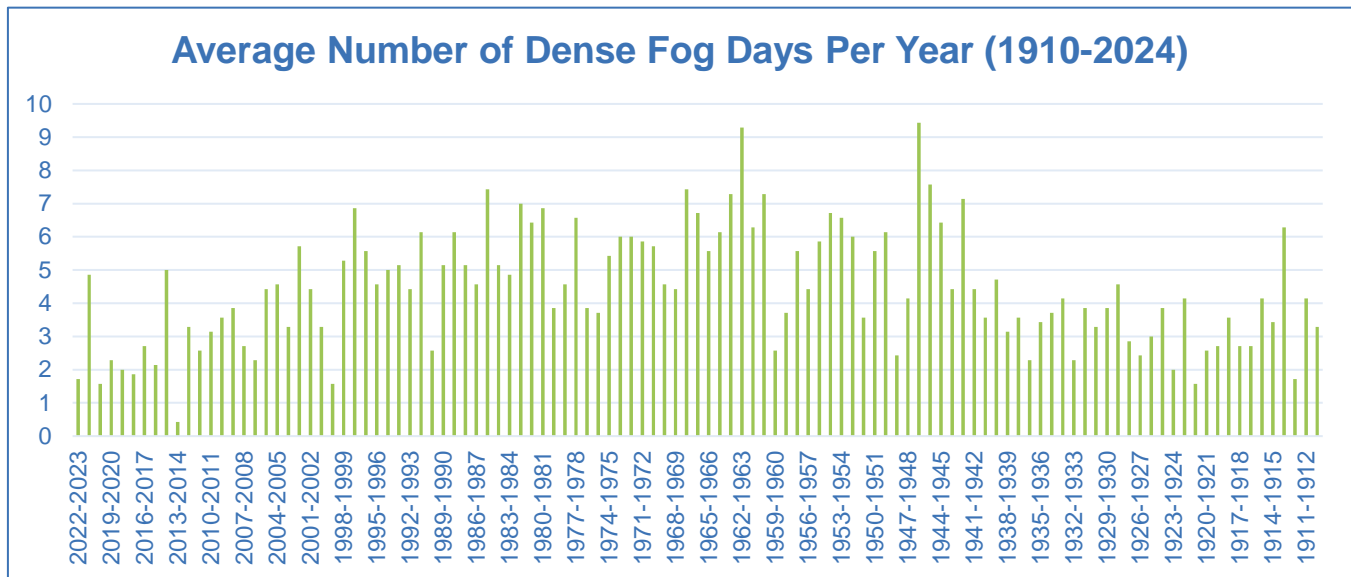


Table 46. Average Number of Dense Fog Days (October-April)

	October	November	December	January	February	March	April	Total
Average Number of Days with Dense Fog	2 days	5 days	10 days	10 days	5 days	2 days	1 day	31 days

Source: NOAA

Figure 42. Average Number of Dense Fog Days Per Year (1910-2024)



Source: NOAA

Fog contributes to transportation accidents and is a significant life safety hazard. These accidents can cause multiple injuries and deaths and could have serious implications for human health and the environment if a hazardous or nuclear waste shipment were involved. Other disruptions from fog include delayed emergency response vehicles and school closures.

EXTENT

Tule fog forms on clear nights when the ground is moist, and the wind is near calm. On nights like this, the ground cools rapidly. In turn, the moist air above it cools and causes water vapor to condense. Once it has formed, the air must be heated enough to either evaporate the fog or lift it above the surface so that visibilities improve. Common areas for tule fog to form include foothills and valleys. Visibility in tule fog is usually less than an eighth of a mile (about 600 ft or 200 m) but can be much lower. Visibility can vary rapidly; in only a few feet, visibility can go from 10 feet (3.0 m) to near zero.

Figure 43. November 2007 Fog Incident shows an example of an incident caused by tule fog in Fresno County.

Figure 43. November 2007 Fog Incident



Source: Donovan, California Highway Patrol

Most of these notable fog-related accidents occurred on Highway 99, like the one pictured above. Traffic Accident Caused by Fog, November 2007. In addition to these events, other, less notable collisions occurred on other roads during foggy conditions. Of their most notable fog events, there have been over 20 deaths and hundreds of injuries.

PAST OCCURRENCES

According to the HMPC, severe fog is a recurring problem within the planning area, and most damage results from automobile accidents. Most of these incidents occurred between November and March; one was in October. There have been hundreds of reported fog incidents since 1950, the most notable fog incidents reported by the HMPC include in the following below and in **Table 47. Fresno County Past Occurrences: Fog.**



- **February 1991:** A series of accidents involving 74 vehicles occurred along a three-mile, fog-shrouded stretch of Highway 99 south of Fresno. Three people were killed and 30 were injured.
- **January 16, 1994:** Dense fog caused a 56-vehicle pileup on Highway 99 near Selma, killing two people and injuring 42 others.
- **November 1998:** Dense fog caused a chain-reaction accident involving 74 vehicles along a one-mile stretch of Highway 99 near Kingsburg. Two people were killed, 51 others injured.
- **February 2002:** Fog was a factor in a string of crashes on Highway 99 near Selma that killed two people. More than 30 others were injured in the accident, which involved 87 cars, trucks, and big rigs over a four-mile stretch.
- **November 20, 2002:** Fog was a major factor in a 50-vehicle collision on Highway 99 near Merced that resulted in 32 injuries.
- **February 7, 2006:** Fog was a factor in a 20-vehicle collision on Highway 99 near Tulare that resulted in one death and multiple injuries.
- **November 3, 2007:** Dense fog contributed to the worst traffic accident in Fresno County on Highway 99 just south of Fresno. At least two people were killed in the 108-car chain-reaction crash, which involved 18 big rigs, and 39 individuals were sent to local hospitals. Drunk driving was also cited as a contributing factor. Traffic Accident Caused by Fog, November 2007.
- **February 2008:** Two nights of dense fog resulted in a 10-15 car pileup on the morning of the 11th near Kerman west of Fresno, where there were no injuries, and newspaper accounts of only minor property damages. However, the fog was a major factor in a series of chain-reaction accidents on Highway 99 near Kingsburg during the morning of February 12th. At least four separate accidents occurred, involving at least 40 vehicles, and resulting in at an estimated 10 people being injured.
- **November 2012:** Patchy dense fog developed in the San Joaquin Valley following a storm on November 20th-21st, starting in the Los Banos area before spreading to the Reedley-Visalia area. This fog caused variable visibilities across the Valley, affecting most airports with fluctuations from near zero to a couple of miles. Persistent dense fog was implicated in a fatal chain reaction crash on Highway 152 near Chowchilla in Madera County on the morning of November 27th.
- **January 2013:** January began with the central and southern San Joaquin Valley under a cold, dry airmass that moved into the region. Dense fog continued its reputation as the main winter weather hazard for the central and southern San Joaquin Valley, as a fatal collision occurred 3 miles southeast of Chowchilla in dense fog during the morning of January 4th. These conditions continued through the morning of the 5th, and then a strong upper-level low brought the first precipitation of the year that evening.
- **January 2017:** High pressure with clearing skies over the region coupled with recent heavy precipitation created ideal conditions for dense nighttime and morning radiational fog to develop. Fresno police and California Highway Patrol reported a 2-vehicle accident during dense fog causing one fatality at Jensen Avenue and Chateau Fresno Avenue in the city of Fresno in Fresno County. It also appeared alcohol was a factor.
- **1/31/2017:** High pressure with clearing skies over the region coupled with recent heavy precipitation created ideal conditions for dense nighttime and morning radiational fog to develop. Damages totaled thousands of dollars and resulted in 1 death.
- **1/10/2019:** An upper ridge pushed inland into California on the evening of January 9th and morning of January 10. As a result, skies cleared out and winds diminished across the San Joaquin Valley during the early morning hours which led to the development of widespread dense fog across much



of the valley on the morning of the 10th and several locations reported visibility of an eighth of a mile or less. The dense fog was responsible for a fatal auto accident near Atwater. Several school districts in the valley opened late that morning. The fog lifted into a low cloud deck by late morning and dissipated by early afternoon.

- **1/27/2019:** The fog reformed in much of the valley not long after midnight and persisted until late morning. Fog reduced visibility to below an eighth of a mile for 5 to 10 hours at several locations. There were several fog related accidents during the morning of January 27 and California Highway Patrol paced traffic on several highways until the fog lifted by late morning.
- **12/11/2019:** Fog settled back into the San Joaquin Valley north of Kern County during the evening of December 10 and reduced visibility to below a quarter mile at several locations during the morning of December 11. Once again, several school districts in the valley either opened late or delayed bus service. The fog lifted into a status deck by late morning which eroded by afternoon as an upper-level trough moved to the north of the area and mixed out the near surface airmass.
- **1/24/2020:** High pressure continued to strengthen over the area on January 24, although some high clouds pushed through the area, light winds and inversion conditions allowed for an area of dense fog to form in the center of the San Joaquin Valley north of Kern County where low-level moisture has persisted. The fog reduced visibility to less than an eighth of a mile at several locations and resulted in several school districts either opening late or delaying or cancelling bus service as it persisted until late morning when it lifted into a low cloud deck. The low stratus deck slowly dissipated during the afternoon. The fog also contributed to two multi-vehicle accidents near Caruthers.
- **1/06/2021:** High pressure built over central California on January 5. With mainly clear skies and light winds, areas of dense fog formed in the San Joaquin Valley during the early morning hours of January 6. The fog did cause a few automobile accidents as it formed over a widespread area. The fog lifted into a stratus deck by late morning as a weak system moved through northern California then dissipated by midday.
- **11/21/2021** - Another night of clear skies, light winds and inversion conditions resulted in widespread dense fog forming in the San Joaquin Valley during the evening of November 21 into the early morning of November 22. The fog persisted over a widespread area until late morning when it lifted into a low clouds deck which eroded during the afternoon. The fog resulted in at least three major vehicular accidents in the San Joaquin Valley during the morning of November 22.
- **12/03/2021** - Little change in the upper air pattern occurred from the previous day. Clear skies, light winds and inversion conditions in the San Joaquin Valley allowed for areas of dense fog to form in Merced, Madera, and Fresno Counties in the central San Joaquin Valley during the early morning hours and the fog resulted in several multi-vehicle accidents including two which had fatalities. Traffic was packed during the morning commute on SR 99 north of Madera and several school districts had delayed openings. The fog lifted into a low cloud deck by late morning and dissipated during the afternoon.
- **January 2022:** Persistent dense fog affected parts of the central San Joaquin Valley, particularly between Merced and Madera, from the evening of January 14 until midday on January 16. Intermittent fog was present in other areas of the San Joaquin Valley during this time. The fog, influenced by a low-pressure system off the Southern California coast, lifted by January 16 and was a contributing factor in a fatal multi-car accident near Biola in Fresno County.



Table 47. Fresno County Past Occurrences: Fog

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Highway 99 Fresno	February 1991	0	0	0	3	30
Highway 99 Selma	1/16/1994	0	0	0	2	42
Highway 99 Kingsburg	November 1998	0	0	0	2	51
Highway 99 Selma	February 2002	0	0	0	2	30
Highway 99 Merced	11/20/2002	0	0	0	0	32
Highway 99 Tulare	2/07/2006	0	0	0	1	0
Highway 99 Fresno	11/03/2007	0	0	0	2	39
Highway 99 Kingsburg	February 2008	0	0	0	0	10
Los Banos Area	November 2012	0	0	0	3	0
Southern San Joaquin Valley	January 2013	0	0	0	0	0
Fresno County	January 2017	0	33,000	0	1	0
Between Merced and Madera	1/14/22	0	630,000	0	0	0
Fresno, Madera, Merced, and Atwater	1/10/2019	0	10,000	0	1	3
San Joaquin Valley	1/27/2019	0	20,000	0	0	0
Fresno and Reedley	12/03/2019	0	10,000	0	0	0
Hanford	12/11/2019	0	10,000	0	0	0
Hanford	1/24/2020	0	50,000	0	0	0
Hanford and Visalia	1/06/2021	0	150,000	0	1	0
Hanford, Visalia, and Porterville	11/21/2021	0	65,000	0	0	0
San Joaquin Valley	11/22/2021	0	15000	0	0	0
San Joaquin Valley	12/03/2021	0	400,000	0	2	3
Between Selma and Fresno Highway 99	1/14/2022	0	630,000	0	1	1

Source: NOAA, National Centers for Environmental Information, Storm Events Database

LIKELIHOOD OF FUTURE OCCURRENCES

Likely—Based on the NCEI, since 1991 there have been 28 major fog incidents over a 32-year period equates to a major fog event about once a year and an 87.5 percent chance of a major fog event in any given year. Based on input from the HMPC, it is likely that minor fog events will continue to occur annually in the Fresno County planning area.

CLIMATE CHANGE CONSIDERATIONS

California's winter tule fog has declined dramatically over the past three decades, raising a red flag for the state's multibillion dollar agricultural industry, according to researchers at UC Berkeley. Crops such as almonds, pistachios, cherries, apricots, and peaches go through a necessary winter dormant period brought on and maintained by colder temperatures. Tule fog, a thick ground fog that descends upon the state's Central Valley between late fall and early spring, helps contribute to this winter chill. "The trees need this dormant time to rest so that they can later develop buds, flowers and fruit during the growing season," said biometeorologist and study lead author Dennis Baldocchi. "An insufficient rest period impairs the ability of farmers to achieve high quality fruit yields." The findings have implications for the entire country since many of these California crops account for 95 percent of U.S. production, the authors noted. The researchers paired NASA and National Oceanic and Atmospheric Administration satellite records with data from a network of University of California weather stations, covering 32 consecutive winters. There was a great deal of variability from year to year, but on average, the researchers found a 46 percent drop in the number of fog days between the first of November and the end of February. Climate forecasts suggest that the accumulation of winter chill will continue to decrease in the Central Valley. Tule fog was also less prevalent in recent years in part due to the multi-year drought.

SEVERE WEATHER: HEAVY RAIN/THUNDERSTORM/HAIL/LIGHTNING/WIND

HAZARD/PROBLEM DESCRIPTION

Storms in the Fresno County planning area are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Thunderstorms are one of the most common natural hazards in the U.S., with approximately 100,000 thunderstorms recorded per year nationwide. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it can produce wind gusts greater than 58 mph, or hail that is one inch or larger in diameter, which is about the size of a quarter. Hail that size and larger can destroy crops, roofs, and vehicles, and even cause human casualties. Descriptions of hail, lightning, and high winds, commonly accompanied by severe thunderstorms, are listed below.

- **Hail:** is formed when water droplets freeze and thaw as they are thrown high into the upper atmosphere by the violent internal forces of thunderstorms. Hail is usually associated with severe storms within the Fresno County planning area. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 miles per hour (mph). Hail events are usually brief, lasting on average 10 to 20 minutes but may last longer with some thunderstorms depending on conditions. Severe hailstorms can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.
- **Lightning:** is defined as all the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be struck directly, which may result in an explosion, burn, or destruction. Or, damage may be indirect, when the current passes through or near an object, which generally results in less damage.
- **High winds:** often accompanying severe thunderstorms, can cause significant property and crop damage, threaten public safety, and have adverse economic impacts from business closures and power loss. Windstorms in Fresno County are typically straight-line winds. Straight-line winds are generally any thunderstorm wind that is not associated with rotation (i.e., is not a tornado). It is these winds, which can exceed 100 mph, that represent the most common type of severe weather and are responsible for most wind damage related to thunderstorms. These winds can overturn mobile homes, tear roofs off houses, topple trees, snap power lines, shatter windows, and sandblast paint from cars. Other associated hazards include utility outages, arcing power lines, debris blocking streets, dust storms, and an occasional structure fire. Tornadoes (see Section 4.2.18 Tornado) and funnel clouds can also occur during these types of storms.
- **Downslope Winds:** occur when warm/dry air descends rapidly down a mountain side. These types of winds may commonly occur just west of the Sierras. These winds can blow over 40 mph and can occur in sudden gusts that are even stronger, which can make driving hazardous. In addition, their dry conditions increase the risk of wildfires in the area.
- **Santa Ana Winds:** occur when air from a region of high pressure over the dry, desert region of the southwestern U.S. flows westward towards low pressure located off the California coast. This creates dry winds that flow east to west through the mountain passages in Southern California closer to Los Angeles and San Diego but may occasionally influence Fresno County. These winds are most common during the cooler months of the year, occurring from September through May. Santa Ana winds typically feel warm (or even hot) because as the cool desert air moves down the side of the mountain, it is compressed, which causes the temperature of the air to rise. These

strong winds can cause major property damage. They also increase wildfire risk because of the dryness of the winds and the speed at which they can spread a flame across the landscape.

EXTENT

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. **Table 48. Hail Measurements** indicates the hailstone measurements utilized by the National Weather Service.

Table 48. Hail Measurements

Average Diameter	Corresponding Household Object
Pea	0.25
Marble or Mothball	0.50
Penny or Dime	0.75
Nickle	0.88
Quarter	1.00
Half-Dollar	1.25
Walnut or Ping Pong Ball	1.50
Golf Ball	1.75
Hen's Egg	2.00
Tennis Ball	2.50
Baseball	2.75
Teacup	3.00
Grapefruit	4.00
Softball	4.50

Source: National Weather Service

The largest hailstones recorded in Fresno County had a diameter of 1.75 inches in 1957. Lightning is measured by the Lightning Activity Level (LAL) scale, created by the National Weather Service to define lightning activity into a specific categorical scale. The LAL is a common parameter that is part of fire weather forecasts nationwide. The LAL is reproduced in **Table 49. Lightning Activity Level Scale**.

Table 49. Lightning Activity Level Scale

Lightning Activity Level	
LAL1	No thunderstorms
LAL2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five-minute period
LAL3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a five-minute period.

Lightning Activity Level	
LAL4	Scattered thunderstorms. Moderate rain is commonly produced. Lightning is frequent, 11 to 15 cloud to ground strikes in a five-minute period.
LAL5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater than 15 cloud to ground strikes in a five-minute period.
LAL6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag warning

Source: National Weather Service

High winds or a windstorm are especially dangerous in areas with significant tree stands and areas with exposed property, poorly constructed buildings, manufactured housing units, major infrastructure, and above-ground utility lines. High winds can cause downed trees and power lines, flying debris and building collapses, which may lead to power outages, transportation disruptions, damage to buildings and vehicles, and injury or death. There are several types of high winds events described in **Table 50. Types of High Winds**.

Table 50. Types of High Winds

Type	Description
Straight-line winds	Used to describe any thunderstorm wind that is not associated with rotation and is used mainly to differentiate from tornadic winds.
Downdraft	Is a small-scale column of air that rapidly sinks toward the ground.
Macrobust	An outward burst of strong winds at or near the surface with horizontal dimensions larger than 4 km and occurs when a strong downdraft reaches the surface.
Microburst	A small, concentrated downburst that produces an outward burst of strong winds at or near the surface. There are small and short-lived, lasting only 5-10 minutes, with maximum speeds sometimes exceeding 100 miles per hour.
Downburst	Used to broadly describe macro and microbursts. It is a general term for all localized strong wind events that are caused by a strong downdraft within a thunderstorm while microburst simply refers to a small downburst that is less than 4 km across.
Gust Front	Is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm.
Derecho	A widespread, long-lived storm that is associated with a band of rapidly moving showers or thunderstorms. A typical derecho event consists of numerous microbursts, downbursts, and downburst clusters. A derecho event is classified when damage extends more than 240 miles and includes wind gusts of at least 58 miles per hour.

Source: NOAA

The Beaufort Wind Scale was one of the first scales to estimate wind speed and effects. It was originally developed to help sailors estimate the winds via visual observations. The scale starts with 0 and goes to a force of 12. The Beaufort scale is still used today to estimate wind strengths shown in the table below. **Table 51. Beaufort Wind Scale** outlines the Beaufort scale, describing the damaging effects of wind speed.



Table 51. Beaufort Wind Scale

Wind Speed (mph)	Description-Visible Condition
0	Calm: smoke rises vertically
1-4	Light air; direction of wind shown by smoke but not by wind vanes
4-7	Light breeze: wind felt on face; leaves rustle; ordinary wind vane moved by wind
8-12	Gentle breeze; leaves and small twigs in constant motion; wind extends light flag
13-18	Moderate breeze; raises dust and loose paper; small branches are moved
19-24	Fresh breeze: small trees in leaf begin to sway; crested wavelets form on inland water
25-31	Strong breeze; large branches in motion; telephone wires whistle; umbrellas used with difficulty
32-38	Moderate gale whole trees in motion; inconvenience in walking against wind
39-46	Fresh gale breaks twigs off trees; generally, impedes progress
47-54	Strong gale slight structural damage occurs; chimney pots and slates removed
55-63	Whole gale trees uprooted; considerable structural damage occurs
64-72	Storm very rarely experienced; accompanied by widespread damage
73+	Hurricane devastation occurs

Source: NOAA

Fresno County is at risk of experiencing events in any of these categories.

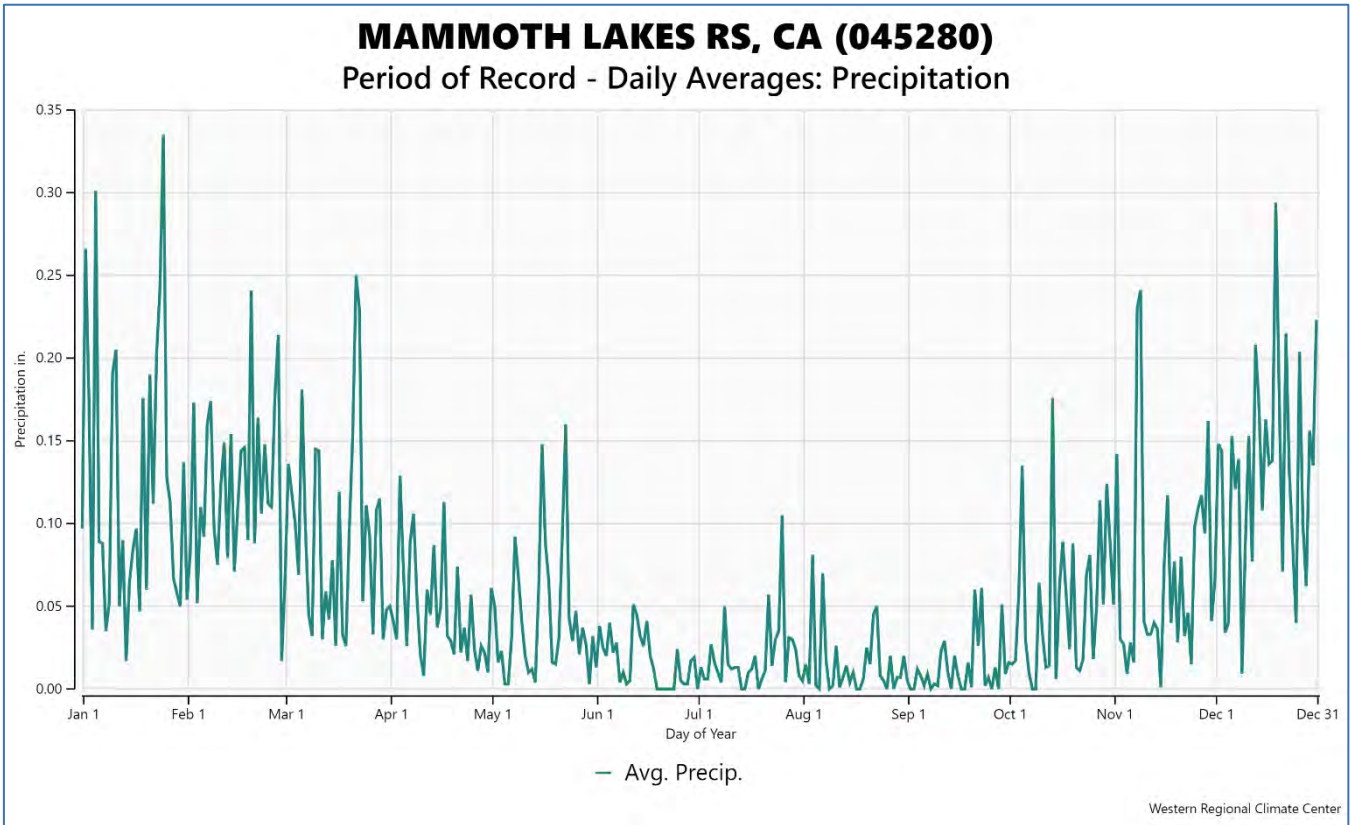
PAST OCCURRENCES

Heavy rains and severe storms occur in the Fresno County planning area primarily during the late fall, winter, and spring, but have been documented in every month of the year. According to the Fresno County General Plan Background Report, the majority of precipitation is produced by storms during the winter months. Precipitation during the summer months is in the form of convective rain showers and is rare. Fresno County receives about 10 inches of rain per year. Snowstorms, hailstorms, and ice storms occur infrequently in the San Joaquin Valley and severe occurrences of any of these are very rare. Damaging winds often accompany winter storm systems moving through the area. Although summer winds are a frequent occurrence, with afternoon winds of 10 to 20 mph being common, it is the winds experienced during the winter storms that result in the most wind-related damage.

According to the HMPC, short-term, heavy storms can cause both widespread flooding as well as extensive localized drainage issues. With the increased growth of the area, the lack of adequate drainage systems has become more of an issue. In addition to the flooding that often occurs during these storms, strong winds, when combined with saturated ground conditions, can down very mature trees.

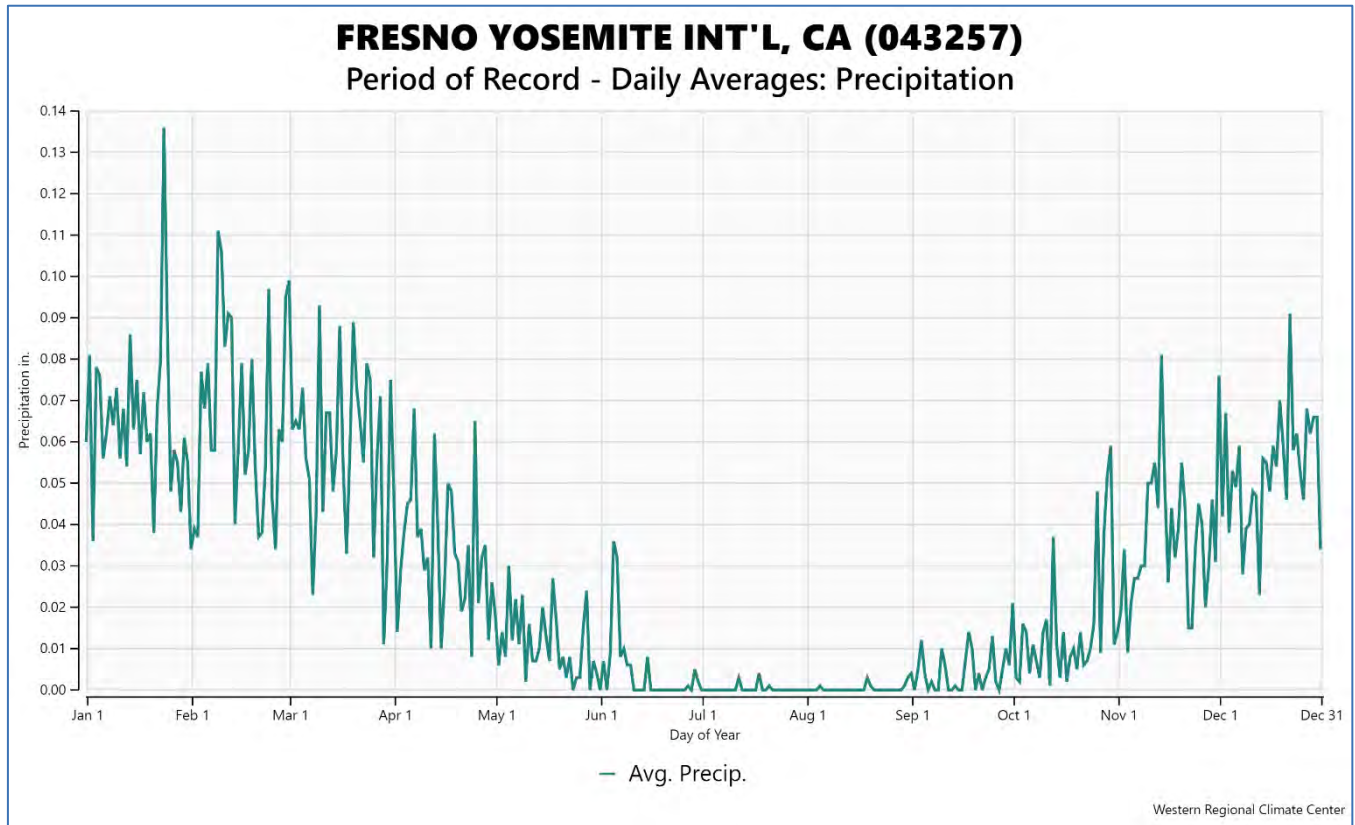
Information from the three representative weather stations introduced in Section 4.2.13 Severe Weather: General is summarized below and in **Figure 44. Mammoth Lakes Daily Averages: Precipitation**, **Figure 45. Central (Fresno WSO AP Weather Station, Period of Record 1948 to 2024)**, and **Figure 46. West (Coalinga Weather Station, Period of Record 1942 to 2023)**.

Figure 44. Mammoth Lakes Daily Averages: Precipitation



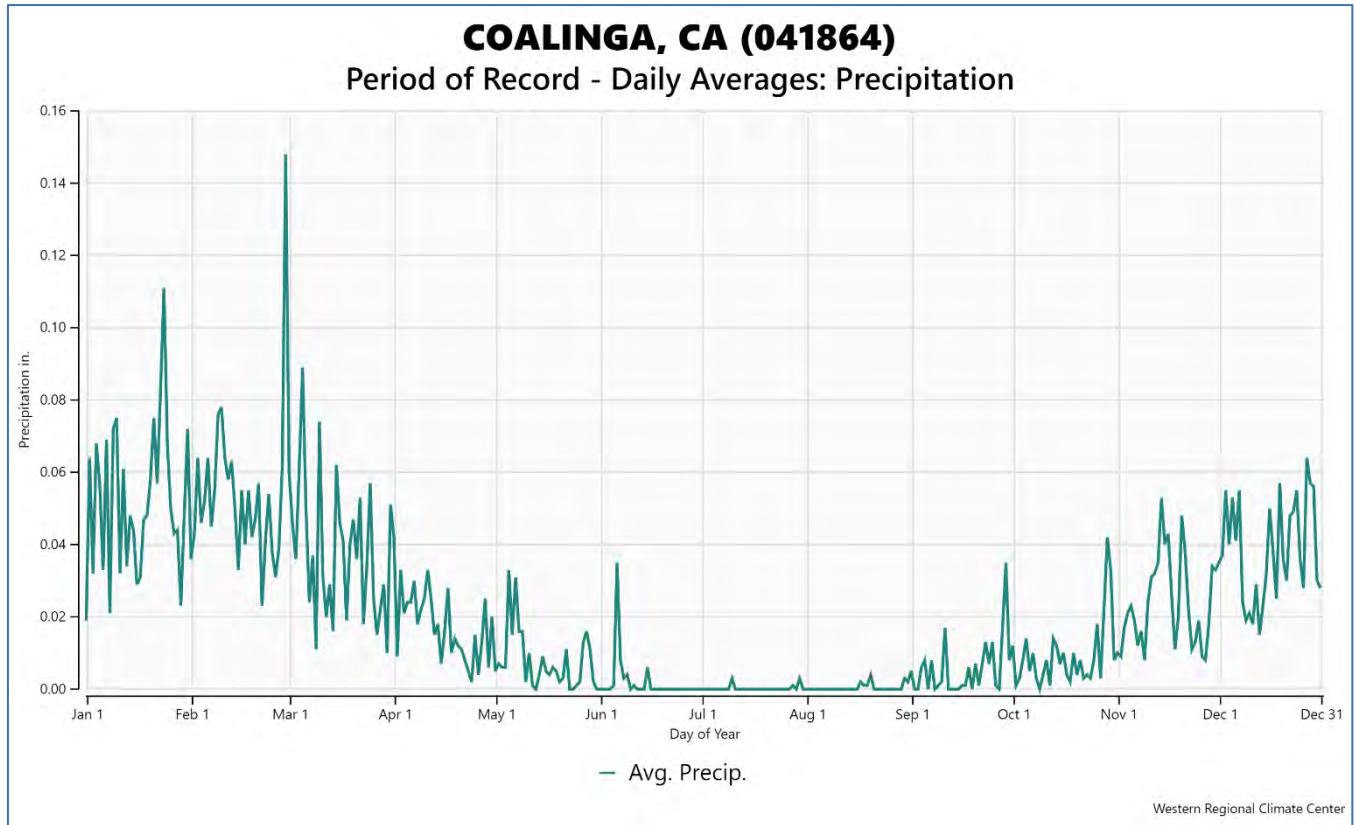
Source: Western Regional Climate Center, www.wrcc.dri.edu/

Figure 45. Central (Fresno WSO AP Weather Station, Period of Record 1948 to 2024)



Source: Western Regional Climate Center, www.wrcc.dri.edu/

Figure 46. West (Coalinga Weather Station, Period of Record 1942 to 2023)



Source: Western Regional Climate Center, www.wrcc.dri.edu/



SEVERE WEATHER EVENTS

Also related to severe weather is the issue of dust storms caused by blowing dust during high wind events. Like foggy conditions, blowing dust can cause extreme visibility problems resulting in traffic accidents. Given the agricultural nature of much of the planning area, recently plowed fields can create the potential for blowing dust and debris. A list of severe weather events is provided in **Table 52**.

Fresno County Past Occurrences: Severe Weather. A list of high wind event is mapped in **Figure 47. Fresno County Historic Wind Events** and detailed in **Table 53. Fresno County Previous Occurrences: High Wind**. The following tables describe other severe weather specific events in **Table 54. Fresno County Past Occurrences: Thunderstorm Wind**, **Table 55. Fresno County Past Occurrences: Hailstorm**, **Table 56. Fresno County Past Occurrences: Lightning Storm**, and **Table 57. Fresno County Past Occurrences: Heavy Rain**. The HMPC provided the following information:

- **11/29/1991:** The day after Thanksgiving, furious winds stoked a huge dust storm on Interstate 5 in western Fresno County, reducing visibility to zero and causing multiple traffic collisions. At least 164 vehicles were involved in 33 collisions clustered along a two- mile segment of the highway. A total of 349 people were involved in the collisions; 17 were killed and 151 were injured.
- **4/14/2009:** California experienced a sequence of weather events starting with an upper-level ridge on April 11th -12th, followed by a mostly dry system on the 13th. This transition led to a cold front on April 14th, causing strong winds and dust storms in the San Joaquin Valley, particularly affecting Coalinga, and Avenal with near-zero visibility. Wind gusts reached 41 mph in Bakersfield and 35 mph in Fresno, closely approaching April wind records. The dust storms led to a traffic collision on Interstate 5 due to poor visibility, resulting in several injuries but no fatalities. Winds persisted into April 15th, spreading to Merced and Atwater, with a notable gust of 40 mph in Fresno on April 16th. The event concluded with minimal rainfall, highlighting the dry conditions of the period.
- **4/14/2015:** An upper-level trough of low pressure moved onshore on April 14th resulting in wind gusts of 45-60 MPH. An area of dust and dirt was lifted into the atmosphere, reducing visibility to near zero across Highway 180 near Fresno. The reduced visibility led to a seven- car crash causing minor injuries and the closure of the roadway for a few hours. Blowing dust reduced visibility to nearly zero along Highway 180, near Fresno, causing two multi-car accidents.
- **2/17/2017:** A series of strong low-pressure systems accompanied with tropical moisture influxes brought strong winds, heavy rainfall, flooding, debris flows, funnel cloud reports, and high elevation snows to the central California region. Precipitation was enhanced at times by orographically lifting.
- **4/06/2017:** A low pressure center moved into northern California on the 6th and spread precipitation into central California by late afternoon. This system brought a period of cool, windy, and unsettled conditions to the area which continued through the 8th. There were several reports of 10-20 inches of new snow over the Southern Sierra Nevada above 8000 feet while thunderstorms during the afternoon of April 8 produced heavy rainfall in some areas. There were numerous reports of heavy rainfall over the Southern Sierra Nevada and adjacent foothills where 2 to 4 inches of rain fell. There were also strong winds across much of the area during this event with several locations reporting wind gusts above 50 mph.
- **11/26/2017:** A swift-moving upper trough brought rain to central California and snow to higher elevations starting late on November 26, with a cold front intensifying the precipitation the following morning. The Southern Sierra Nevada received up to an inch of rain, while the San Joaquin Valley saw lighter rainfall; snow levels, initially high, dropped to 4000 feet post-frontal, resulting in modest snow accumulation. The system's most pronounced effect was the robust winds it generated across



the southern Sierra Nevada, Tehachapi Mountains, and Kern County deserts from the evening of November 26 through the next day's early afternoon.

- **12/16/2017:** An upper trough that had very little moisture with it dropped southeast out of the Gulf of Alaska and pushed into northern California on December 15. This system pushed through central California on the morning of December 16 pushing a cold front through the region. Strong post-frontal winds developed in the San Joaquin Valley behind the front by late morning and continued well into the afternoon hours before the winds diminished by evening. Several stations in the San Joaquin Valley measured peak wind gusts between 35 mph and 55 mph.
- **11/29/2018:** A strong upper trough reached California's coast on November 28, bringing significant rainfall that triggered mudslides, particularly in the burn scar areas, and forced the closure of Highway 140. On November 29, as the system advanced inland, it delivered intense precipitation, with 2 to 5 inches in the Southern Sierra Nevada and foothills, and snowfall accumulating up to 3 feet above 5500 feet. Accompanying the system were strong winds, with gusts surpassing 55 mph, and post-frontal thunderstorms that produced localized heavy showers and gusty winds until the weather system exited the region early on November 30.
- **12/28/2018:** A dry shortwave dropped southward just to the east of the Sierra crest as an upper trough deepened over the Desert Southwest during the morning of December 28. Meanwhile, an upper ridge pushed inland into northern California setting up a period of strong offshore Mono type winds along the crest of the Southern Sierra Nevada. This resulted in a closure of the China Peak ski resort as winds gusted around 55 mph at the top of the lifts. Meanwhile the center of the San Joaquin Valley was sheltered from the winds and clear skies overnight some locally dense fog formed and impacted traffic along State Route 99.
- **12/31/2018:** A strong shortwave trough dropped down through the Great Basin during the morning of December 31. With high pressure pushing inland into northern California behind the trough, offshore Mono type winds developed over the higher elevations of the southern Sierra Nevada which down sloped into the foothills. This resulted in several drought weakened trees being knocked down in the foothills near North Fork and Oakhurst where locally strong wind gusts exceeding 60 mph were reported.
- **1/06/2019:** The second of a series of winter storms moved through central California from the afternoon of January 6 through the early morning of January 7. While this storm produced another round of rain and higher elevation snow across the area with many locations in the southern Sierra Nevada picking up between 1 to 2 inches of liquid precipitation, the main impact from this storm was strong winds were most noticed across the San Joaquin Valley where several trees and power lines were blown down or knocked over.
- **1/17/2019:** As a potent low-pressure system surged into central California on January 16, it delivered not only moderate to heavy precipitation but also spawned strong winds, with several reports of gusts over 50 mph in the Kern County Mountains and Deserts. The storm prompted flash flooding, notably in the Ferguson Fire burn area of Mariposa County and produced a tornado east of Clovis rated as EF-1. While the San Joaquin Valley and Kern County Deserts received up to an inch of rain, the Southern Sierra Nevada saw 2 to 4 inches of liquid precipitation, predominantly as snow above 7000 feet, with some locations accumulating 10 to 20 inches.
- **2/02/2019:** As a potent upper low-pressure system neared the central California coast on the morning of February 2, it generated strong southerly winds that disrupted the Grapevine area and extended into Bakersfield, causing downed trees and damage. The ensuing inland movement of the low ushered in moderate to heavy precipitation, triggering numerous flooding events and thunderstorms that produced hail and a brief tornado south of Mariposa. The San Joaquin Valley



received over an inch of rain, while mountain areas accumulated 2 to 5 inches of liquid precipitation, with the higher elevations above 5000 feet experiencing significant snowfall.

- **2/13/2019:** A low-pressure system brought a surge of moisture to central California on February 13 and 14, unleashing heavy rain and strong winds, with gusts over 60 mph and snow levels rising to nearly 9000 feet, causing widespread flooding and multiple road closures due to flooding and debris flows. A subsequent cold front on February 15 drastically lowered snow levels to 5000 feet, sparking thunderstorms with small hail in the San Joaquin Valley and an EF0 tornado near Yosemite Lakes. The ensuing days saw snow levels drop to 1500 feet, resulting in significant snowfall accumulation and travel disruptions across the Southern Sierra Nevada, with total rainfall reaching up to 7 inches in higher elevations.
- **3/06/2019:** A potent upper low-pressure system brought intense winds and heavy rains to central California on March 5, causing extensive damage. Gusts escalated as a strong southwest upper jet streamed overhead, leading to widespread flooding and the evacuation of several communities due to a potential levee breach near Lake Isabella. The storm's forceful winds, alongside substantial rainfall, prompted road closures and thunderstorms, further exacerbating the severe weather conditions and infrastructure disruptions.
- **3/19/2019:** Strong southerly winds developed over the area during the evening of March 19 as a low-pressure system deepened off the California coast and interacted with an amplifying inland ridge. Several locations along the west side of the San Joaquin Valley and in the Kern County Mountains reported wind gusts exceeding 40 mph during the evening. The winds diminished overnight as cooler air settled in over the area.
- **11/26/2019:** A cold low-pressure system from the Gulf of Alaska reached the Pacific Northwest on November 26, bringing widespread precipitation to central California through November 28, affecting Thanksgiving travel with road closures due to snow. Snow levels dropped to 2000-2500 feet, leading to 5-10 inches of snow in the southern Sierra foothills and 3-8 inches in the Kern County Deserts, while the higher Sierra regions accumulated 18-36 inches. The San Joaquin Valley received a quarter to half an inch of rain, with localized heavier falls from thunderstorms, and significant closures occurred on Interstate 5 and State Route 58 due to snow and accidents.
- **12/22/2019:** A frontal system crossing central California on December 22 and 23 generated strong winds, especially in the Fort Tejon area and Bakersfield, where gusts surpassed 50 mph and some locations near Lebec experienced gusts over 75 mph, causing minor damage. After the winds eased on December 22, the region received widespread rain, with the Sierra Nevada and foothills accumulating 1 to 1.5 inches of precipitation, and higher elevations above 5000 feet gaining 10 to 15 inches of snow. The San Joaquin Valley recorded lower rainfall amounts due to rain shadowing, with most places receiving a quarter to half an inch.
- **1/16/2020:** A cold front connected to an upper trough swept through California on January 16, bringing 6 to 8 hours of precipitation, and depositing a quarter to a full inch of rain across the San Joaquin Valley and adjacent areas, with higher elevations above 4000 feet receiving 5 to 14 inches of snow. Strong winds followed, especially in the southern San Joaquin Valley and Kern County Mountains and Deserts, where gusts surpassed 40 mph and some areas experienced brief gusts over 70 mph, causing minor wind damage. The intense conditions eased by the morning of January 17 as the system moved on.
- **2/09/2020:** A upper-level low pressure system dropped southward along the crest of the Sierra Nevada on the evening of February 8 and morning of February 9 then strengthened over southern California during the afternoon of February 9 through the morning of February 10. This system produced a very strong offshore gradient which resulted in damaging northeast winds over the



Sierra Nevada, mainly over Yosemite Park and Sierra National Forest as well as over the adjacent foothills. The winds knocked down many droughts killed trees over the Sierra and produced widespread property damage over the Sierra foothills in Madera County. There were also several reports of wind gusts between 60 and 70 mph over the Kern County Mountains and Deserts between the evening of February 8 and morning of February 10.

- **3/01/2020:** A cold upper low-pressure system moved south off the California coast on March 1, causing mountain showers and dropping snow levels to 3000 feet, with up to four inches of snow accumulating in areas like Pine Mountain Club. Northeast winds gusted between 35 and 45 mph in the Sierra Nevada, with a peak gust of 83 mph reported near North Fork, while the Kern County Deserts experienced northerly gusts over 60 mph. The gusty conditions persisted until the evening of March 2 before diminishing.
- **12/28/2020:** A low pressure system moving along the central California coast brought significant precipitation and snowfall to the region on December 27-28, with the Sierra Nevada receiving up to three-quarters of an inch of rain and high-elevation areas accumulating several inches of snow. The Tehachapi Mountains also experienced snowfall and precipitation, leading to paced travel and chain restrictions on major routes like Interstate 5 and State Route 168. Gusty winds accompanied the storm, with some areas recording wind gusts exceeding 50 mph.
- **1/18/2021:** A low-pressure system off Southern California's coast and a secondary low moving through Nevada produced destructive northeast winds, with gusts over 60 mph, damaging structures and causing extended power outages in the Sierra foothills. The winds, which also caused the loss of ancient sequoias and necessitated major power line repairs in Mariposa County, prompted disaster declarations. By January 20, the winds subsided as the low pressure moved southward away from the coast.
- **1/27/2021:** A very potent storm system swept through central California, causing heavy rainfall, flooding, and strong winds, with gusts over 45 mph and peak winds reaching 60 mph in the Fort Tejon and West Side Hills areas. This led to power outages and additional trees downed, especially in the Sierra Nevada which had recently experienced a severe wind event. The storm generated heavy precipitation throughout the region, with up to 7 inches of rain in the Sierra foothills and 4 inches in the San Joaquin Valley, while the mountains received 4 to 6 feet of snow, disrupting travel, and closing roads until the system exited on January 29.
- **10/11/2021:** A deep upper low-pressure system dropped from the Pacific Northwest into the Great Basin during the morning of October 11. This resulted in a period of strong winds from the late morning hours until the evening as a very strong pressure gradient developed. Several stations reported wind gusts exceeding 58 mph with the strongest winds most noticeable on the Mojave Desert Slopes of the Tehachapi Mountains. A few low impact indicator sites reported gusts exceeding 80 mph. The winds diminished by the morning of October 12 as the low moved east of the Great Basin and pressure gradients relaxed.
- **10/17/2021:** A strong cold front pushed through central California from the evening of October 17 through the early morning of October 18 as a low-pressure system dropped southward through the Great Basin. While this system did bring some light precipitation to the Sierra Nevada with several stations measuring 1 to 3 tenths of an inch of liquid precipitation and 1 to 3 inches of new snowfall above 6000 feet, the main impact from this system was a period of gusty winds across the West Side Hills as well as across the Kern County Mountains. Several stations reported wind gusts exceeding 45 mph with a few low impact indicator sites measuring gusts exceeding 60 mph.
- **10/25/2021:** A significant upper-level low from the Gulf of Alaska, fueled by Typhoon Namtheun's remnants, brought intense moisture and heavy precipitation to Central California, with areas north



of Kern County receiving up to 5 inches of rain and snow levels dropping to 6000 feet by October 25 evening. The storm also generated high winds, with gusts hitting 58 to 70 mph, and fostered scattered thunderstorms, one of which formed a funnel cloud in southwestern Kings County. This system concluded with snow accumulations of 9 to 30 inches in the higher elevations and rainfall tapering off late on October 25, with diminished winds by the next morning.

- **12/13/2021:** A strong low-pressure system from the Gulf of Alaska brought heavy moisture to central California, resulting in 2 to 4 inches of rain in the Sierra Nevada and significant snowfall above 5500 feet. The system also caused substantial snowfall, with high-elevation SNOTELs recording 2 to 4 feet of new snow, and snow levels dropping to 1500 feet in some areas. Accompanying the precipitation were strong winds, particularly over the West Side Hills and through the Grapevine and Tehachapi areas of Kern County, with gusts surpassing 50 mph and some exceeding 70 mph.
- **3/27/2022:** An upper low-pressure system off the southern California coast brought strong winds, with gusts over 45 mph in the West Side Hills and Tehachapi Mountains. Precipitation followed, yielding a quarter to half an inch of rain in the San Joaquin Valley and foothills, and 0.40 to 0.80 inches in the Sierra Nevada, where elevations above 5500 feet saw 3 to 8 inches of new snow. Thunderstorms developed in the afternoon but moved quickly, preventing significant flooding.
- **11/08/2022:** A deep upper low-pressure system from the Gulf of Alaska introduced widespread precipitation to central California, with the Sierra Nevada receiving 2-4 inches of rain and 20-30 inches of snow above 6000 feet. Strong southerly winds were prominent in Kern County's higher elevations on November 8, with gusts surpassing 50 mph, and some areas experiencing over 75 mph. These conditions led to power outages across the San Joaquin Valley and Sierra foothills, attributed to wind damage, accidents on wet roads, and thunderstorms.
- **12/31/2022:** A large trough brought tropical moisture to California, causing moderate to heavy precipitation and flooding, with the Sierra Nevada receiving up to 7 inches of rain. Strong winds also affected the region, particularly the West Side Hills and Tehachapi Mountains, where gusts surpassed 60 mph. Additionally, higher elevations saw substantial snow accumulation, with SNOTEL stations recording 18 to 30 inches, adding to the already heavy snowpack from earlier in December.
- **1/04/2023:** A significant low-pressure system with an atmospheric river caused moderate to heavy precipitation and strong winds, leading to widespread flooding and snow levels between 7000 to 8000 feet. High elevation areas received up to 30 inches of snow, while the Sierra Nevada and foothills saw up to 3 inches of rain, exacerbating the effects of previously saturated soils. Additionally, the system generated intense winds, with gusts over 60 mph in the Kern County Mountains and West Side Hills, resulting in numerous reports of wind damage.
- **1/07/2023:** A low-pressure system traversed northern California, delivering light to moderate precipitation and strong wind gusts, with some areas experiencing gusts over 60 mph. Precipitation varied, with the Sierra Nevada near Yosemite Park receiving up to an inch of rain and the San Joaquin Valley getting up to half an inch, while Kern County saw less than a tenth of an inch. The snow level dropped to around 5000 feet, leading to significant snow accumulation of 5 to 10 inches at higher elevations.
- **1/09/2023:** A strong low-pressure system brought intense precipitation and high winds to central California, with the Sierra Nevada receiving 3 to 6 inches of rain, exacerbating runoff from existing snowpack and causing extensive flooding, including the inundation of Planada and a record flood at Bear Creek. Strong downslope winds, exceeding 60 mph in areas like the Tehachapi Mountains and Sierra foothills, led to power outages and fallen power lines. The storm system moved east by



January 11, with winds abating, but the significant rainfall resulted in continued flooding from the accumulated runoff.

- **1/16/2023:** Following the January 14 storm, another system on January 15-16 unleashed less rainfall but more destructive winds, with gusts over 40 mph in the San Joaquin Valley and Sierra foothills, and over 60 mph in the Tehachapi Mountains and West Side Hills. These strong winds caused widespread power outages and toppled trees, leading to road closures. The storm's impact lingered with slow subsiding precipitation, not fully clearing until January 17.
- **2/21/2023:** A cold upper trough pushed into central California between the afternoon of February 21 and the early morning of February 22. A cold front associated with this trough produced strong winds throughout much of the area. Several stations in the wind prone areas of the West Side Hills and in the Mountains and Deserts of Kern County measured gusts exceeding 60 mph with a few low impact indicator stations reporting gusts above 80 mph. There were also several reports of downed trees in the San Joaquin Valley.
- **2/24/2023:** On February 24 and 25, a cold upper low-pressure system near California's coast generated powerful winds, as snow levels plunged to 1500 feet, resulting in 2 to 4 feet of snow at higher elevations and subsequent road closures. The San Joaquin Valley and lower Sierra foothills faced both flooding and wind-related disruptions. As the system advanced across southern California on the evening of February 25, it continued to produce strong winds before moving eastward by the morning of February 26.
- **3/14/2023:** Following the recent events which produced widespread flooding across the central California Interior, another atmospheric river plunged through the region on March 14 and 15 producing heavy precipitation, flooding and strong winds with several stations measuring gusts exceeding 60 mph. Much of the Sierra Nevada picked up another 3 to 6 inches of liquid precipitation with snow levels above 8500 feet while the adjacent foothills picked up 2 to 4 inches of rainfall while the San Joaquin Valley and West Side Hills generally picked up between 0.5 to 1.5 inches of rainfall.
- **3/21/2023:** A strong upper trough passed through, bringing intense winds that exceeded 60 mph across the West Side Hills, Sierra Nevada, and Kern County Mountains and Deserts. The Sierra Nevada experienced heavy snowfall, with high elevation SNOTEL stations recording 18 to 30 inches, while the San Joaquin Valley received additional rain on saturated ground. Thunderstorm outflow winds also caused tree damage in and around Fresno on March 21.

Table 52. Fresno County Past Occurrences: Severe Weather

Date	Location	Magnitude (mph)	Fatality	Injury	Property Loss	Crop Loss
3/04/1954	Fresno	0	0	0	\$0	\$0
7/28/1958	Fresno	0	0	0	\$0	\$0
7/28/1958	Unincorporated	0	0	0	\$0	\$0
5/29/1984	Fresno	0	0	0	\$0	\$0
5/30/1994	Fresno	0	1	0	\$0	\$0
5/01/1995	Unincorporated	0	0	0	\$500,000	\$0
5/01/1995	Unincorporated	0	0	0	\$500,000	\$0
5/13/1995	Unincorporated	0	0	0	\$0	\$0
6/15/1995	Unincorporated	0	0	0	\$500,000	\$0

4. Risk Assessment



Date	Location	Magnitude (mph)	Fatality	Injury	Property Loss	Crop Loss
10/30/1996	Unincorporated	0	0	0	\$10,000	\$0
2/14/1998	Fresno	57.5	0	0	\$0	\$0
2/23/1998	Fresno	0	0	0	\$100,000	\$0
4/20/2001	Fresno	57.5	0	0	\$0	\$0
5/31/2002	Unincorporated	0	0	0	\$50,000	\$0
5/31/2002	Unincorporated	0	0	0	\$50,000	\$0
7/21/2006	Unincorporated	69	0	0	\$0	\$0
10/29/2007	Fresno	57.5	0	0	\$30,000	\$0
10/29/2007	Fresno	57.5	0	0	\$50,000	\$0
10/29/2007	Fresno	57.5	0	0	\$10,000	\$0
1/27/2008	Unincorporated	64.4	0	0	\$50,000	\$0
3/15/2008	Mendota	57.5	0	0	\$10,000	\$0
5/28/2009	Fresno	57.5	0	0	\$0	\$0
5/28/2009	Reedley	57.5	0	0	\$0	\$0
5/28/2009	Sanger	57.5	0	0	\$0	\$0
5/28/2009	Unincorporated	57.5	0	0	\$60,000	\$0
5/28/2009	Unincorporated	57.5	0	0	\$0	\$0
6/05/2009	Unincorporated	59.8	0	0	\$0	\$0
6/05/2009	Unincorporated	59.8	0	0	\$0	\$0
2/28/2014	Unincorporated	64.4	0	0	\$500,000	\$0
2/17/2017	Fresno, Clovis, Visalia	57	0	0	0	0
4/06/2017	Fresno, Clovis, Visalia	73	0	0	0	0
11/26/2017	Auberry, Prather, Shaver Lake	52	0	0	0	0
12/16/2017	Fresno, Clovis, Visalia	51	0	0	0	0
11/29/2018	Fresno, Clovis, Visalia	55	0	0	0	0
12/28/2018	South Sierra Mountains Zone	58	0	0	0	0
12/31/2018	Auberry, Prather, Shaver Lake	59	0	0	0	0
1/06/2019	Fresno, Sanger, Reedley	53	0	0	0	0
1/17/2019	South Sierra Mountains Zone	57	0	0	0	0

4. Risk Assessment



Date	Location	Magnitude (mph)	Fatality	Injury	Property Loss	Crop Loss
2/02/2019	South Sierra Mountains Zone	52	0	0	0	0
2/13/2019	South Sierra Mountains Zone	51	0	0	0	0
3/06/2019	Fresno, Clovis, Visalia	56	0	0	0	0
3/19/2019	Fresno, Clovis, Visalia	56	0	0	0	0
11/26/2019	Firebaugh, Coalinga, Mendota	56	0	0	0	0
12/22/2019	Firebaugh, Coalinga, Mendota	53	0	0	0	0
1/16/2020	Shaver Lake, Huntington Lake, Lakeshore	51	0	0	0	0
2/09/2020	Auberry, Shaver Lakes	81	0	0	22,000	0
3/01/2020	Auberry, Shaver Lakes	72	0	0	0	0
12/28/2020	Coalinga, Mendota, Firebaugh	55	0	0	0	0
1/18/2021	Shaver Lake, Huntington Lake, Lakeshore	87	0	0	200,002,000	0
1/27/2021	Auberry, Shaver Lakes	56	0	0	0	0
10/11/2021	Coalinga, Avenal	53	0	0	0	0
10/17/2021	West Side Mountains North of Highway 198 (Zone)	55	0	0	0	0
10/25/2021	Friant, Auberry, Shaver Lake	58	0	0	0	0
12/13/2021	West Side Mountains South of Highway 198 (Zone)	54	0	0	0	0
3/27/2022	West Side Mountains North of	52	0	0	0	0

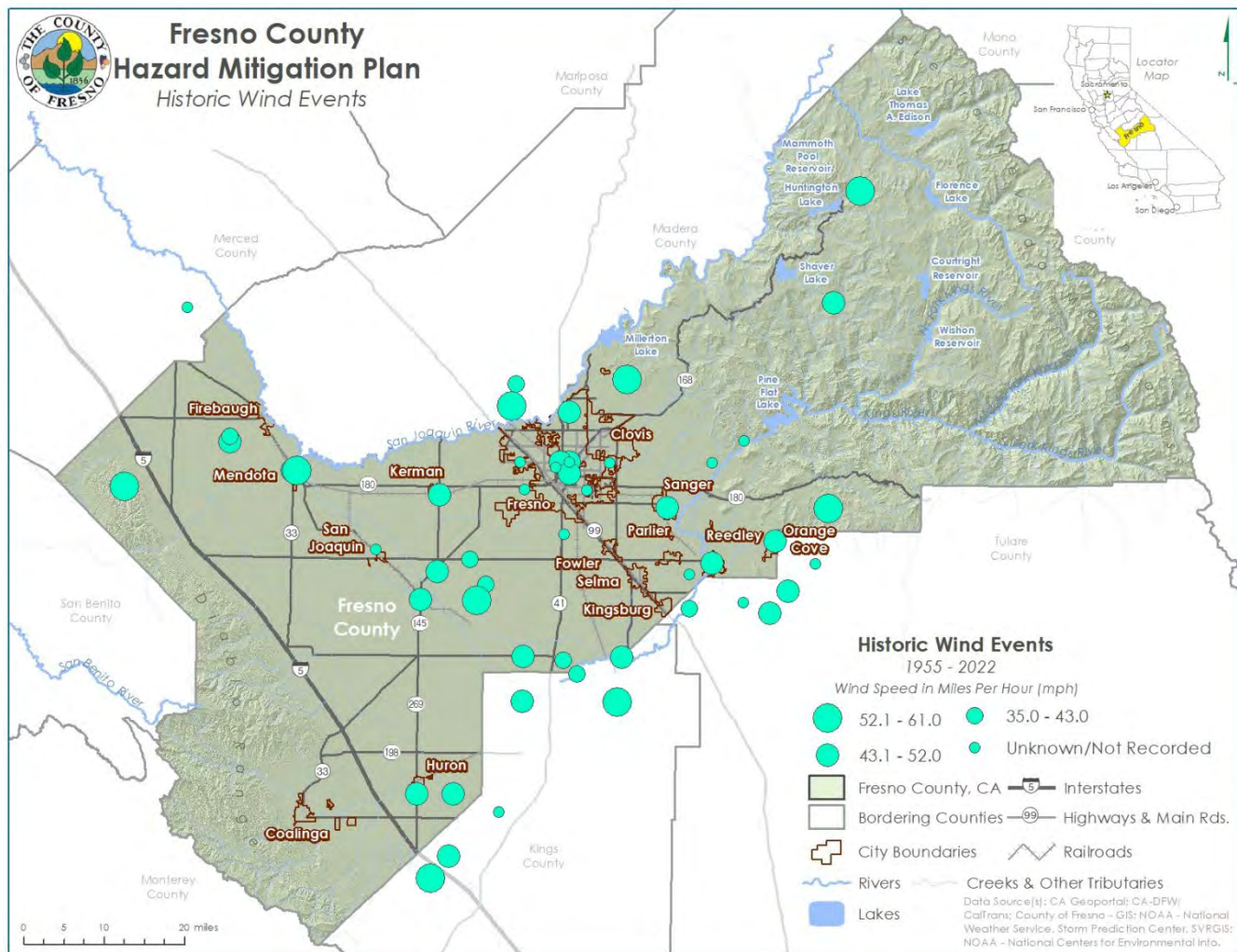
4. Risk Assessment



Date	Location	Magnitude (mph)	Fatality	Injury	Property Loss	Crop Loss
	Highway 198 (Zone)					
11/08/2022	West Side Mountains South of Highway 198 (Zone)	52	0	0	0	0
12/31/2022	West Side Mountains South of Highway 198 (Zone)	54	0	0	0	0
1/04/2023	West Side Mountains North of Highway 198 (Zone)	51	0	0	0	0
1/07/2023	West Side Mountains North of Highway 198 (Zone)	57	0	0	0	0
1/09/2023	West Side Mountains North of Highway 198 (Zone)	50	0	0	0	0
1/16/2023	West Side Mountains South of Highway 198 (Zone)	63	0	0	0	0
2/21/2023	Coalinga, Avenal	54	0	0	0	0
2/24/2023	West Side Mountains North of Highway 198 (Zone)	52	0	0	0	0
3/14/2023	West Side Mountains North of Highway 198 (Zone)	56	0	0	0	0
3/21/2023	West Side Mountains South of Highway 198 (Zone)	52	0	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

Figure 47. Fresno County Historic Wind Events



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; NOAA – National Weather Service, Storm Prediction Center, SVRGIS; NOAA – National Centers for Environmental Info.



STRONG WIND EVENTS

- **2/01/2017:** A weak cold frontal passage brought breezy to gusty winds for parts of the San Joaquin Valley and caused minor damage.
- **3/05/2017:** A cold upper trough delivered widespread rain, with 0.75 to 1.5 inches in the Southern Sierra Nevada and adjacent foothills, and 6 to 12 inches of snow above 6000 feet. The San Joaquin Valley received less than a quarter of an inch of rain due to rain shadowing. Post-frontal gusty winds affected the Kern County Mountains and Deserts, with gusts exceeding 45 mph reported on the afternoon and evening of March 5.
- **3/30/2017:** A upper-level trough moved southeast along the Sierra Nevada range on the day of the 30th. Upper-level northwest flow helped increase the surface wind as the pressure gradient at the surface tightened. This resulted in strong and gusty winds across most of the area. Several reports of wind gusts above 40 mph were reported in the San Joaquin Valley while several reports of winds gusts above 50 mph were reported in the Kern County Mountains and Deserts while some indicator ridge tops had gusts exceeding 90 mph. The strong winds produced blowing dust across portions of the southern San Joaquin Valley and Kern County Deserts. In addition, there were several reports of downed trees and power lines which resulted power outages across parts of the San Joaquin Valley.
- **12/04/2017:** A large upper ridge built into the Pacific Northwest on December 4 behind a trough which pushed through California the previous day. This resulted in a strong gradient over the southern Sierra Nevada producing Mono type winds over the Southern Sierra Nevada on the evening of December 4 through the late morning of December 5.
- **1/09/2018:** Central California experienced a series of low-pressure systems, with the most significant arriving between January 8 and 9, bringing heavy rain and strong winds, including a peak gust of 94 mph at Grapevine Peak. This system resulted in street flooding in Bakersfield, mudslides in Kern County, and snowfall above 5500 feet. By the morning of January 10, the precipitation had ceased, but dense fog affected visibility and traffic across the San Joaquin Valley and nearby highways.
- **5/11/2018:** High pressure built over Central California on May 3 and kept warm temperatures, dry conditions, and generally light winds over the area. However, an upper-level low pressure system moved into the Pacific Northwest on May 10 then dropped into the Great Basin on May 11. This resulted in increased surface pressure gradients which produced strong winds over portions of the area during the afternoon of May 11. There were a few reports of minor wind damage in the San Joaquin Valley and some low impact indicator stations in the Kern County Mountains and Deserts reported winds gusts exceeding 70 mph.
- **10/14/2018:** A low pressure system moved into southern California on October 13 and moved slowly inland on October 14. While the precipitation with this system mainly stayed to the south of our area, it interacted with an upper ridge that was building into the Pacific Northwest to produce a strong offshore gradient over central California which resulted in a brief period of strong mono-type northeast winds over the Southern Sierra Nevada during the late evening of October 14 and the early morning of October 15. Several dead trees were blown down near North Fork and Bass Lake in Madera County resulting in some brief road closures and some damage to a few structures.
- **12/31/2018:** A strong shortwave trough dropped down through the Great Basin during the morning of December 31. With high pressure pushing inland into northern California behind the trough, offshore Mono type winds developed over the higher elevations of the southern Sierra Nevada which down sloped into the foothills. This resulted in several drought weakened trees being



knocked down in the foothills near North Fork and Oakhurst where locally strong wind gusts exceeding 60 mph were reported.

- **1/06/2019:** The second of a series of winter storms moved through central California from the afternoon of January 6 through the early morning of January 7. While this storm produced another round of rain and higher elevation snow across the area with many locations in the southern Sierra Nevada picking up between 1 to 2 inches of liquid precipitation, the main impact from this storm was strong winds were most noticed across the San Joaquin Valley where several trees and power lines were blown down or knocked over.
- **1/17/2019:** A strong low-pressure system delivered moderate to heavy rain and strong winds to central California, leading to flash flooding and roadway closures, especially in the Ferguson Fire burn area. The storm system caused a tornado rated EF-1 east of Clovis on January 17, and the Southern Sierra Nevada received 2 to 4 inches of rain, translating to 10 to 20 inches of snow above 7000 feet. Additionally, post-frontal wind gusts in the Kern County Mountains and Deserts exceeded 50 mph, with some areas experiencing gusts over 65 mph.
- **1/20/2019:** A strong cold front swept through central California on January 20-21, causing moderate to heavy precipitation and strong wind gusts. The San Joaquin Valley experienced widespread wind damage, with gusts over 35 mph, while gusts in the Kern County Mountains and Deserts reached up to 90 mph. The Southern Sierra Nevada received up to 1.5 inches of rain and 5 to 10 inches of snow above 7000 feet before the system exited the region by the evening of January 21.
- **2/02/2019:** A strong southerly winds ahead of an upper low-pressure system caused damage in the Grapevine and Bakersfield areas, with reports of downed trees and wind damage. The system brought moderate to heavy rain and thunderstorms to the San Joaquin Valley and southern Sierra foothills, with over an inch of rain in the valley and 2 to 5 inches in the mountains, and a brief tornado near Mariposa. Above 5000 feet, heavy snowfall accumulated, adding to the snow from another storm on February 4 and 5.
- **4/09/2019:** a strong low-pressure system entered the Pacific Northwest and moved southeast, bringing a cold front that caused strong wind gusts across the San Joaquin Valley, Lake Isabella, and Tehachapi areas. These gusts, exceeding 40 mph in the valley and 60 mph in the mountain areas, led to several power outages due to downed lines. Some locations even reported gusts surpassing 70 mph, underscoring the system's strength despite limited moisture affecting central California.
- **11/29/2019:** The cold low-pressure system which brought widespread rain and lower elevations snow during the previous two days moved east of the area on November 29, but brisk northwest winds behind the departing system produced several gusts exceeding 40 mph in the Kern County Mountains and Deserts. A few low impact indicator sites measured gusts exceeding 60 mph.
- **2/02/2020:** The cold front which moved into the area during the morning of February 2 brought strong winds to the area by late afternoon as pressure gradients increased. Winds gusts exceeding 40 mph were reported in the San Joaquin Valley and several gusts exceeding 60 mph were reported across the Kern County Mountains and Deserts with a few low impact indicator sites measuring gusts above 80 mph. The winds downed several trees and power poles and flipped over two big rigs near Mojave during the evening. The winds decreased during the morning of February 3 as pressure gradients diminished.
- **2/08/2020:** An upper-level low pressure system moved along the Sierra Nevada on February 8-9 and strengthened over southern California, causing damaging northeast winds. These winds downed drought-stricken trees in Yosemite Park and the Sierra National Forest, causing



widespread property damage, especially in Madera County's foothills. Gusts between 60 and 70 mph were also reported in the Kern County Mountains and Deserts during this period.

- **1/18/2021:** An upper low off the southern California coast and a secondary system from Nevada generated destructive northeast winds across the Sierra Nevada, with gusts over 60 mph causing extensive damage and power outages. The severe winds led to disaster declarations in Mariposa and Madera Counties, with over 30 miles of power lines replaced in Mariposa County and fifteen ancient giant sequoias felled. The winds, which also affected the Tehachapi Mountains and the San Joaquin Valley with gusts over 50 mph, subsided by the morning of January 20 as the low moved towards the Baja coast.
- **5/20/2021:** A cold low-pressure system brought strong winds, with gusts over 60 mph in Kern County and up to 90 mph in certain areas, prompting road closures. As the system moved on the following day, it left behind a cool airmass and instability that resulted in rain and snow showers over the Sierra Nevada. The precipitation was mostly light, but areas above 6000 feet received up to 2 inches of new snow.
- **6/22/2022:** Tropical Storm Celia's moisture, coupled with a hot, unstable airmass over central California, triggered scattered thunderstorms on June 22, ending a two-month dry spell. These storms varied in intensity but generally brought one to two tenths of an inch of rain to the San Joaquin Valley and more to the Tehachapi Mountains and southern Sierra. Strong outflow winds and dry microbursts from the storms caused damage, downing several trees and power lines.
- **12/31/2022:** A trough with tropical moisture caused moderate to heavy precipitation and significant flooding in California, with reports of road closures due to debris flows. Strong winds with gusts over 60 mph affected the West Side Hills and Tehachapi Mountains, while the Sierra Nevada and foothills received substantial rainfall, contributing to an already heavy snowpack from earlier storms. The San Joaquin Valley and Tehachapi Mountains received less rain due to rain shadow effects.
- **1/04/2023:** An intense low-pressure system with an atmospheric river brought heavy precipitation and strong winds to the area, leading to flooding and heavy snowfall above 8000 feet. The San Joaquin Valley experienced significant rainfall, exacerbating the flooding from previously saturated soils. The system's powerful winds, surpassing 60 mph in places, caused widespread wind damage.
- **1/07/2023:** A low pressure system passed through northern California from January 7 to 8, bringing light to moderate precipitation and wind gusts exceeding 60 mph in some areas. The Sierra Nevada near Yosemite received up to an inch of rain and 5 to 10 inches of snow at higher elevations, while the San Joaquin Valley saw up to a half inch of rain. Despite being less intense than the previous storm, the system still affected the region with notable wind and precipitation.
- **1/09/2023:** A powerful low-pressure system unleashed strong winds exceeding 60 mph in the Tehachapi Mountains, West Side Hills, and Sierra foothills of central California, leading to extensive power outages as lines were downed. The tropical moisture within the system also produced significant rain, contributing to widespread flooding, but the most disruptive force was the wind, which caused the evacuation of towns like Planada and a record flood along Bear Creek. Though the precipitation ceased, and the winds subsided by January 11, the impact of the winds, alongside the heavy rains, left a lasting imprint with ongoing flooding and damage control.
- **1/16/2023:** Following the storm on January 14, a subsequent system on January 15-16 brought less rain but caused damaging wind gusts in the San Joaquin Valley and the Sierra foothills, with gusts over 60 mph in the Tehachapi Mountains. These winds led to power outages and road closures from fallen trees and power lines, compounding the flooding from already saturated grounds. The storm's effects lingered until January 17, although winds diminished by the afternoon of January 16.



- **2/21/2023:** A cold upper trough pushed into central California between the afternoon of February 21 and the early morning of February 22. A cold front associated with this trough produced strong winds throughout much of the area. Several stations in the wind prone areas of the West Side Hills and in the Mountains and Deserts of Kern County measured gusts exceeding 60 mph with a few low impact indicator stations reporting gusts above 80 mph. There were also several reports of downed trees in the San Joaquin Valley.
- **8/20/2023:** Moisture from Hurricane Hillary prompted thunderstorms and significant outflow winds in the San Joaquin Valley on August 19, and as the storm weakened, it brought 3 to over 5.5 inches of rain to Kern County's mountains and deserts on August 20. The southern Sierra Nevada received 1 to 3 inches of rain, setting new daily rainfall records. Flash flooding and road closures followed, with conditions stabilizing as the moisture dissipated and an offshore trough moved northeast by August 22.

Table 53. Fresno County Previous Occurrences: High Wind

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Fresno, Coalinga, Mendota	02/01/2017	30	1000	0	0	0
Shaver Lake, Squaw Valley, Auberry	03/05/2017	26	0	0	1	0
Fresno, Sanger, Reedley	03/30/2017	43	200000	0	0	0
Auberry, Shaver Lake, Prather	12/04/2017	43	100000	0	0	0
Shaver Lake, Squaw Valley, Auberry	01/09/2018	43	1000	0	0	0
Fresno, Coalinga, Mendota	05/11/2018	30	1000	0	0	0
Auberry, Shaver Lake, Prather	10/14/2018	39	10000	0	0	0
Auberry, Shaver Lake, Prather	12/31/2018	43	1000	0	0	0
Fresno, Sanger, Reedley	1/06/2019	39	1000	0	0	0
Auberry, Shaver Lake, Prather	1/17/2019	35	1000	0	0	0
Fresno, Sanger, Reedley	1/20/2019	39	5000	0	0	0

4. Risk Assessment



Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Auberry, Shaver Lake, Prather	2/02/2019	43	5000	0	0	0
Fresno	4/09/2019	35	1000	0	0	0
Sequoia Kings Zone	11/29/2019	43	100000	0	0	0
Fresno, Kerman, Mendota	2/02/2020	39	5000	0	0	0
Shaver Lake, Auberry, Tollhouse	2/08/2020	43	5000	0	0	0
Shaver Lake, Auberry, Tollhouse	1/18/2021	43	1000	0	0	0
Foggy Bottom Zone	5/20/2021	26	1500	0	0	0
Fresno, Clovis	6/22/2022	48	10000	0	0	0
Los Banos, Dos Palos	12/31/2022	35	1000	0	0	0
Merced, Madera, Mendota	1/04/2023	35	1000	0	0	0
Fresno, Clovis	1/07/2023	30	1000	0	0	0
Visalia, Porterville, Reedley	1/09/2023	30	1000	0	0	0
Fresno, Clovis	1/16/2023	43	50000	0	0	0
Fresno, Clovis	2/21/2023	35	1000	0	0	0
Merced, Madera, Mendota	8/20/2023	30	1000	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

THUNDERSTORM WIND EVENTS

- **9/11/2017:** A stationary upper low off the California coast drew tropical moisture into central California, triggering a severe thunderstorm outbreak on September 11 with downburst winds over 60 mph, causing damage to structures and knocking down power lines. Rainfall was light, with most areas receiving less than a quarter inch, but parts of the Southern Sierra Nevada and Tehachapi Mountains saw up to half an inch.



- **5/19/2019:** A strong low-pressure system delivered heavy rainfall to central California, breaking several daily records, and depositing 8 to 14 inches of snow above 6000 feet in the Sierra Nevada. The unstable weather also sparked thunderstorms in the San Joaquin Valley, leading to reports of small hail, heavy rain, and a small EF0 tornado with accompanying wind damage near Huron.
- **6/29/2021:** A strong high-pressure center over the Pacific Northwest pulled in moisture from the east which produced thunderstorms over the Sierra Nevada during the afternoon of June 29. Although the thunderstorms on the previous day were mainly dry with very little rainfall, the moisture surge the following day was deeper and as a result some of the thunderstorms produced locally heavy rainfall, damaging outflow winds and small hail during the afternoon and early evening hours of June 29.
- **6/22/2022:** Moisture from Tropical Storm Celia combined with a hot, unstable airmass over central California, triggering scattered showers and thunderstorms on June 22, marking the region's first significant rain in two months. Rainfall varied due to the storms' convective nature, with the San Joaquin Valley receiving up to two-tenths of an inch, while the Tehachapi Mountains and southern Sierra saw up to three-quarters of an inch. Some storms generated strong winds and dry microbursts, toppling trees and power lines.
- **2/05/2023:** A strong low-pressure system swept through northern to central California, dropping 0.75 to 1.5 inches of rain and reducing snow levels to 4000 feet, leaving 9 to 15 inches of snow above 6500 feet in the Sierra Nevada. Strong wind gusts hit the Mohave Desert, and the system's unstable conditions led to scattered thunderstorms in the San Joaquin Valley, causing wind damage and hail. The weather affected travel, pacing traffic on Interstate 5, and accumulating light snow across the Tejon Pass.
- **3/12/2023:** Following the departure of the warm and moist storm which produced widespread flooding across the area on March 9 and 10, another moist system moved through central California on March 11 and 12. While precipitation amounts were generally much lower with this system with most of the Sierra Nevada picking up between 1 and 2 inches of liquid precipitation and adjacent foothills picking up between a half inch and an inch of rainfall, the cooler unstable airmass on the back side of this system produced afternoon and evening thunderstorms across the lower elevations resulting in widespread flooding and wind damage across the San Joaquin Valley.
- **3/21/2023:** A strong upper trough moved across the region on March 21 and 22. This system produced strong winds across the West Side Hills, the Sierra Nevada and across the Kern County Mountains and Deserts where several stations measured gusts exceeding 60 mph. In addition, heavy snow fell in the Sierra Nevada where several high elevation SNOTEL stations picked up between 18 and 30 inches of new snow while liquid precipitation totals were generally between 1 and 2 inches. Much of the San Joaquin Valley picked up between a quarter and three quarters of an inch of additional rainfall over an already saturated ground while thunderstorm outflow winds knocked down several trees in and around Fresno during the afternoon of March 21.
- **8/19/2023:** Hurricane Hillary's moisture caused showers and thunderstorms with notable outflow winds in the San Joaquin Valley on August 19, and as it weakened, it brought 3 to over 5.5 inches of rain to Kern County on August 20. The Sierra Nevada south of Kings Canyon and the southern San Joaquin Valley received 1 to 3 inches and a half inch to an inch of rain, respectively, with new daily records set in the northern areas. Flash flooding and road closures followed in Kern County, but by August 22, an offshore trough moved the moisture out, leading to drier conditions for the rest of the week.



Table 54. Fresno County Past Occurrences: Thunderstorm Wind

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Caruthers	9/11/2017	61	120,000	0	0	0
Huron	5/19/2019	52	75,000	25000	0	0
Pine Logging Camp	6/29/2021	52	0	0	0	0
Friant	6/22/2022	60	0	0	0	0
Wahtoke	2/05/2023	35	1000	0	0	0
Monmouth	3/12/2023	35	1000	0	0	0
Highway City	3/21/2023	40	25000	0	0	0
Sunnyside	8/19/2023	48	50000	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

HAILSTORM EVENTS

- **5/19/2019:** An upper-level low brought heavy rain to central California, breaking daily records, and delivering 0.75 to 2 inches of precipitation, with snowfall of 8 to 14 inches above 6000 feet in the Sierra Nevada. The following day, thunderstorms caused small hail, heavy rain, and an EF0 tornado with some wind damage near Huron.
- **3/11/2023:** After a storm caused extensive flooding on March 9 and 10, another system passed through central California on March 11 and 12, bringing less precipitation, with the Sierra Nevada receiving 1 to 2 inches and foothills about half an inch to an inch. However, afternoon and evening thunderstorms in the cool, unstable air mass led to widespread flooding and wind damage across the San Joaquin Valley.

Table 55. Fresno County Past Occurrences: Hailstorm

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Westhaven	5/19/2019	0.5	0	1 M	0	0
Ingle	3/11/2023	1	0	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

LIGHTNING STORM EVENTS

- **7/30/2021:** Subtropical moisture continued to stream into central California on July 30. Once again, afternoon thunderstorms developed over the Sierra Nevada. One thunderstorm produced a fatal lightning strike over the Sierra Nevada during the early afternoon.
- **8/12/2023:** An upper-level low pressure system which contained the remnant moisture from former Tropical Storm Eugene was situated off the California coast on August 12. This moisture helped fuel scattered thunderstorms during the afternoon and evening hours over the Sierra Nevada. A

lightning strike from one of the thunderstorms downed a large tree and started a small fire near Shaver Lake during the evening.

Table 56. Fresno County Past Occurrences: Lightning Storm

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Mono Hot Springs	7/30/2021	0	0	0	1	0
Shaver Lake Heights	8/12/2023	0	1,000	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

HEAVY RAINSTORM EVENTS

- **1/12/2017:** A series of systems fed by a continued influx of very moist air was pushed into the central California interior through an atmospheric river set-up for several days prior and a colder low-pressure system moved into central California. This created thunderstorms that produced heavy rainfall for parts of the San Joaquin Valley. Reports of road ponding/flooding were reported along with a few reports of funnel clouds.
- **1/21/2017:** A nearly stationary cold low-pressure system from the Pacific Northwest moved into central California and tropical moisture being fed from the Pacific with a continued atmospheric river set-up, brought thunderstorms and heavy rainfall to the Sierra Nevada Mountains and Foothills and parts of the San Joaquin Valley over several days. Small pea-sized hail was also reported with some thunderstorms.
- **2/03/2017:** Tropical influx jet pushed into central California ahead of a cold front created heavy rains which were enhanced by orographically lifting with the Sierra Mountains.
- **4/13/2017:** a large low-pressure system moved through central California, generating strong wind gusts and moderate rainfall, with the San Joaquin Valley experiencing winds over 35 mph and the Kern County Mountains and Deserts over 45 mph. Merced and Mariposa Counties and Yosemite National Park received up to half an inch of rain. Fresno was hit by a nearly stationary thunderstorm that set a record for April rainfall since the 1880s with 2.04 inches at the airport. Thunderstorm outflow also caused blowing dust and reduced visibility, leading to vehicular accidents near Lemoore.
- **11/17/2017:** A strong upper trough pushed through the Pacific Northwest on November 16 and 17. A fetch of deep moisture of tropical origin was pulled up ahead of this trough and brought moderate to heavy precipitation to Merced and Mariposa Counties as well as to Yosemite National Park. Several locations in Yosemite National Park measured between 2 and 4 inches of rainfall while several mountain and foothill stations in Madera, Fresno and Tulare Counties picked up over an inch of rain. Snow was basically confined to elevations above 8000 feet as a warm airmass prevailed over the region. Several SNOTELs above 9000 feet did pick up between 1 and 2 feet of fresh snowfall as this was the first significant storm of the season at the higher elevations.
- **3/21/2018:** A tropical air mass brought heavy rain to central California, causing widespread flooding, road closures due to rockslides and debris flows, particularly in burn scar areas around Mariposa and Springville. Thunderstorms on March 22 led to flash flooding and funnel clouds, prompting a



Flash Flood Emergency in western Mariposa County, including building floods and evacuations. A tornado was also reported near Dinuba in Tulare County. The Southern Sierra Nevada received 4 to 8 inches of rain, while the San Joaquin Valley recorded 1 to 3 inches, with several feet of snow above 9000 feet.

- **9/04/2018:** A low pressure system centered over southern Nevada provided for a shallow surge of mid-level moisture into central California on September 3 and 4. During the afternoon of the 4th, several thunderstorms developed over the higher elevations of the Southern Sierra Nevada from Yosemite National Park southward to the Lake Isabella area where the atmosphere was unstable. Heavy rainfall was produced by thunderstorms near Kings Canyon and near Lake Isabella which over an inch of rainfall between 100 pm PDT and 5 pm PDT. In addition, isolated thunderstorms brought some light rainfall to the southern Sierra foothills and to the Kern County Deserts.
- **5/18/2019:** An upper-level low pressure system entered central California, delivering between 0.75 and 2 inches of rain, and setting new daily records. Above 6000 feet, the Sierra Nevada received 8 to 14 inches of fresh snow. On May 19, thunderstorms in the San Joaquin Valley caused small hail and heavy rainfall, and an EF0 tornado along with wind damage was reported near Huron.
- **12/01/2019:** A large upper low-pressure system brought moderate to heavy rain to central California, mainly north of Fresno County, with 1 to 3 inches of rainfall. The Sierra Nevada and the central San Joaquin Valley were significantly impacted, while snow levels over the Southern Sierra Nevada dropped to 7000 feet, resulting in 6 to 12 inches of new snow. Less rain fell further south, with up to half an inch. This weather caused nuisance flooding and a multi-vehicle accident on State Route 99 north of Fresno.
- **12/08/2019:** An upper trough brought widespread precipitation to California, with the heaviest in the northern regions where the Sierra recorded 1 to 2 inches and the valley got up to an inch of rain. Southern areas saw less, with Kings and Tulare Counties receiving up to half an inch, and Kern County less than a quarter inch. Snow levels stayed between 7000 and 8000 feet, with the higher Sierra getting 8 to 12 inches of new snow. The event also included scattered thunderstorms that led to local heavy rain, roadway flooding, and small hail before the precipitation ceased by the evening of December 8 as the trough moved east.
- **10/08/2021:** A Pacific cold frontal system pushed through the area during the morning of October 8 spreading widespread precipitation across the area. Several stations in the eastern portion of the San Joaquin Valley and the Sierra Nevada range measured between a tenth and four tenths of an inch of rainfall with portions of Fresno and Madera Counties picking up locally heavy showers which produced higher precipitation amounts. Several high elevation SNOTELs picked up an estimated one to three inches of new snowfall. The precipitation ended by late afternoon as the storm moved east of the area.
- **2/24/2023:** A cold low-pressure system off California's coast brought 1.5 to 3 inches of rain and significant snowfall, with snow levels dropping to near 1000 feet. Higher elevations in the Sierra Nevada and adjacent areas received 2 to 4 feet of snow, leading to extended closures of mountain roads. Flooding in the San Joaquin Valley and lower Sierra foothills caused additional road closures. The system moved out of the area by the morning of February 26.

Table 57. Fresno County Past Occurrences: Heavy Rain

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Glorietta	1/12/2017	0	0	0	0	0

4. Risk Assessment



Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Melvin	1/21/2017	0	0	0	0	0
Glorietta	2/03/2017	0	0	0	0	0
(FAT) Air Terminal	4/13/2017	0	0	0	0	0
Clovis	11/17/2017	0	0	0	0	0
Melvin	3/21/2018	0	0	0	0	0
Cedar Grove	9/04/2018	0	0	0	0	0
Fresno	5/18/2019	0	0	15M	0	0
Herndon	12/01/2019	0	50,000	0	0	0
Clovis	12/08/2019	0	0	0	0	0
Melvin	10/08/2021	0	0	0	0	0
Melvin	2/24/2023	0	0	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely—Heavy rain, thunderstorms, hail, lightning, and wind are well-documented seasonal occurrences that will continue to occur annually in the Fresno County planning area.

CLIMATE CHANGE CONSIDERATIONS

Atmospheric Rivers - Atmospheric rivers account for up to 50 percent of California's total annual precipitation. Climate change can drive conditions to be conducive to an increase and greater intensity of atmospheric rivers due to warmer temperatures. Additional moisture from atmospheric rivers could increase the frequency of thunderstorms and severe storms to occur.

Heavy Rain - California's variable precipitation is also characterized by multi-year wet or dry periods. Future average precipitation is difficult to predict and unlikely to change substantially when focusing on annual precipitation. Even if heavy rain were to increase in future decades, it is likely that warmer air temperatures will increase moisture loss from soils and lead to drier seasonal conditions. ⁴⁴

Hail - According to some scientists, it is predicted that severe convective storms are becoming more likely in our warming climate. Storms with the right mixture of atmospheric ingredients for hail are more likely to form. Because the planet is getting warmer, the odds are generally higher that a hailstone will melt before making its way to the ground. However, the hailstones that do make it down may be larger and cause more damage. ⁴⁵Overall, the future probability of hail events occurring in the future is unlikely unless significant changes in the atmosphere increase the chance of hail events impacting the planning area.

Lightning - On a large scale, lightning strikes nationwide are projected to increase by 12 percent per every degree Celsius of global warming and about 50 percent over the 21st century if greenhouse gases increase at their current pace. However, so far scientists have not yet seen an increase in lightning events. When looking at the past 25 years, there hasn't been a noticeable increase in global lightening or U.S. lightning. ⁴⁶In future decades, it is uncertain if lightning events will increase or decrease in frequency within the planning area.

⁴⁴ Summary of Projected Climate Change Impacts on California - California Climate Adaptation Strategy
<https://climateresilience.ca.gov/overview/impacts.html>

⁴⁵ Severe Hailstorms Are Costly and Hard to Predict - Eos <https://eos.org/articles/severe-hailstorms-are-costly-and-hard-to-predict>
Severe Hailstorms Are Costly and Hard to Predict - Eos <https://eos.org/articles/severe-hailstorms-are-costly-and-hard-to-predict>

⁴⁶ Lightning could spark more California fires as world warms - CalMatters
<https://calmatters.org/environment/2021/09/california-fires-lightning/>

SEVERE WEATHER: WINTER STORM

HAZARD/PROBLEM DESCRIPTION

Winter snowstorms can include heavy snow, ice, and blizzard conditions. Heavy snow can immobilize a region, stranding commuters, stopping the flow of supplies, and disrupting emergency and medical services. Accumulations of snow can collapse roofs and knock down trees and power lines. In rural areas, homes and farms may be isolated for days, and unprotected livestock may be lost. The cost of snow removal, damage repair, and business losses can have a tremendous impact on cities and towns.

Winter weather can vary by types including blizzards, ice storms, snow squalls, heavy snow, and sleet or freezing rain, described in more detail below:

Winter Weather Types

- **Blizzards:** defined by the National Weather Service, blizzards are a combination of sustained winds or frequent gusts of 35 mph or greater and visibilities of less than a quarter mile from falling or blowing snow for 3 hours or more. A blizzard, by definition, does not indicate heavy amounts of snow, although they can happen together. The falling or blowing snow usually creates large drifts from the strong winds. The reduced visibilities make travel, even on foot, particularly treacherous. The strong winds may also support dangerous wind chills. Ground blizzards can develop when strong winds lift snow off the ground and severely reduce visibilities.
- **Ice Storm:** occurs when a layer of warm (above freezing), moist air aloft coincides with a shallow cold (below freezing) pool of air at the surface. As snow falls into the warm layer of air, it melts to rain, and then freezes on contact when hitting the frozen ground or cold objects at the surface, creating a smooth layer of ice. This phenomenon is called freezing rain. Similarly, sleet occurs when the rain in the warm layer subsequently freezes into pellets while falling through a cold layer of air at or near the Earth's surface. The U.S. National Weather Service defines an ice storm as a storm which results in the accumulation of at least .25 inch of ice on exposed surfaces. Extended periods of freezing rain can lead to accumulations of ice on roadways, walkways, power lines, trees, and buildings. Almost any accumulation can make driving and walking hazardous. Ice accumulations can lead to downed trees, utility poles and communication towers. Ice can disrupt communications and power while utility companies repair significant damage. Even small accumulations of ice can be extremely dangerous to motorists and pedestrians. Bridges and overpasses are particularly dangerous because they freeze before other surfaces.
- **Snow Squalls:** often associated with strong cold fronts, are a key wintertime weather hazard. They move in and out quickly, and typically last less than an hour. The sudden white-out conditions combined with falling temperatures produce icy roads in just a few minutes. Squalls can occur where there is no large-scale winter storm in progress and might only produce minor accumulations. Snow squalls can cause localized extreme impacts to the traveling public and to commerce for brief periods of time. Unfortunately, there is a long history of deadly traffic accidents associated with snow squalls. Although snow accumulations are typically an inch or less, the added combination of gusty winds, falling temperatures and quick reductions in visibility can cause extremely dangerous conditions for motorists.
- **Heavy Snow:** in large quantities, may fall during winter storms. Six inches or more in 12 hours or eight inches or more in 24 hours constitute conditions that may significantly hamper travel or create hazardous conditions. The National Weather Service issues warnings for such events. Smaller amounts can also make travel hazardous, but in most cases, only results in minor inconveniences.



Heavy wet snow before the leaves falls from the trees in the fall or after the trees have leafed out in the spring may cause problems with broken tree branches and power outages.

- **Sleet or Freezing Rain:** sleet is defined as pellets of ice composed of frozen or mostly frozen raindrops or refrozen partially melted snowflakes. These pellets of ice usually bounce after hitting the ground or other hard surfaces. Heavy sleet is a relatively rare event, defined as ice pellets covering the ground to a depth of a one- half inch or more. Freezing rain falls as a liquid but freezes into glaze upon contact with the ground.

Heavy accumulations of ice can bring down trees, electrical wires, telephone poles and lines, and communication towers. Communications and power can be disrupted for days until the damage can be repaired. Even small accumulations of ice may cause extreme hazards to motorists and pedestrians.

Some winter storms are accompanied by strong winds, creating blizzard conditions with blinding wind-driven snow, severe drifting, and dangerous wind chills. Strong winds with these intense storms and cold fronts can knock down trees, utility poles, and power lines. Blowing snow can reduce visibilities to only a few feet in areas where there are no trees or buildings. Serious vehicle accidents can result in and cause injuries and deaths.

The central and western portions of the Fresno County planning area generally do not experience snowfall on a seasonal basis; however, the higher elevations in the eastern portion of the County receive an abundance of snow, mostly between the months of November through April. Winter snowstorms in this part of the County, including strong winds and blizzard conditions, can result in localized power and phone outages and closures of streets, highways, schools, business, and nonessential government operations. People can also become isolated from essential services in their homes and vehicles. Snow removal costs can impact budgets significantly. Heavy snowfall during winter can also lead to flooding or landslides during the spring if the area snowpack melts too quickly.

EXTENT

The extent of winter storms and cold that cause issues in Fresno County includes storms forecasted to be Winter Storm Warnings, Wind Chill Warnings or Blizzard Warnings. These storms would be confined to the Sierra Mountains within Fresno County. Heavy snows, or a combination of snow, freezing rain or extreme wind chill due to strong wind, may bring widespread or lengthy road closures and hazardous travel conditions, plus threaten temporary loss of community services such as power and water. Deep snow and additional strong wind chill or frostbite may be a threat to even the appropriately dressed individual or to even the strongest person exposed to the frigid weather for only a short period.

Depending on the magnitude of the winter storm, the National Weather Service will issue either a Winter Weather Advisory, Winter Storm Watch, or a Winter Storm Warning, shown in **Table 58. NWS Winter Storm Weather Product**.

Table 58. NWS Winter Storm Weather Product

Winter Storm Product	Description
Winter Weather Advisory (Light Purple)	Wintry weather expected. Light amounts of wintry precipitation or patchy amounts of wintry precipitation or patchy blowing snow will cause slick conditions and could affect travel if precautions are not taken.

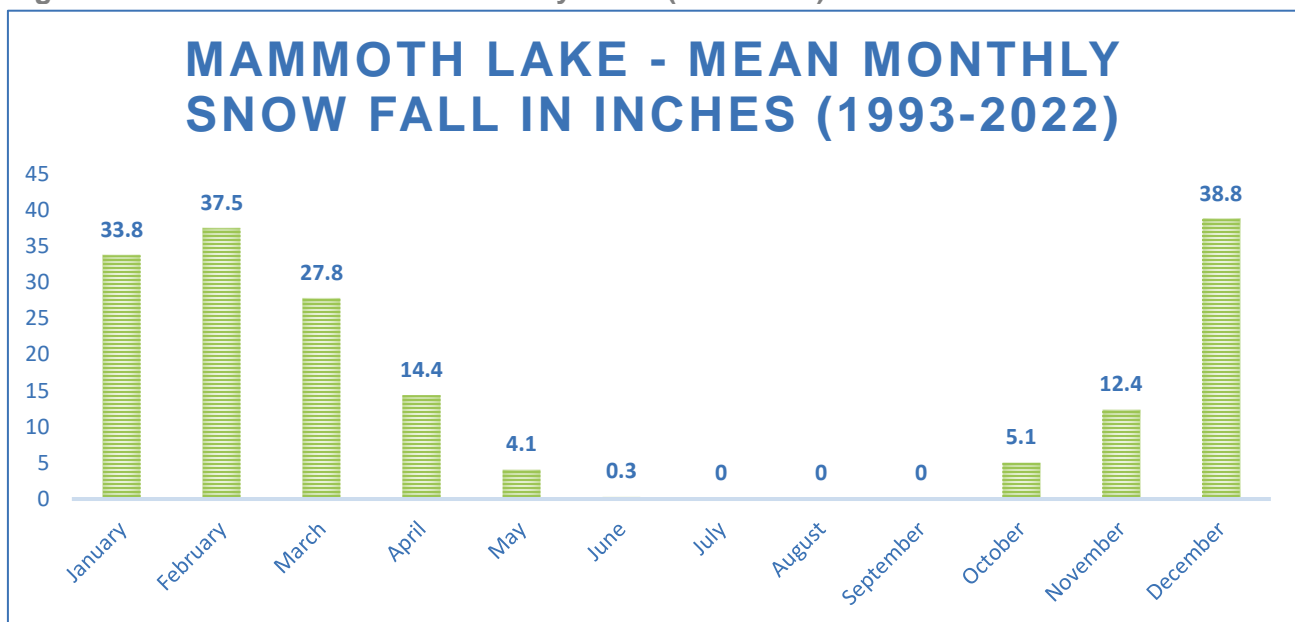
Winter Storm Product	Description
Winter Storm Watch (Light Blue)	Snow, sleet, or ice possible. Confidence is medium that a winter storm could produce heavy snow, sleet, or freezing rain and cause significant impacts.
Winter Storm Warning (Pink)	Snow, sleet, or ice expected. Confidence is high that a winter storm will produce heavy snow, sleet, or freezing rain and cause significant impacts.

Source: NWS

PAST OCCURRENCES

Information from the three representative weather stations introduced in the Severe Weather: General section is summarized below. There was no mean monthly snow fall for the central and eastern weather stations across the county. **Figure 48. Mammoth Lake Mean Monthly Snow (1993-2022)** shows the monthly mean snow fall in inches for the Mammoth Lake Weather Station.

Figure 48. Mammoth Lake Mean Monthly Snow (1993-2022)



Source: Western Regional Climate Center, www.wrcc.dri.edu/

The Fresno County Office of Emergency Services is not aware of any incidents where snow caused enough damage to declare a countywide emergency. The following winter snow event impacted the eastern portion of the Fresno County planning area shown in **Table 59. Fresno County Past Occurrences: Snow** and listed below.

- **January 2005:** Heavy wet snow fell in eastern Fresno County above 4,000 feet resulting in a regionwide closure of roads and loss of power for up to three weeks in three communities. Eight injuries were reported due to vehicle accidents from poor road conditions. Property damage was estimated at \$3.5 million from trees falling on homes, cabins, and outbuildings. Infrastructure



damage was estimated at \$2.5 million to the power distribution grid and \$250,000 to the road system. An estimated 10-15,000 merchantable trees were damaged or destroyed. Most roads in the area were closed for three weeks; schools were closed for two weeks.

- **3/24/2011:** The last major storm of the month arrived on March 24th. This storm brought gusts to 45 mph to the west side of the San Joaquin Valley, and gusts to 65 mph in the Kern County mountains and deserts. Convective activity was limited to near Merced, with several reports of road flooding due to the already saturated ground. Thunderstorms and showers moved east into the foothills of Madera and Mariposa Counties, where the heavy rains triggered rock and mud slides. Mainly light showers occurred southward. The trough moved east of the region on the 25th, with residual light showers in its wake. Additionally, light snow fell in the Southern Sierra Nevada measuring around 5 inches or less. Local media reported that the roof of a vacant store at Shaver Lake collapsed on March 26th due to 6 feet of snow accumulation on the roof.
- **4/12/2012:** An upper-level short-wave moved into California on April 10th, flattening the ridge. This set the stage for back-to-back strong storms to move through the central California interior on the 11th, 12th, and 13th. Each storm triggered severe thunderstorms over the central and southern San Joaquin Valley with hail up to 1.75 inches in diameter. Tallies of agricultural and crop loss approached 100 million dollars due to the extensive hail damage across Kings, Tulare, Fresno, and Merced counties. Funnel clouds were observed, although none touched down. The first storm brought up to a foot of snow to the Southern Sierra Nevada, and the second colder storm dropped up to 30 inches of snow at Lodgepole in Sequoia National Park.
- **2/18/2019:** Showers and winds diminished across the area during the evening of February 17 as skies cleared out. This resulted in the freezing of leftover rain and melted snow on several roads which resulted in several roads in the Kern County Mountains being closed for several hours overnight and into the morning hours of February 18. Black ice also resulted in a fatal two vehicle accident near Oakhurst on State Route 49 during the morning of February 18.
- **1/09/2023:** Central California was struck by a low-pressure system that swept in with a tropical moisture surge, causing widespread heavy precipitation and record-breaking flooding. The snow levels at about 7500 feet led to significant runoff, exacerbating the flooding that shut down numerous roads and necessitated evacuations, including the entire inundated town of Planada. Additionally, the storm caused power outages due to high winds, with a record 26.2-foot crest at Bear Creek, before diminishing on January 11.

Table 59. Fresno County Past Occurrences: Snow

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Eastern Fresno County	January 2005	0	3.5 M	0	0	8
Fresno County	3/24/2011	0	0	0	0	0
Fresno County	4/10/2012	0	0	100 M	0	0
Oakhurst	2/18/2019	0	80,000	0	0	0
Planada	1/09/2023	0	8,900,000	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database



LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely—Snow in the eastern region of the County is a well-documented seasonal occurrence that will continue to occur annually.

CLIMATE CHANGE CONSIDERATIONS

Historically, California has relied heavily on the Sierra Nevada snowpack. Runoff from melting mountain snow is captured and distributed throughout the state via an extensive network of aqueducts. Observations over recent warmer decades reveal a decline in California's lower elevation snowpack, and climate models indicate considerably greater loss of mountain snowpack as temperatures continue to warm. Overall, precipitation will fall as rain instead of snow. However, snow that does manage to accumulate will melt earlier in the spring. As spring snowpack decreases in the future decades, the state's water storage capacity will be reduced as well. Researchers found that winters are becoming increasing shorter in the mountainous western United States, as snow is disappearing earlier in the year. By 2050, the average water supply from snowpack is projected to decline to two-thirds of historical levels, some studies project. If greenhouse gas emissions do not reduce, water from snowpack could fall less than one-third of historical levels by the year 2100.⁴⁷

⁴⁷ <https://scripps.ucsd.edu/research/climate-change-resources/faq-climate-change-california>

SEVERE WEATHER: TORNADO

HAZARD/PROBLEM DESCRIPTION

Tornadoes are another severe weather hazard that can affect the Fresno County planning area, primarily during the rainy season. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist. They can have the same pressure differential that fuels 300-mile-wide hurricanes across a path only 300-yards wide or less. With additional heat in the atmosphere storms are projected to become more severe in the future, and thus lightning may become more prevalent. Tornadoes typically occur during the “tornado season” from April through June. Tornadoes usually occur in the spring and summer months, however the tornadoes that have occurred in the planning area and in neighboring communities have occurred in the spring but also in the winter months (December and January). Tornadoes can last from several seconds to more than an hour as they are rolling through communities. However, most tornadoes usually last less than 10 minutes. Typically, tornadoes will gradually lose intensity as the condensation funnel decreases in size, the tornado becomes tilted with height before it completely dissipates.

The size of the tornado does not necessarily equate to the severity of the tornado. Occasionally, small tornadoes can do major damage and some very large tornadoes, over a quarter-mile wide, have produced only light damage. The measure of the magnitude and intensity of a Tornado, the Enhanced Fujita Scale or EF Scale, which became operational in 2007, is used to categorize tornadoes based on estimated wind speeds and related damage, shown in **Table 60. Fujita Scale** and **Table 61. Enhanced Fujita Scale**. The EF scale is based off wind estimates (not measurements) from the relevant damage. The scale uses three-second gusts estimated at the point of damage. Additionally, the National Weather Service is the only federal agency with authority to provide an “official” tornado EF Scale rating.

Table 60. Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown and large missiles generated.



Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/f-scale.html

Table 61. Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, most injuries and deaths result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Agricultural crops and industries may also be damaged or destroyed. Access roads and streets may be blocked by debris, delaying necessary emergency response.

EXTENT

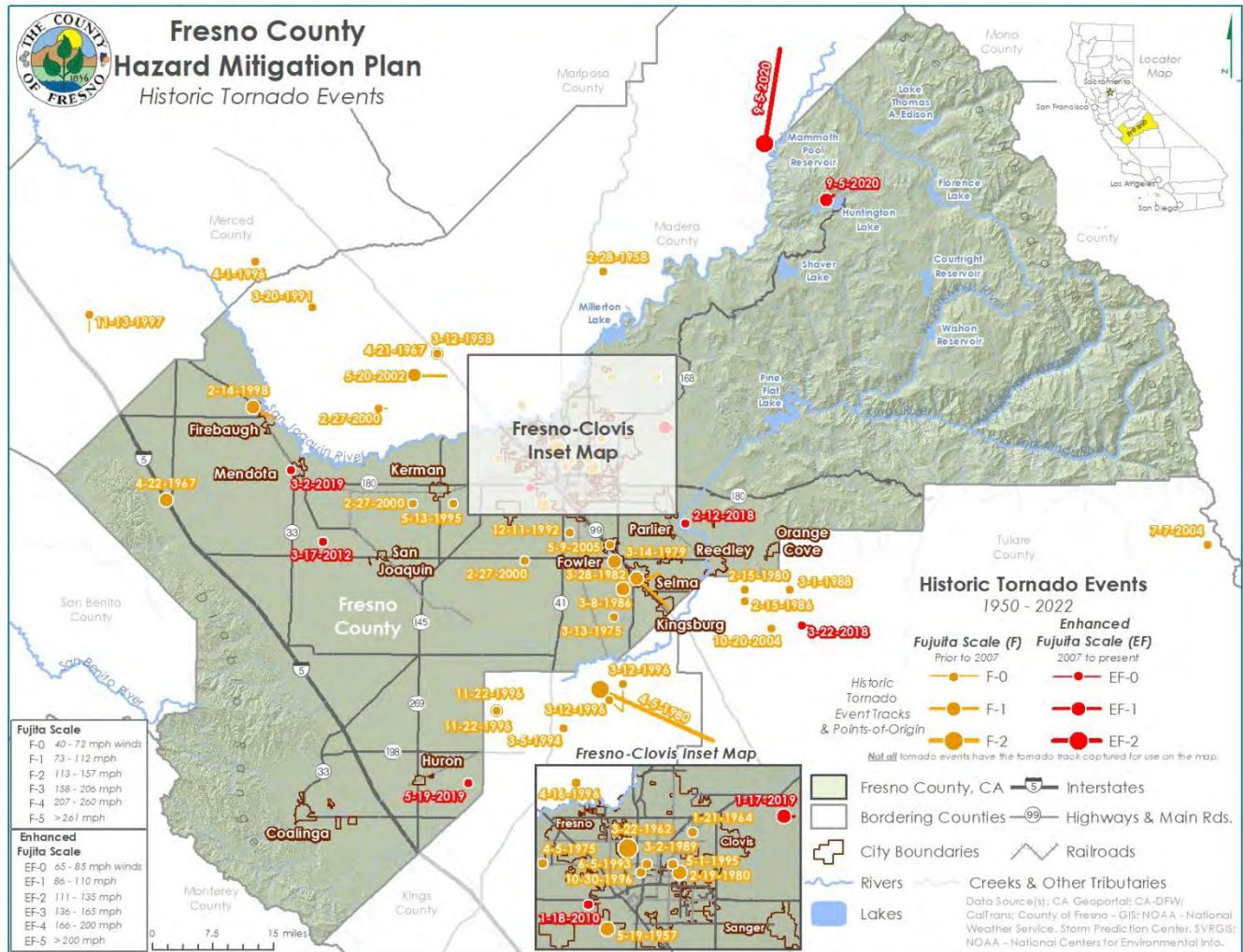
The majority of tornadoes in the past in Fresno County have been F0 and F1. Large tornadoes are possible, however. Should the County be hit by an EF-4 or EF-5 tornado, it can be extrapolated that because of its relative size and the potential size and length of a tornado's path a significant portion of the County could be impacted, resulting in property and crop damage and loss of life.

PAST OCCURRENCES

Based on data from 1950 to 1995, California ranks 32nd among the 50 states for frequency of tornadoes, 36th for injuries, and 31st for cost of damage. When compared to other states by frequency per square mile, California ranks 44th for frequency and injuries per area and 40th for cost of damage

per area. **Figure 49. Fresno County Historic Tornado Events** shows tornadoes that have affected the County using NOAA data from 1950 to 2022.

Figure 49. Fresno County Historic Tornado Events



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; NOAA – National Weather Service, Storm Prediction Center, SVRGIS; NOAA – National Centers for Environmental Info.



According to the HMPC, during the rainy season, the Fresno County planning area is prone to relatively strong thunderstorms, sometimes accompanied by funnel clouds and tornadoes. While tornadoes do occur occasionally, most often they are of F0 or F1 intensity. Documented incidents of tornadoes in the Fresno County planning area from the NCEI Storm Events Database are listed in **Table 62. Fresno County Past Occurrences: Tornadoes** and **Table 63. Recent Fresno County Past Occurrences by City: Tornado**.

Table 62. Fresno County Past Occurrences: Tornadoes

Type	# of Events	Property Loss (\$)	Deaths	Injuries
Tornado: F0	20	250,000	0	0
Tornado: F1	9	5,705,050	0	3
Tornado: F2	1	5,000	0	0
Totals	30	5,960,050	0	3

Source: NOAA, National Centers for Environmental Information, Storm Events Database

A summary of the most recent tornadoes is described below.

- **2/12/2018** - Warm temperatures were followed by a low-pressure system that led to strong winds in the Kern County area. This weather system also resulted in a weak tornado touching down near Sanger on the morning of February 12th.
- **1/16/2019** - Intense storms brought heavy rain and strong winds to central California, leading to an EF-1 tornado east of Clovis, alongside significant snowfall above 7000 feet in the Southern Sierra Nevada. The storm affecting the region on January 16 and 17, also caused extensive roadway flooding and forced the closure of State Route 140 due to flash flooding and debris flows.
- **3/02/2019** - A Pacific storm system brought moderate to heavy precipitation to central California, culminating in thunderstorms that led to a tornado near Mendota causing minor roof damage. The Southern Sierra Nevada received 1 to 3 inches of rain, while snow levels, initially above 8000 feet, dropped to around 5000 feet after the cold front. The storm passed by March 3rd.
- **5/18/2019** - An intense low-pressure system led to record-breaking rainfall in central California with significant snowfall in the Sierra Nevada. The system also sparked thunderstorms across the San Joaquin Valley, producing small hail, heavy rain, and an EF0 tornado near Huron.

Table 63. Recent Fresno County Past Occurrences by City: Tornado

Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Parlier	2/12/2018	EF0	0	0	0	0
Academy	1/17/2019	EF1	500,000	0	0	0
Mendota	3/02/2019	EF0	20,000	0	0	0
Huron	5/18/2019	EF0	0	0	0	0

Source: NOAA, National Centers for Environmental Information, Storm Events Database

LIKELIHOOD OF FUTURE OCCURRENCES

Possible—Thirty tornadoes have occurred in Fresno County over 73 years of record keeping, which equates to one tornado every 2.4 years, on average, and a 40 percent chance of a tornado occurring in any given year. Historical tornadic activity within the planning area indicates that the area will likely continue to experience the formation of funnel clouds and low intensity tornadoes during adverse weather conditions. The actual risk to the County is dependent on the nature and location of any given tornado.

CLIMATE CHANGE CONSIDERATIONS

The total number of U.S. tornadoes observed each year roughly doubled from the 1950s to the 1990s with the advent of more storm spotters and chasers. Most of these “extra” tornadoes were on the weak side that were not originally detected prior. Climate change typically plays out through broad regional shifts, such as depleted sea ice, warmer oceans, and drier landscapes. Sometimes these shifts are distinct enough from natural variation to signal clearly that human-caused climate change is likely involved. In contrast, tornadoes are brief and episodic, and they normally vary a great deal over time and space, so it’s difficult to distill long-term trends in their behavior and distinguish those from normal ups and downs. ⁴⁸Therefore, scientists must attempt to predict how climate change might affect the individual weather “ingredients” that support the development of supercell thunderstorms. The weather ingredients include warm, moist air, an unstable atmosphere, and wind at different levels moving in different directions at different speeds, a phenomenon known as wind shear. As global temperatures increase, the hotter atmosphere is able to hold more moisture. This increases atmospheric instability, an important supercell ingredient. On the other hand, as the earth warms, wind shear is likely to decrease.

Some studies predict that climate change could provide the opportunity for more severe thunderstorms to form. However, this does not necessarily mean that more tornadoes will occur, especially in light of the fact that only about 20 percent of supercell thunderstorms produce tornadoes. While there have been no long-term trends in the frequency of tornadoes, there have been changes in tornado patterns in recent years. Research has shown that there are fewer days with at least one tornado but more days with over thirty, even as the total number of tornadoes per year has remained relatively stable. In other words, tornado events are becoming more clustered. There is speculation that some of these changes are linked to climate change and its effect on the jet stream. Tornado outbreaks have also coincided with rising ocean temperatures. But no one can say for certain that climate change is a contributing factor in these events. ⁴⁹

⁴⁸ <https://yaleclimateconnections.org/2021/07/climate-change-and-tornadoes-any-connection/>

⁴⁹ <https://education.nationalgeographic.org/resource/tornadoes-and-climate-change/>



VOLCANO

HAZARD/PROBLEM DESCRIPTION

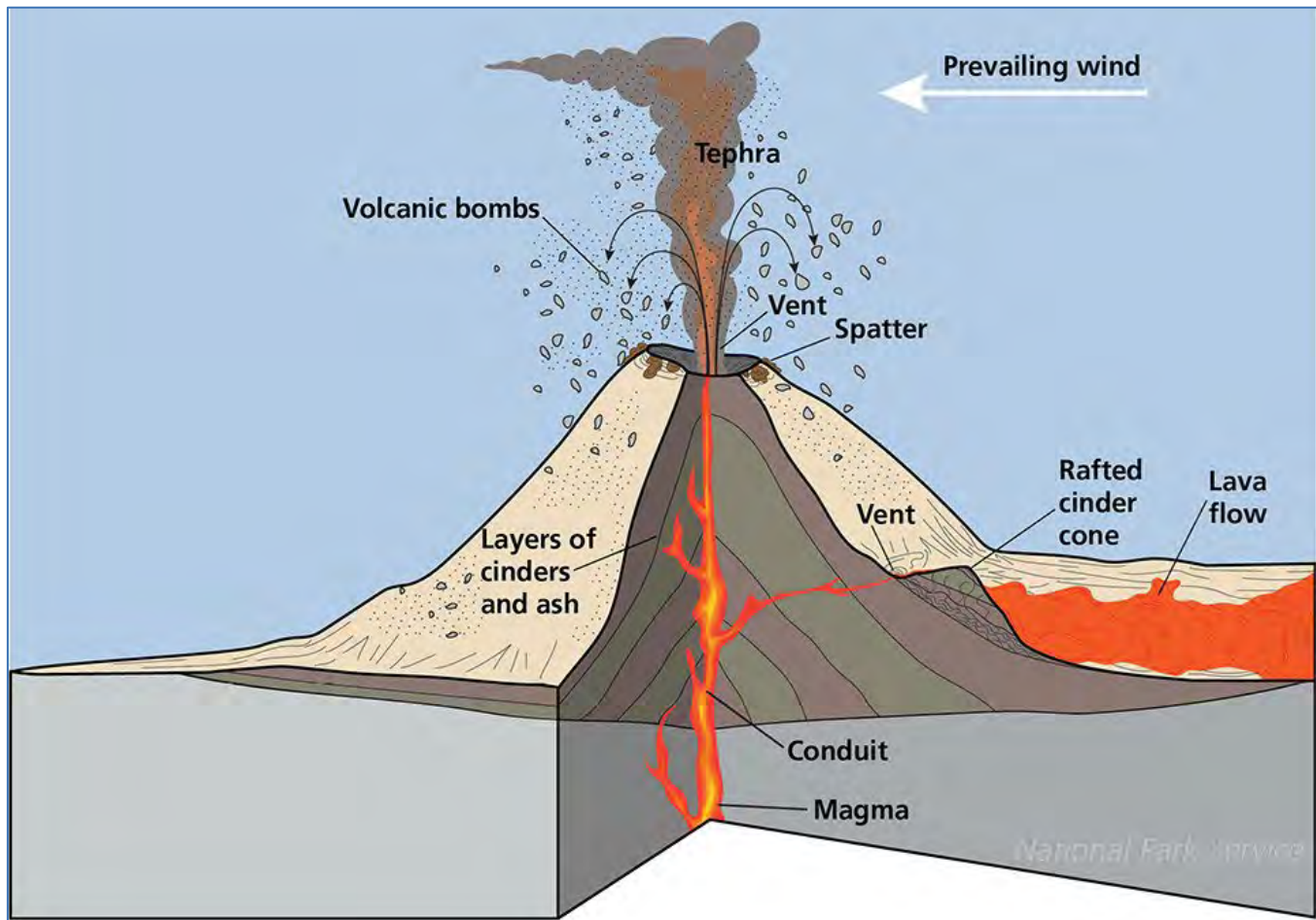
Of the almost 70 active and potentially active volcanoes in the United States, more than 50 have erupted one or more times in the past 200 years. Volcanic eruptions occur in the state about as frequently as the largest San Andreas Fault Zone earthquakes; at least ten eruptions have occurred in California in the last 1,000 years and the likelihood of renewed volcanism in the state is on the order of 1 in a few 100 to 1 in a few thousand annually. Volcano hazards are the greatest in five western states: Alaska, Hawaii, California, Oregon, and Washington. Volcanoes create a wide variety of hazards that can kill people and destroy property.⁵⁰

Populations living near volcanoes are most vulnerable to volcanic eruptions and lava flows; although, large explosive eruptions can endanger people and property hundreds of miles away and even affect global climate. Volcanic ash can also travel and affect populations many miles away. The ash from the 1980 eruption of Mount St. Helens in Washington fell over a large area of the western United States. Heavy ash fall can collapse buildings, and even minor ash fall can damage crops, electronics, and machinery. Some volcanic hazards, such as landslides, can occur even when a volcano is not erupting.

Figure 50. Components of a Volcanic Eruption depicts a volcano typical of those found in the western United States.

⁵⁰ California State Hazard Mitigation Plan

Figure 50. Components of a Volcanic Eruption



Source: National Park Service

The State of California Multi-Hazard Mitigation Plan identifies volcanoes as one of the hazards that can adversely impact the state. However, there have been few losses in California from volcanic eruptions. Of the approximately 20 volcanoes in the state, only a few are active and pose a threat. According to the USGS California Volcano Observatory, there are six volcanos that pose a high risk and 4 volcanos that pose a moderate risk to the state of California. The six volcanoes include Mount Shasta, Medicine Lake Volcano, Lassen Volcanic Center, Clear Lake Volcanic Field, Long Valley Volcanic Region, and Salton Buttes. The volcanoes that pose a moderate risk include Soda Lakes, Long Valley Volcanic Region, Ubehebe Craters, Coso Volcanic Field.

EXTENT

The Fresno County General Plan Background Report identifies the Mono Lake-Long Valley area located adjacent to the north and east of the northernmost areas of Fresno County as the only known volcanic hazard to Fresno County. The Long Valley area is an active volcanic region of California and includes features such as the Mono-Inyo Craters, Long Valley Caldera, and numerous active and

potential faults. **Figure 51. Volcanoes In or Near California** shows volcanoes in or near California and the location of the Long Valley area relative to the Fresno County planning area.

Figure 51. Volcanoes In or Near California



Populations living near volcanoes are most vulnerable to volcanic eruptions and lava flows, although volcanic ash can travel and affect populations many miles away and cause problems for aviation. Based on information in the background report, the Fresno County planning area is susceptible to various hazards associated with its proximity to the Long Valley area as further described below.

VOLCANIC FLOWS

Two mildly explosive volcanic vents are located three to four miles from northernmost Fresno County, northwest of Duck Lake. In the event of an eruption, flows or debris from the vents would likely flow predominantly southwest approximately parallel to the North Fork of the San Joaquin River in Madera County. Lava flows, steam blasts, or base surges could occur in the northernmost tip of Fresno County. The northern portions of the Silver Divide (including Duck Lake and Fish Creek) could be subject to lava flows. However, this area of the County is mostly unpopulated and not easily developable as it is

situated on the high peaks of the Sierra Nevada. Thus, potential safety hazards would be limited to backcountry visitors.

PYROCLASTIC FLOW

Pyroclastic flows are sudden eruption of hot (400- 1300°F), gas-pressurized flows of ash and lava fragments that rush outward from the volcano with great force at ground speeds greater than 50 miles per hour (mph). Pyroclastic flows typically follow valleys but can overtop ridges and travel 30 miles or more from the volcano. Due to the fast nature of these flows, they are the main cause of eruption-related fatalities. Flows can knock down, shatter, bury, or carry away nearly all objects and structures in its path and extreme temperatures can burn forests, crops, buildings, furnishings, and vehicles.

ASH

With most volcanic eruptions, a significant amount of ash is released into the atmosphere. The location and thickness of ash in any given area is generally a function of the volume erupted and wind speed and direction. Based on historical wind directions and wind speeds, most volcanic ash from a volcanic eruption of Long Valley would be deposited east of the volcano. Looking at historical data from past ash falls, most ash beds from volcanic eruptions in California lie east of their source vents. Other studies of Mount Rainier and Mount St. Helens show that more than 90 percent of the ash beds deposited from volcanic eruptions during the last 10,000 years lie to the east of those volcanoes. This data suggests that most ashfall from future eruptions, including those from Long Valley, would also be deposited to the east of the source.

According to a worst-case scenario provided in the background report, geologists estimate that the South Fork of the San Joaquin River, Mono Creek, Margaret Lakes, Duck Lake, Fish Creek, Lake Thomas A. Edison, Bear Creek, Lake Italy, and the town of Mono Hot Springs could be subject to eight inches or more of compacted ash from an eruption at Long Valley. It only takes up to five inches of ash to stop an automobile engine. These areas, in addition to Kaiser Creek and Three Island Lake, could also be affected by hot pyroclastic flows. It is further estimated that up to two inches of ash could fall within a 50-mile radius of the eruption, potentially affecting the areas of Auberry, Prather, Meadow Lakes, Pine Ridge, Tollhouse, Dinkey Creek, Humphreys Station, Courtright Reservoir, Pine Flat Reservoir, and numerous small lakes, creeks, and streams.

LAHARS

Lahars are slurry-like floods of volcanic ash, rock, and water that look like wet concrete. Debris flows gain momentum during travel by eroding and entraining soil and loose rock debris from channels. Large debris flows may carry boulders 30 feet across and travel through valleys and stream channels at speeds of 20 to 40 mph. Debris flows can be hot, with temperatures close to boiling. They occur during an eruption due to melting snow or ice, or after an eruption due to remobilization of loose volcanic deposits during intense rainfall. Debris flows have the ability to destroy buildings and bridges and bury vast areas with deposits of mud and rock to 160 feet thick as far as 65 miles from the volcano.

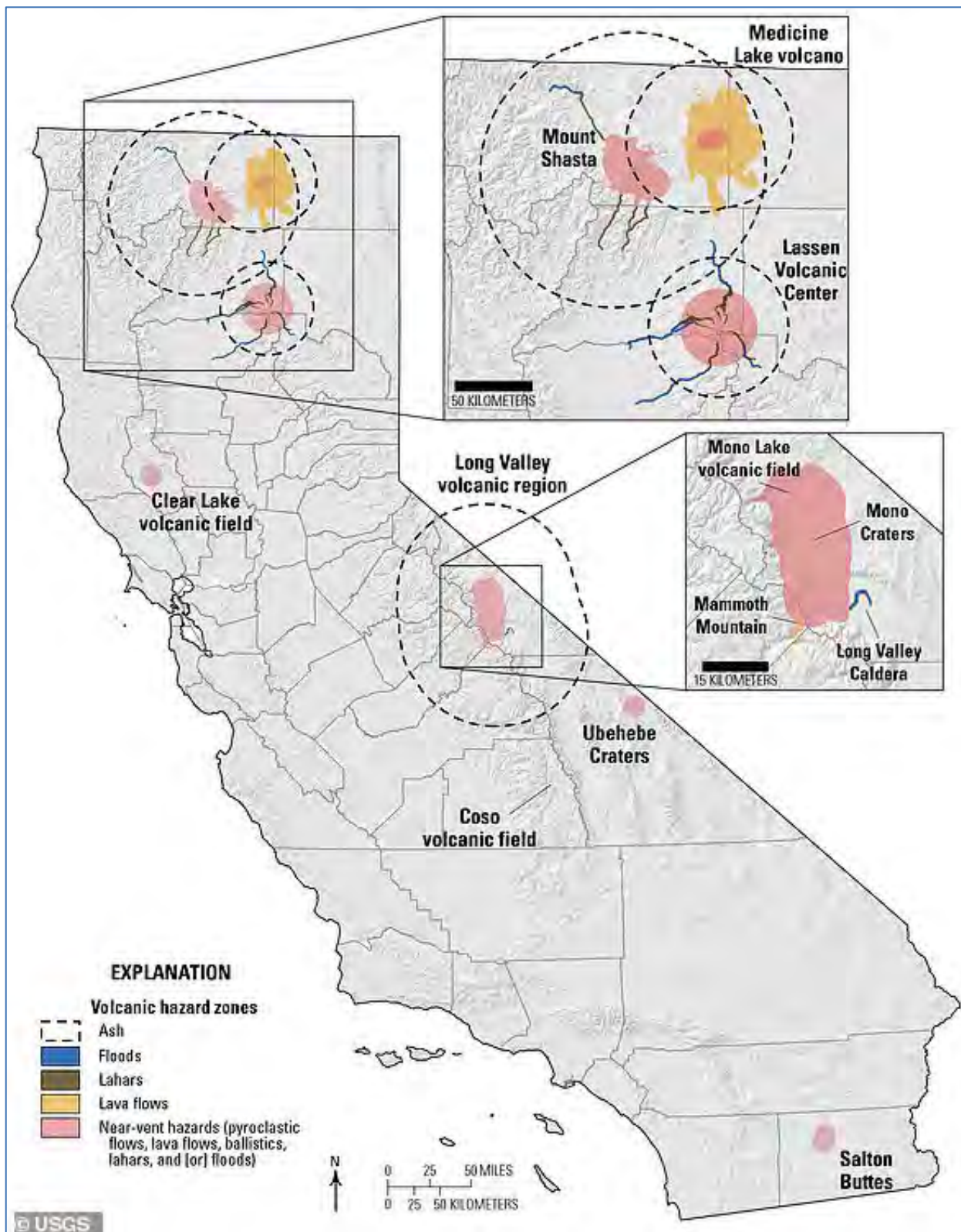


RESULTING FLOODS AND MUDFLOWS

An eruption on the western slope of Mammoth Mountain (on the rim of the Long Valley Caldera) in the winter could also cause hot mudflows to mix with melting snow and rock debris, creating the possibility of severe flood conditions in the San Joaquin River drainage system, endangering people, dams, and other property as it moves downstream.

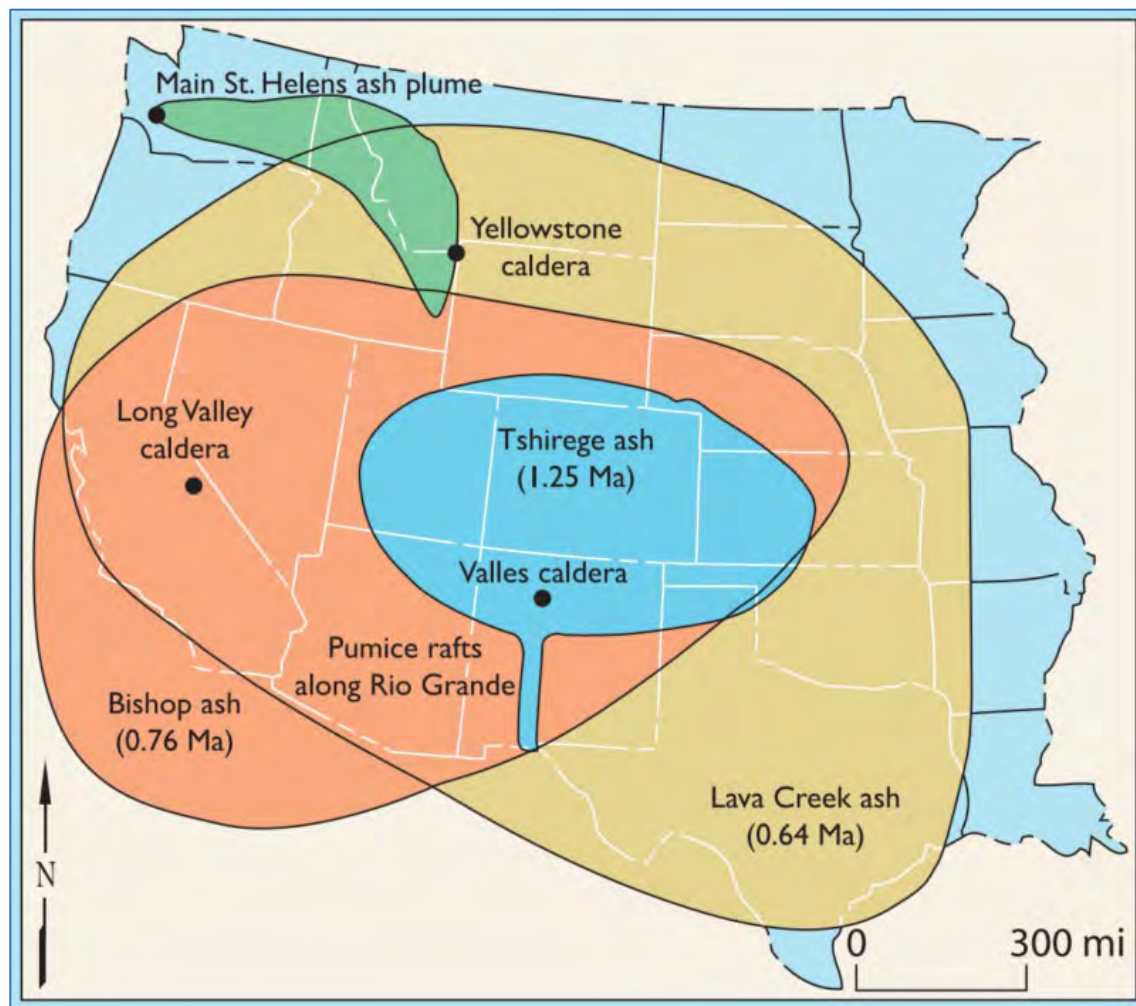
Figure 52. California Volcano Hazard Zones illustrates areas subject to potential volcanic hazards from future eruptions in California and supports the conclusion that the planning area is potentially at risk to volcanic activity from the Long Valley area. The hazard zone for the Long Valley Volcanic Region is right outside of the Fresno County's jurisdictional boundaries but would still pose a threat to the planning area. The ash dispersion map that follows (**Figure 53. Volcanic Hazards Ash Dispersion Map for the Long Valley Caldera**) also illustrates the extent to which the planning area may be affected by ash fallout in the event of renewed volcanic activity in the area.

Figure 52. California Volcano Hazard Zones



Source: USGS

Figure 53. Volcanic Hazards Ash Dispersion Map for the Long Valley Caldera



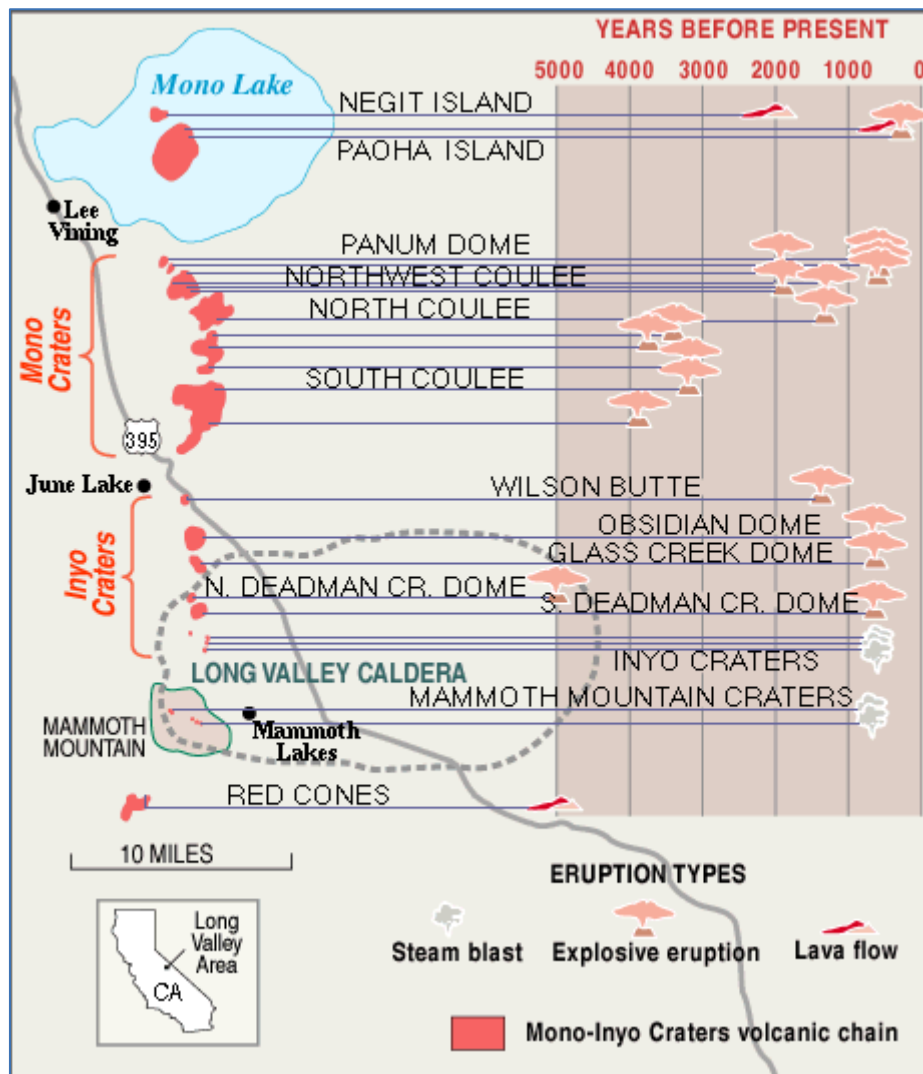
Source: National Parks Service

Note: Ma = Million Years Ago

PAST OCCURRENCES

During the past 1,000 years there have been at least 12 volcanic eruptions in the Long Valley area. Volcanoes in the Mono-Inyo Craters volcanic chain, which extends from just south of Mammoth Mountain to the north shore of Mono Lake, have erupted often over the past 40,000 years. Over the past 5,000 years, small to moderate eruptions have occurred at various sites along the Mono-Inyo Craters volcanic chain at intervals ranging from 250 to 700 years (see **Figure 54. Volcanic Activity in the Mono-Inyo Craters Volcanic Chain of the Past 5,000 Years**). According to the California State Hazard Mitigation Plan, the most recent eruption in California occurred at Lassen Park within the Lassen Volcanic National Park about 100 years ago, from 1914- to 1917, about 55 miles east of the town of Redding.

Figure 54. Volcanic Activity in the Mono-Inyo Craters Volcanic Chain of the Past 5,000 Years



Source: U.S. Geological Survey

In 1980, four large earthquakes (greater than magnitude 6 on the Richter Scale) and numerous relatively shallow earthquakes occurred in the area. Since then, earthquakes and associated uplift and deformation in the Mammoth Lakes Caldera have continued. Because such activities are common precursors of volcanic eruptions, the U.S. Geological Survey closely monitors the unrest in the region.

LIKELIHOOD OF FUTURE OCCURRENCES

Unlikely—According to the U.S. Geological Survey, the pattern of volcanic activity over the past 5,000 years suggests that the next eruption in the Long Valley area will most likely happen somewhere along the Mono-Inyo volcanic chain. However, the probability of such an eruption occurring in any given year is less than 1 percent. Most likely, the next eruption will be small and like previous eruptions along the



Mono-Inyo volcanic chain during the past 5,000 years. Based on available data and the location of the County relative to the Long Valley area, there is a remote potential for volcanic activity of sufficient magnitude to adversely impact the Fresno County planning area. Researchers have long thought the risk of a super volcanic eruption in the Long Valley Caldera in our lifetime is extremely low, given that overall, the magma underneath the area is clearly cooling—essentially continuing to calm down, but the cooling process may release enough gas and liquid to cause earthquakes and small eruptions. Other scientists suggest that scientists suspect the Long Valley Caldera as a volcano is moribund—essentially dead—and the increased seismic activity, when it happens, is being generated by fluids that are not magma, but are still hot and moving to the surface as the magma cools and solidifies.⁵¹

CLIMATE CHANGE CONSIDERATIONS

There presently is not enough data or research to quantify the magnitude of potential change that climate change may have on volcanic activity.

⁵¹ <https://phys.org/news/2023-10-california-riskiest-volcanoes-eruption.html>

WILDFIRE

HAZARD/PROBLEM DESCRIPTION

Three classes of fires exist in the planning area: understory fires, crown fires, and ground fires. Naturally induced wildfires burn at relatively low intensities, consuming grasses, woody shrubs, and dead trees. These understory fires often play an important role in plant reproduction and wildlife habitat renewal and self-extinguish by low fuel loads or precipitation. Crown fires, which consist of fires consuming whole living trees, are low probability but high consequence type events. Crown fires typically match perceptions of wildfires. In areas with high concentrations of organic materials in the soil, ground fires may burn, sometimes persisting undetected for long periods until the surface is ignited.

Potential losses from wildfire include human life, structures, critical infrastructure, natural and cultural resources, quality and quantity of water supplies, cropland, timber, and recreational opportunities. Economic losses could also result due to damages to natural resources, grazing lands, tourism, and local businesses do not mention the loss of revenue to businesses during a wildfire event. Smoke and air pollution from wildfires can be a severe health hazard to local communities and the greater San Joaquin Valley air basin. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides, and erosion during the rainy season impacting communities and downstream reservoirs.

To better address wildfire threats, California has updated its approach to land and fire management. This includes advanced techniques for managing vegetation to lower fuel levels, employing controlled burns to restore natural fire cycles and mitigate risks, and enforcing tighter building regulations alongside thoughtful land use strategies to enhance the resilience of communities to wildfires. This comprehensive approach integrates the latest scientific insights, technological innovations, and traditional practices, aiming for a more effective mitigation of wildfire impacts throughout the state.

Generally, there are three major factors that sustain wildfires and predict a given area's potential to burn. These factors are fuel, topography, and weather.

- **Fuel**—Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also, to be considered as a fuel source are manmade structures, such as homes and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Fuel is the only factor that is under human control. Fuel types within the Fresno County planning area include annual grasses, deciduous oaks, and heavy brush in the Coast Range of western Fresno County, seasonal grasses, deciduous and evergreen oaks, brush, and grass in the lower and mid-elevations of central and eastern Fresno County, and conifers in the higher elevations of eastern Fresno County.
- **Topography**—An area's terrain and slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement and types of vegetation throughout a hillside can also contribute to increased fire activity on slopes.
- **Weather**—Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out fuels that feed wildfires, creating a situation where fuel will more readily ignite and burn more intensely. Thus, during periods of drought, the threat of wildfire increases. Wind is the most influential weather factor of the three and its influence can increase rates of spread regardless of temperature and relative



humidity. The Fresno County planning area has a diverse normal wind pattern. The western side of the planning area is influenced more by the coastal range and weather patterns along the coast. The east side of the valley is more influenced by the normal heating and cooling of the valley floor and the influence along the river drainages, this area is also susceptible to foehn winds from the high Sierra. Lightning during the summer monsoonal moisture season also ignites wildfires, often in difficult terrain with limited access for firefighters.

- Wildfire is an ongoing concern for the Fresno County planning area. Historically, the fire season extends from June through October of each year during the hot, dry months. Since 2010 the fire season throughout California and Fresno County has been getting longer, typically starting in May, and extending into November, but wildfires can occur any time of year. Fire conditions arise from a combination of high temperatures, intense sunlight, low rainfall and humidity, dry vegetation, and high winds. Down slope winds, such as the Santa Ana winds of southern California which can gust to 80 mph, are often associated with the most destructive wildfires. Since they usually occur in the fall and winter after the summer dry season when there is ample dry vegetation for fuel, they can cause small fires to quickly burn out of control. Between 1948 and 2017, a recent study found, 22 percent of Southern California's fires started under Santa Ana-like wind conditions, but those fires were more destructive and extensive than fires that started in calmer conditions, responsible for nearly half of the total area burned in the region and 80 percent of the fire-related economic damage incurred between 1990 and 2009.

WILDLAND URBAN INTERFACE (WUI)

Throughout California, communities 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. While wildfire risk is predominantly associated with wildland-urban interface (WUI) areas, significant wildfires can also occur in heavily populated areas and across non WUI landscapes in the forest. The wildland-urban interface is a general term that applies to development adjacent to or within large watershed landscapes that support wildfire. Wildfires affect grass, forest, and brush lands, as well as any structures located within them. Where there is human access to wildland areas, such as the Sierra Nevada and Coast Range foothills, the risk of fire increases due to a greater chance for human carelessness as 90 percent of wildland fires are human caused.

EXTENT

In terms of geographic extent, the wildfire hazard potentially impacts the entire planning area, but the most intense fires will be in the forested areas of the county. While **Figure 55. Fresno County's Wildfire Severity Zones** depicts potential severity across the planning area, the history of occurrence table (**Table 65. Fresno County Past Occurrences: Wildfire**) and **Figure 56. Fresno County Historic Wildfires** indicates that even moderate and low risk areas have experienced wildfires, and potentially will continue to do so. However, with regard to the severity or potential impact of the wildfire hazard two facts should be considered: first, both maps demonstrate that the areas of greatest risk correspond to the locations with the greatest number of historical events; second, the Medium, High, and Very High hazard areas correspond to heavily forested areas and urban wildland interface areas, where fuel loads for wildfire are highest, are periodically exacerbated by drought conditions, and further complicated by a widespread incidence of tree mortality adding additional fuel load risk (see drought and tree mortality sections for more information). Finally, to understand the extent of wildfire severity,

the variable risk (Low, Medium, High, Very High) across the planning area identified on the wildfire risk map must be viewed in relation to the location of each jurisdiction participating in the plan. Most of the risk is in the unincorporated areas and on the fringes of municipalities that include Coalinga, Fresno, and Firebaugh. The Sierra Resource Conservation District has considerable area at risk of wildfires. For additional information on each jurisdiction's wildfire risk, please consult the jurisdictional Annexes and the Vulnerability Section.

The Fire Rating System is defined in **Table 64. The Fire Danger Rating System** describes the characteristics and potential intensity of fires, including the effect on the ability to manage and suppress fires. Such characteristics should be understood considering the wildfire risks and history of occurrence in Fresno County, as identified and in the narrative descriptions of wildfire history previously discussed. Fire conditions up through Class 5 are possible in Fresno County, primarily in the unincorporated areas.

Table 64. The Fire Danger Rating System

Rating	Basic Description	Detailed Description
CLASS 1: Low Danger (L) COLOR CODE: Green	fires not easily started	Fuels do not ignite readily from small firebrands. Fires in open or cured grassland may burn freely a few hours after rain, but wood fires spread slowly by creeping or smoldering and burn in irregular fingers. There is little danger of spotting.
CLASS 2: Moderate Danger (M) COLOR CODE: Blue	fires start easily and spread at a moderate rate	Fires can start from most accidental causes. Fires in open cured grassland will burn briskly and spread rapidly on windy days. Woods fires spread slowly to moderately fast. The average fire is of moderate intensity, although heavy concentrations of fuel – especially draped fuel -- may burn hot. Short-distance spotting may occur but is not persistent. Fires are not likely to occur. serious and control is relatively easy.
CLASS 3: High Danger (H) COLOR CODE: Yellow	fires start easily and spread at a rapid rate	All fine dead fuels ignite readily, and fires start easily from most causes. Unattended bushes and campfires are likely to escape. Fires spread rapidly and short-distance spotting is common. High intensity burning may develop on slopes or in concentrations of fine fuel. Fires may become serious and their control difficult, unless they are hit hard and fast while small.
CLASS 4: Very High Danger (VH) COLOR CODE: Orange	fires start very easily and spread at a very fast rate	Fires start easily from all causes and immediately after ignition, spread rapidly and increase quickly in intensity. Spot fires are a constant danger. Fires burning in light fuels may quickly develop high-intensity characteristics - such as long-distance spotting - and fire whirlwinds when they burn into heavier fuels. Direct attack at the head of such fires is rarely possible after they have been burning more than a few minutes.
CLASS 5: Extreme (E) COLOR CODE: Red	fire situation is explosive and can result in extensive property damage	Fires under extreme conditions start quickly, spread furiously, and burn intensely. All fires are potentially serious. Development into high intensity burning will usually be faster and occur from smaller fires than in the Very High Danger class (4). Direct attack is rarely possible and may be dangerous, except immediately after ignition. Fires that develop headway in heavy slash or in conifer stands may be unmanageable while the extreme burning condition lasts. Under these conditions, the only effective and safe control action is on the flanks, until the weather changes or the fuel supply lessens.

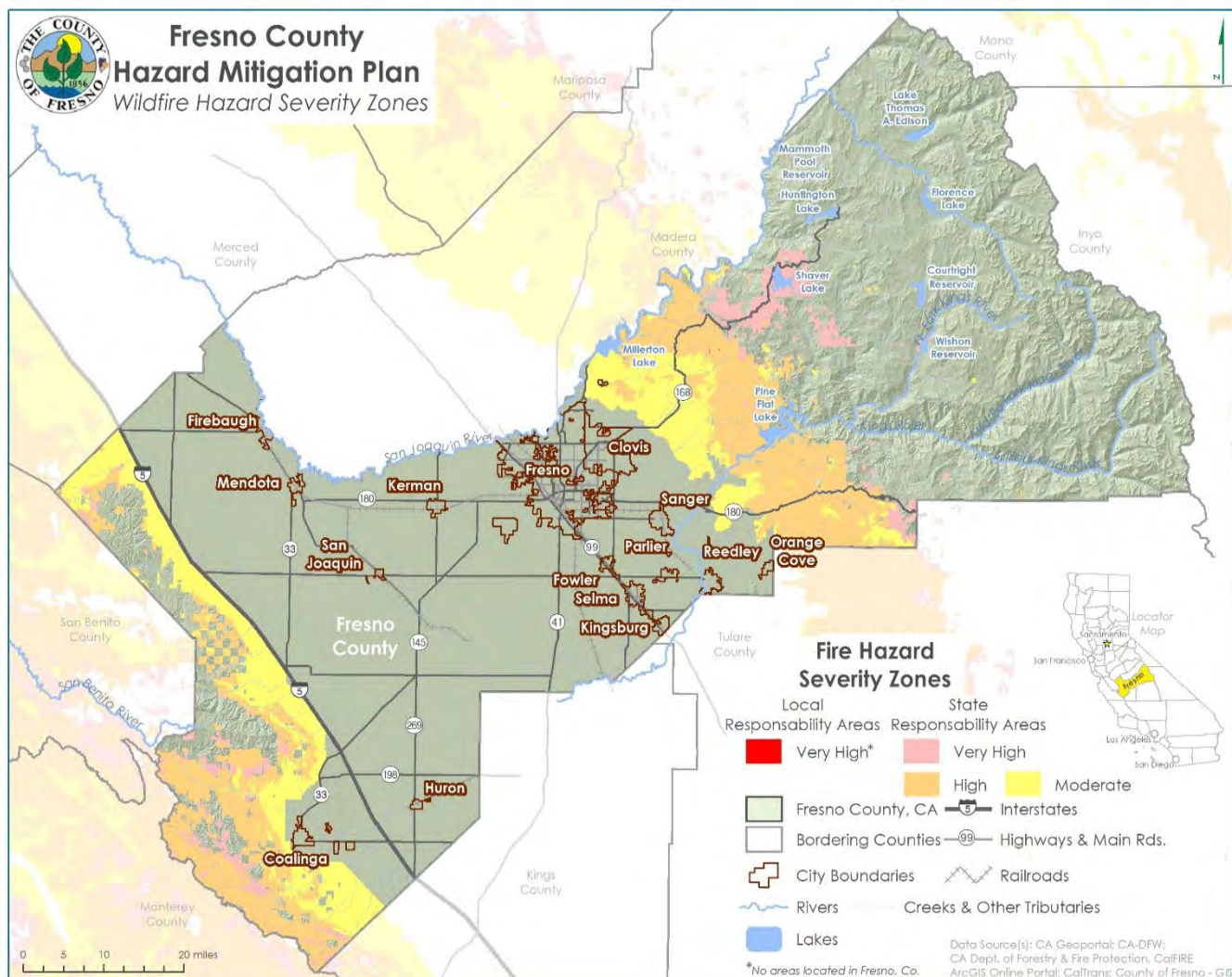
Source : <http://www.wfas.net>



Within the County there are three principal areas that have large damaging fire history: West of Interstate 5, the San Joaquin River Watershed, and the Kings River Watershed. Each of these areas have unique vegetation and topography types, fire weather and communities. West of Interstate 5 is best described as an area with low rainfall (average of less than 10 inches) and a vegetation type consisting of annual grass, oak woodlands, and brush. This area is predominantly used as rangeland for livestock grazing, mining, oil and gas production and underground transportation.

The San Joaquin River and the Kings River Watersheds have a diverse vegetation type ranging from annual grasslands, oak woodlands, brush, and timber. These vegetation types of transition from the valley floor to the Sierra Nevada's. The topography ranges from rolling foothills, steep river canyons to high Sierra mountains. This area has numerous communities and homes on small parcels intermixed within the larger landscape. The San Joaquin River and Kings River have numerous hydroelectric facilities and critical power infrastructure located from the foothills to the high Sierra. Recreation in the Sierra and Sequoia National Forests areas along with group camps increases the population and ignition potential during fire season. The drought that started in 2012 has left an abundance of dead brush, oaks, and timber in the upper elevations of these watersheds. The impacts to the vegetation will carry on for many years into the future making fire suppression more difficult and increasing the chance for large catastrophic fires across the landscape.

Figure 55. Fresno County's Wildfire Severity Zones



Source: CA Geoportal; CA-DFW; CA Department of Forestry & Fire Protection, CalFIRE ArcGIS Online Portal; CalTrans; County of Fresno – GIS

PAST OCCURRENCES

Wildfires are of significant concern throughout California. According to the California Department of Forestry and Fire Protection (CAL FIRE), vegetation fires occur within their jurisdiction on a regular basis; most are controlled and contained early with limited damage. For those ignitions that are not readily contained and become major incidents, damage can be extensive. There are many causes of wildfire, from naturally caused lightning fires to human-caused fires linked to activities such as smoking, campfires, debris burning, equipment use, and arson. Recent studies conclude that the greater the population density in an area, the greater the chance of an ignition. The recent major wildland fires are the Powerhouse Fire in 1989 and the Valerie Meadows Fire in 1979. Most of the lands at the upper elevations have experienced fire within the past fifty years. Fires at the lower elevations generally do not offer fuel reduction benefits in following year(s) due to re-growth of annual grasses. With population



continuing to grow throughout California and the Fresno County planning area, the risk posed by wildfire also continues to grow.

According to the 2005 Prefire Management Plan for CAL FIRE's Fresno-Kings Unit, an ignition analysis for 2004 was determined to be very similar to that of years past. The four primary ignition sources continue to be other and undetermined (535 fires), arson (311 fires), equipment use (315 fires), and debris burning (158 fires). The remaining causes, which are almost insignificant in number, are lightning, campfires, smoking, vehicles, electrical power, and playing with fire. The unit, which encompasses all of Fresno and Kings counties, experiences 120 to 200 fires a year in the state responsibility area and 1,400 to 1,600 fires in the local responsibility area is a fire history map for the Fresno-Kings Unit. During the drafting of the 2009 Fresno County HMP, the Unit, which encompasses all of Fresno and Kings counties, experienced 120 to 200 fires a year in the state responsibility area and 1,400 to 1,600 fires in the LRA.

In 2017, the Fresno County Fire Protection District reports a dramatic increase in fire incidents, with 1,283 reported as of July 31, 2017. That said, of the total number, 470 were categorized as Vegetation fires (wildfires), while the remaining fires related to vehicles (221), structures (197), refuse (331), industrial (33), improvement/controlled burns (21), and agricultural products (10). However, as has been noted previously, wildfires occur from both natural and human-made causes. Therefore, given the recent frequency increase in vegetation fires, and the fact that other types of fires have the potential to spread into a wildfire scenario, the wildfire hazard risk seems to be growing, and the LHMP will remain vigilant in its efforts to mitigate the risks, although an increase in frequency does not necessarily translate to an increase in the extent (range) of wildfires or their severity.

Previous wildfire events are detailed in the table and map below for Fresno County. The HMPC identified the following as notable wildfires in the Fresno County planning area:

- **1933:** The Tollhouse Fire started when a local resident was burning brush in late August. The fire got out of hand and burned across fields and grazing lands and encircled the Town of Tollhouse, a large hub for the timber industry in eastern Fresno County. It burned portions of the flume that carried logs and boards from Shaver Lake to the valley floor. The fire raced up the hill and burned into Jose Basin and over Burrough Mountain into Blue Canyon. The fire burned very hot, destroying conifers in the area, which never grew back. Tollhouse was evacuated for safety, but no losses were incurred.
- **1987:** The state declared a disaster for Fresno County and 32 other counties during the 1987 wildfires. Collectively, the fires resulted in 3 deaths, 76 injuries, and \$18 million in damage. The eastern side of Fresno County was primarily affected. Property damage was estimated at \$1 million. Damage to roads, bridges, and power distribution also occurred. Timber production in the area was also impacted.
- **August 2-21, 1989:** The Powerhouse Fire, suspected to be caused by arson, ignited near the Fresno and Madera County line, and burned through 21,000 acres, affecting the areas from Auberry to Meadow Lakes. Although no fatalities occurred and no homes were destroyed, the fire caused minor injuries to firefighters and the loss of several outbuildings, as well as damage to infrastructure. The fire's impact was particularly severe on the local watershed and wildlife, signaling a significant ecological and community disturbance.
- **August 24, 1994:** The Big Creek Wildland Fire in eastern Fresno County burned 9,000 acres of national forest land, threatened hundreds of homes, and led to the evacuation of the Big Creek community. Costs included \$2 million in damage to national forest infrastructure, \$500,000 to power distribution, and recovery expenses for the land were estimated at \$2 million. The firefighting effort exceeded \$50 million, and a subsequent mudslide incurred an additional \$50,000 in damages.



- **September 21, 2000:** The Millwood Fire burned 283 acres; 363 personnel responded. Highway 180 was closed until 8:00 p.m. that evening. A shelter was prepared in the City of Orange Cove but was not used.
- **August 17, 2001:** The Highway fire located near the community of Dunlap, burned 4,152 acres, and destroyed five outbuildings, a cabin, two travel trailers, and a miscellaneous number of cars.
- **August 17, 2001:** The Musick Fire, located between Shaver Lake and Big Creek, burned 193 acres. No structures were damaged in this fire caused by downed power lines. The cost was estimated at \$800,000.
- **July 2013:** The Aspen Fire took place in the Kaiser Wilderness area of the Sierra National Forest, North of Huntington Lake. The fire burned over 150,000 acres with a suppression cost of \$22.8 million dollars. The fire posed imminent danger to people within the National Forest, resulting in the evacuation of multiple campsites.
- **July 30, 2015:** The Rough Fire, sparked by lightning in the Sierra National Forest, spread to encompass 151,000 acres, affecting nearby national parks, and causing the evacuation of multiple communities. The blaze led to poor air quality, the closure of schools and summer camps, and the destruction of buildings, while also severely reducing local tourism revenue. Suppression efforts for this massive wildfire cost \$119 million.
- **July 1, 2016:** The Curry Fire was a major wildland fire that burned 2,944 acres in Coalinga, CA. Though no crop, property or infrastructure damage or personal injury occurred, it did result in several road closures.
- **July 2016:** The Goose Fire began at or around the intersection of Gooseberry Lane and Morgan Canyon Road, South of the town of Prather. The fire consumed 2,241 acres and destroyed 4 residences and 5 outbuildings. The fire posed an imminent threat to 400 homes, and residents were issued evacuation orders.
- **August 8, 2016:** The Mineral Fire was a major wildland fire which burned 7,05 acres in Coalinga, CA. Though no crop, property or infrastructure damage or personal injury occurred, it did result in several road closures.
- **October 11, 2016:** The Sacata Fire started near Sacata Ridge above Pine Flat in the Sierra National Forest. The fire was contained after burning over 1,500 acres. Active for 9 days, it was fully contained by October 20, 2016.
- **July 9, 2017:** The Garza Fire was a major wildland fire igniting in Monterey County (Coalinga, CA), and spreading to Kings and Fresno Counties. Although the fire burned 48,888 acres, no personal injuries or damage to crops, buildings or infrastructure were reported. However, it did result in several road closures.
- **June 25, 2017:** The Creek fire began off Los Gatos Creek Rd, west of Derrick, or 13 miles northwest of Coalinga, CA in Fresno County. The cause is under investigation. It burned 357 acres before being contained on June 28, 2017. There was one residence and 3 sheds destroyed. The cost of containment was \$1.5 million.
- **July 16, 2017:** The Detwiler Fire began 15 miles northwest of Mariposa, CA. It was human caused. It burned 81,826 acres, resulting in 63 residences, 67 minor structures and 1 commercial structure being destroyed with another 13 residences and 8 minor structures damaged. The fire forced the evacuation of several small rural communities for as long as 10 days and the entire town of Mariposa (population 18,000) for 3 days. Parts of Highways 41, 49, and 140 were closed at times during the fire. The fire was 90 percent contained on July 31, 2017, but no additional growth



occurred before it was completely contained on August 24, 2017. The cost of containment was \$87 Million.

- **August 13, 2017:** The South Fork Fire started near Wawona in Yosemite National Park, prompting the closure of trails and the evacuation of Wawona due to the spread of the fire caused by thunderstorm downdrafts. Although containment reached 44 percent by the end of August, the fire was allowed to burn to the east into more rugged terrain. The fire, managed as it moved into the wilderness, was expected to continue burning into October.
- **August 29, 2017:** The Railroad Fire started near Sugar Pine, just south of Yosemite National Park, and led to the closure of Highway 41 and evacuations, including the Tenaya Lodge. It burned 12,407 acres, including part of the Nelder Grove of Giant Sequoias, and was contained by September 15, 2017, with costs reaching \$20.8 million. Seventeen structures were destroyed, notably historical railroad items from the Yosemite Mountain Sugar Pine Railroad.
- **September 3, 2017:** Two fires started within a short time of each other both in the foothills of the Sierra Nevada. The Mission fire began 2 miles east of North Fork in Madera County and burned 1035 acres and destroyed three residences and damaged 4 other structures before being contained on September 13, 2017. The Peak fire began 9 miles southeast of Mariposa in Mariposa County and burned 680 acres and destroyed 2 structures before being contained on September 9, 2017. The cause of both fires is unknown.
- **July 13, 2018:** The Ferguson Fire began on July 13 near Mariposa, CA, and grew under difficult conditions including steep terrain and heavy beetle-killed trees, leading to road closures and evacuations. Smoke from the fire caused significant air quality issues, prompting the closure of parts of Yosemite National Park, and impacting the broader Sierra Nevada region. By the end of July, the fire had consumed 57,041 acres and incurred costs of \$64.3 million, with the firefighting effort marred by the deaths of two firefighters.
- **July 13, 2020:** The Mineral fire was first spotted around 5 PM, with nearly 1000 acres burned by days end. The next several days resulted in significant fire growth and numerous evacuation notices within the region. Highway 198 between Coalinga and Monterey County was closed which impacted commerce, though the greatest impact was the loss of seven structures. Full containment of the fire was seen on 26th, though growth ended days prior.
- **July 24, 2020:** The Blue Jay fire began due to a lightning strike near the White Wolf Campground. The fire burned in general wilderness, though did close several trails within the park.
- **August 15, 2020:** The Hills Fire started in the foothills about 9 miles south of Coalinga, CA. It grew to 2,121 acres before being contained on 8/25/2020. The cause was under investigation. The cost of containment was \$3.9 million. No structures were destroyed or damaged. Tragically, a helicopter pilot was killed on August 18 when his helicopter crashed while making water drops over the fire.
- **August 19, 2020:** The Castle Fire, ignited by lightning on August 19, 2020, near the Giant Sequoia National Monument, grew from 2,000 to 35,674 acres by the end of August, prompting evacuations and road closures. Merging with the Shot Gun Fire to form the SQF Complex on August 29, the fire had zero containment and costs reached \$5.6 million by August 31st. The fire persisted into September, challenging firefighting efforts in the Sequoia National Forest.
- **September 4, 2020:** The Creek Fire, which started near Big Creek, California on September 4th, rapidly expanded to 73,278 acres by September 6th due to extreme heat and low humidity. Despite the slowing effects of extensive smoke, by September 9th the fire had reached nearly 153,000 acres, necessitating the evacuation of about 45,000 people and the destruction of 853 structures by



the end of the month. Persistent hot and dry conditions under strong high pressure allowed the fire to continue burning into November, with containment costs reaching \$106 million.

- **2021:** The Blue Fire, Fish Fire, Slope Fire, and Vulcan Fire, all occurring in 2021, collectively burned 442 acres of land in Fresno County, California. The Blue Fire was the largest, scorching 277 acres near Shaver Lake, while the Fish and Slope Fires were quickly contained, affecting 75 and 25 acres, respectively. The Vulcan Fire consumed 140 acres near Friant Road and was managed by both CAL FIRE and Fresno City Fire Department. Despite the varied sizes and locations, effective firefighting efforts led to the successful containment of each incident without significant damage to communities or infrastructure.
- **2022:** In 2022, Fresno County in California experienced several wildfires that tested the mettle of firefighting teams. Near Shaver Lake, the House Fire in May necessitated significant resource deployment and evacuation measures but was quickly brought under control, covering an area of 171 acres. The Pebble Fire, which emerged east of Fresno in late July, consumed 55 acres and was swiftly contained, showcasing the effectiveness of local firefighting efforts. The Power Fire in September posed a threat to 130 acres near Aubery Rd but was contained within a week by the diligent efforts of the Fresno-Kings Unit. Finally, the Table Fire, which occurred in early July on Table Mountain, was the most quickly addressed, with 52 acres contained in a mere two days.
- **2023:** Throughout 2023, Fresno County in California faced a series of wildfires across various locations, each notable for their swift containment. The Crane Fire and Rodeo Fire, both near Squaw Valley, and the Juniper Fire to the west of Coalinga were among the smaller incidents, affecting areas of 24 and 15 acres each. Larger fires like the Orange Fire near Orange Cove and the Panoche Fire north of Little Panoche Rd, burned through 108 and 65 acres, respectively. The Pistol Fire near Auberry Road, and the extensive Slough Fire near San Joaquin, which spanned a vast 640 acres, were also brought under control promptly. Meanwhile, the Wildcat Fire occurred around Forest Service Road 10S069 and Trimmer Springs Road, near Pine Flat, and was managed by the US Forest Service-Sierra National Forest. The investigation into the causes of these wildfires was ongoing as the fire season progressed.



Table 65. Fresno County Past Occurrences: Wildfire

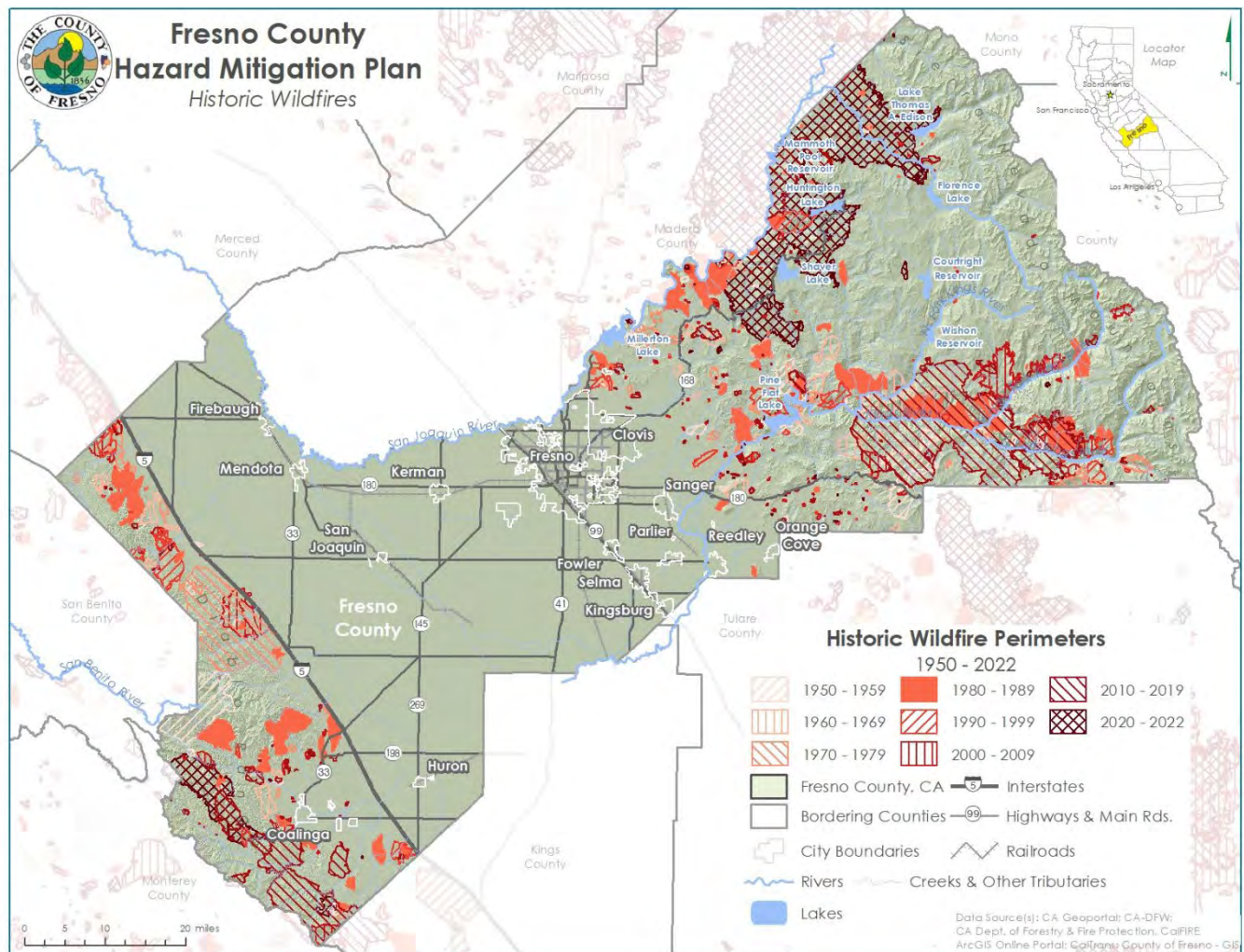
Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Town of Tollhouse	1933	0	0	0	0	0
Eastern Fresno County	1987	0	1 M	0	3	76
Auberry Road and Meadow Lane	8/2/1989 – 8/21/1989	0	0	0	0	0
Big Creek	8/24/1994	0	0	0	0	12
Big Creek	9/21/2000	0	0	0	0	0
Dunlap	8/17/2001	0	0	0	0	0
Shaver Lake and Big Creek	8/17/2001	0	0	0	0	0
Kaiser Wilderness	July 2013	0	0	0	0	0
Sierra National Forest	7/30/2015	0	0	0	0	0
Coalinga	7/01/2016	0	0	0	0	0
Gooseberry Lane and Morgan Canyon Road	July 2016	0	0	0	0	0
Coalinga	8/08/2016	0	0	0	0	0
Coalinga	7/09/2017	0	0	0	0	0
Los Gatos Creek Road	6/23/2017	0	0	0	0	0
Mariposa	7/16/2017	0	0	0	2	19
Wawona	8/13/2017	0	0	0	0	0
Sugar Pine	8/29/2017	0	0	0	0	6
Sierra Nevada Foothills	9/03/2017	0	0	0	0	0
Mariposa	7/13/2018	0	0	0	2	19
Highway 198 Coalinga	7/13/2020	0	0	0	0	0
White Wolf Campground	7/24/2020	0	0	0	0	0
Coalinga	8/15/2020	0	0	0	1	0
Giant Sequoia National Monument	8/19/2020	0	0	0	0	15
Big Creek	9/04/2020	0	0	0	0	29
Shaver Lake, Friant Road	2021					
Shaver Lake, Table Mountain	2022					



Location	Date	Magnitude	Property Loss (\$)	Crop Loss (\$)	Deaths	Injuries
Squaw Valley, Orange Cove	2023					

Source: NOAA, National Centers for Environmental Information, Storm Events Database, California Department of Forestry and Fire Protection CAL FIRE

Figure 56. Fresno County Historic Wildfires



Source: CA Geoportal; CA-DFW; Ca Department of Forestry & Fire Protection, CalFIRE ArcGIS Online Portal; CalTrans; County of Fresno - GIS



LIKELIHOOD OF FUTURE OCCURRENCES

Highly Likely—Within the Fresno-Kings Unit, fire occurrences range from 120 to 200 fires a year in the SRA and 1,400 to 1,600 fires in the LRAs. Fires will continue to occur on an annual basis in the Fresno County planning area.

Other statistical measures to be considered in assessing the extent of the wildfire hazard include data on frequency (and severity): According to the Fire and Resource Assessment Program (FRAP), having compiled and analyzed a variety of measures for fire activity, such as the influence of time and fuel types, although fire activity across the state varies from year to year, the annual average since 2000 is 598,000 acres, or almost twice that of the preceding 50-year period from 1950-2000 (264,000 acres).

It should be noted that many ecosystems in the state that previously adapted to frequent low to moderate severity fires have seen shifts in reduced fire frequency (missed fire cycles), associated fuel build-up, and subsequent increases in fire severity when wildfires eventually occur. That said, other ecosystems appear to be burning too frequently – a situation facilitated by exotic invasive species that cause fundamental changes to post-fire fuel dynamics. These changes facilitate early seral phases to re-burn within a matter of only a couple years and may reduce or eliminate native species that require time to develop to maturity and assure regeneration. And, in areas such as Fresno County, where ecosystems are commingled across various regimes, there is more uniformity of mixed-and high-severity effects that are not as clearly linked to basic ecosystem function. Therefore, in many mixed conifer systems, while the modern trend indicates an increase in fire rates, the type of fire and its typical interval are still significantly departed from the frequent low and mixed-severity fires that dominated low and mid-elevation conifer forests throughout California⁵²

CLIMATE CHANGE

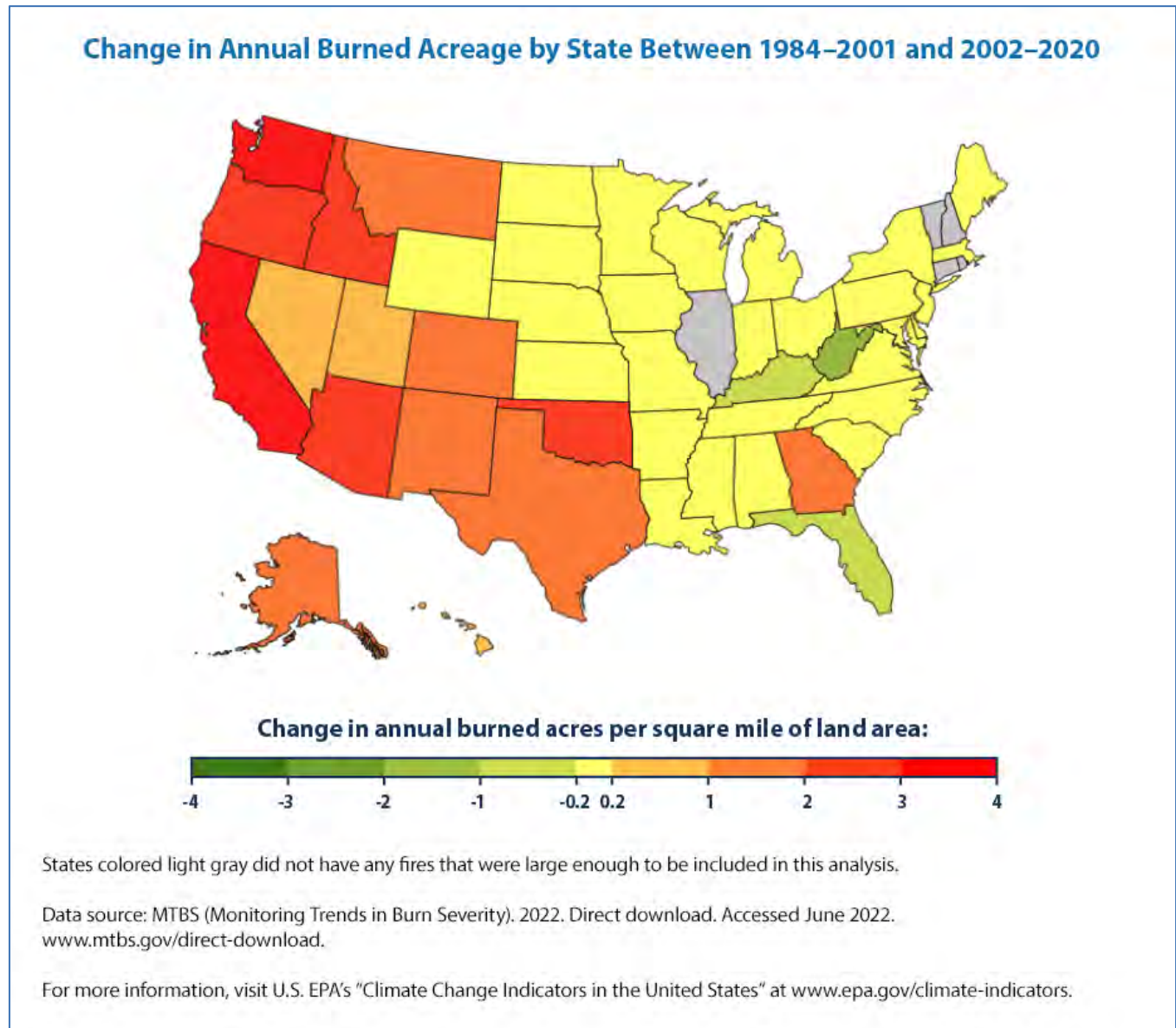
Over the past four decades, annual area burned has increased significantly in California and across the western United States. This trend reflects a confluence of intersecting factors that affect wildfire regimes. It is correlated with increasing temperatures and atmospheric vapor pressure deficit. Anthropogenic climate change is the driver behind much of this change, in addition to influencing other climate-related factors, such as compression of the winter wet season. These climatic trends and associated increases in fire activity are projected to continue into the future. Additionally, factors related to the suppression of the Indigenous use of fire, aggressive fire suppression and, in some cases, changes in logging practices or fuel management intensity, collectively have produced large build-ups of vegetative fuels in some ecosystems.⁵³

According to the Environmental Protection Agency (EPA) the change in burned area has increased from 1984-2001 and 2002-2020 by 3.62 acres per square mile. Most of the western states have also seen an increase in burned acreage from similar time intervals, shown in **Figure 57. Change in Annual Burned Acreage by State Between 1984-2001 and 2002-2020.**

⁵² 2010 Assessment Chapter 2.1: Wildfire Threat to Ecosystem Health and Community Safety

⁵³ Drivers of California's changing wildfires a state-of-the-knowledge synthesis (nwfirescience.org) [nwfirescience.org/sites/default/files/publications/Drivers of California's changing wildfires- a state-of-the-knowledge synthesis.pdf](https://nwfirescience.org/sites/default/files/publications/Drivers%20of%20California's%20changing%20wildfires-a%20state-of-the-knowledge%20synthesis.pdf)

Figure 57. Change in Annual Burned Acreage by State Between 1984-2001 and 2002-2020



Source: MTBS (Monitoring Trends in Burn Severity) 2022

Even under a pathway of lower greenhouse gas emissions, average annual temperatures are projected to exceed historical record levels most likely by the middle of the 21st century. Overall, warming will lead to increased heat wave intensity but decreased cold wave intensity. Future heat waves signify a potential increase in the wildfire hazard intensity and severity in Fresno County, as well as a year-long fire season. According to the California's Fourth Climate Change Assessment, by 2100 if greenhouse gas emissions continue to rise, one study found that the frequency of extreme wildfires would increase, and the average area burned statewide would increase by 77 percent.⁵⁴

⁵⁴ State Key Findings - California Climate Change Assessment

4. Risk Assessment



Finally, it should be noted that Fresno County potentially has less capacity to address future wildfire risk related to climate change due to shortages in water, vital to combating wildfires. In California, rising temperatures are projected to increase the average lowest elevation at which snow falls, reducing water storage in the snowpack.



FRESNO COUNTY'S MITIGATION CAPABILITIES

Thus far, the planning process has identified the hazards posing a threat to Fresno County and described, in general, the vulnerability of the County to these risks. The next step is to assess what risk reduction mechanisms are already in place. These mechanisms include laws, policies, programs, staff, funding and other resources on hand to carry out the plan and increase resilience. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the County's "net vulnerability" to disasters and more accurately focuses the goals, objectives, and proposed actions of this plan. The capability assessment also informs the mitigation strategy. The chosen actions should either match the community's resources or support strengthening or building capacity where resources might not exist.

As such, this section presents Fresno County's mitigation capabilities: programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. It also identifies capabilities specific to the other participating jurisdictions can be found in the jurisdictional annexes.

The HMPC used a two-step approach to originally conduct this assessment for the County. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken, if deemed appropriate. Second, the HMPC reviewed existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses. During the 2024 update this section was reviewed by County and Witt O' Brien's consultant team staff to update information where applicable. This included revising sections to align with changes that will be reflected in the updated General Plan.

This update process afforded the County and its participating jurisdictions the opportunity to review their previous capabilities and note the ways in which these capabilities have improved or expanded since the adoption of the previous plan. Additionally, in summarizing their current capabilities and identifying gaps, plan participants also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. Chapter 5 Mitigation Strategy includes mitigation actions aimed at improving community capability to reduce hazard risk and vulnerability. An overview of Fresno County's capabilities is described in **Table 66. Fresno County Capability Summary**.

Table 66. Fresno County Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Fiscal Capability			X
Available Staff			X
Political Support/Interest			X
Community Support			X



FRESNO COUNTY'S REGULATORY MITIGATION CAPABILITIES

Table 67. Fresno County's Regulatory Mitigation Capabilities regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Fresno County. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 67. Fresno County's Regulatory Mitigation Capabilities

Plans	In Place		Adopted/Updated	Under Development		Expected Completion
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X		2022 California Building Code			
Community Emergency Response Team (CERT)	X		Adopted			
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)	X		Adopted			Using State of California Plan
Fire Code	X		Local jurisdiction code used			
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance	X		Title 15			
Land Use/Development Planning	X		Updated February 2024			
National Flood Insurance Program (NFIP)	X		August 2023			
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready		X				
Stormwater Management Plan/Ordinance		X				
Subdivision Regulations/Ordinance	X		Title 17			
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance	X		Updated			February 2024

As indicated in the table above, Fresno County has several plans and programs that guide the County's development in hazard-prone areas. Starting with the Fresno County General Plan, which is the most comprehensive of the County's plans when it comes to mitigation, some of these are described in more detail below.



FRESNO COUNTY GENERAL PLAN

The Fresno County General Plan consists of multiple documents: the countywide General Plan Background Report, the countywide General Plan Policy Document, and over 40 regional, community, and specific plans. This discussion is derived primarily from the Fresno County General Plan Policy Document, from which the text that follows is largely extracted.

The Fresno County General Plan is a comprehensive, long-term framework for the protection of the county's agricultural, natural, and cultural resources and for development in the county. Designed to meet State general plan requirements, it outlines goals, policies, and programs and sets out plan proposals to guide day-to-day decisions concerning Fresno County's future. The County sees its primary role to be the protector of prime agricultural lands, open space, recreational opportunities, and environmental quality, and the coordinator of countywide efforts to promote economic development.

- Economic Development
- Agricultural Land Use
- Transportation and Circulation
- Public Facilities and Services
- Open Space and Conservation
- Health and Safety
- Environmental Justice
- Housing

Each of these elements includes goal statements relating to different aspects of the issues addressed in the element. Under each goal statement, the plan sets out policies that amplify the goal statement. Implementation programs are listed in a separate Administration and Implementation Section and describe briefly the action proposed by the program, the County agencies or departments with primary responsibility for carrying out the program, and the time frame for accomplishing the program.

The County is conducting a comprehensive review of its current General Plan. Based on the review, County staff has proposed revisions to the Plan's goals, policies, and programs.

Following is an element-by-element summary of the General Plan goals and policies that are most relevant to the Hazard Mitigation Plan Update. The summary tracks the organization of each element, with topically focused goals followed by related policies. Note that the summaries reflect policies as proposed by the County as a result of its ongoing review, including deletions and revisions.

STATE OF CALIFORNIA SAFETY ELEMENT

The state of California requires General Plans to address nine elements which include land use, circulation, housing, conservation, open space, noise, safety, environmental justice, and air quality. The safety elements aim to reduce the potential short and long-term risk of death, injuries, property damage, and economic and social dislocation resulting from fires, floods, droughts, earthquakes, landslides, climate change, and other hazards. The safety elements should contain general hazard and risk reduction strategies complementary to the local hazard mitigation plan. In order to support the Fresno County General Plan's Safety Element, the local hazard mitigation plan must address parts of the state's safety element requirements. **Table 68. California State Safety Element Requirements** includes the state's Safety Element requirements.



Table 68. California State Safety Element Requirements

Statutory Citation	Brief Description of Requirements
Gov. Code 65302(g)(1)	Identification of unreasonable risks and policies for the protection of the community from such risks.
Gov. Code 65302(g)(1)	Slope Instability Slope instability leading to mudslides and landslides.
Gov. Code 65302(g)(1)	Seismic risks, including: Seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failures; subsidence, liquefaction, and other seismic hazards identified to Chapter 7.8 (commencing with Section 2690) of Division 2 of the Public Resources Code, and other geologic hazards known to the legislative body <ul style="list-style-type: none"> • Mapping known seismic and other geologic hazards • Address <ul style="list-style-type: none"> ○ Evacuation routes ○ Military installations ○ Peak load water supply requirements and ○ Minimum road widths and clearances around structures
Gov. Code 65302(g)(2)	Flooding Identify <ul style="list-style-type: none"> • Flood Hazard Zones • FEMA Flood Insurance Maps • Army Corps of Engineer Flood Information • Flood maps from the Central Valley Flood Protection Board • Dam Failure Maps (Office of Emergency Services) • DWR Floodplain Maps • Maps of Levee Protection Zones • Areas subject to inundation in the event of the failure of levees and floodwalls • Historic flood information • Existing and planned development in flood hazard areas • Agencies with responsibility for flood protection Mandatory Goals, Policies, and Objectives <ul style="list-style-type: none"> • Avoid and minimize flood risks for new development • Should new development be located in flood hazard zones? If so, what are appropriate mitigation measures? • Maintain the integrity of essential public facilities • Locate, when feasible, new essential public facilities outside of flood hazard zones, including hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities, or identifying mitigation measures. • Establishing cooperative working relationships among public agencies with responsibility for flood protection Feasible Mitigation Measures, to implement the policies above.
Gov. Code 65302(g)(3)	Wildland and Urban Fires Identification of, and policies for, the protection of the community from, unreasonable risks associated with wildland and urban fires. State Responsibility Areas and Very High Fire Hazard Severity Zones Consider advice in OPR's Fire Hazard Technical Advisory



Statutory Citation	Brief Description of Requirements
	<p>Identify</p> <ul style="list-style-type: none"> • CalFIRE Fire Hazard Severity Zone Maps • Historical data on wildfires • USGS wildfire hazard areas • Existing and planned development within these areas • Agencies with responsibility for fire protection in these areas <p>Mandatory Goals, Policies and Objectives</p> <ul style="list-style-type: none"> • Protect the community from unreasonable risks • See mitigation measures below <p>Feasible Mitigation</p> <ul style="list-style-type: none"> • Avoid and minimize fire risks for new development • Should new development be located in fire hazard zones? If so, what are appropriate mitigation measures? • Maintain the integrity of essential public facilities • Locate, when feasible, new essential public facilities outside of fire hazard zones, including hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities. • If essential facilities are located in high fire zones, identify mitigation measures, such as safe access for emergency response vehicles, visible street signs, and water supplies for structural fire suppression • Establishing cooperative working relationships among public agencies with responsibility for fire protection
Gov. Code 65302(g)(4)	<p>Climate Change Adaptation and Resilience</p> <p>Address climate change adaptation and resiliency strategies by using the process in the Adaptation Planning Guide and reflected in referenced tools such as Cal-Adapt</p> <p>Vulnerability Assessment (Gov Code 65302(g)(4)(A))</p> <p>Create a vulnerability assessment that identifies the risks that climate change poses to the local jurisdiction and the geographic areas at risk from climate change impacts, the following:</p> <ul style="list-style-type: none"> • Information that may be available from federal, state, regional, and local agencies that will assist in developing the vulnerability assessment and the adaptation policies and strategies, including, but not to, all of the following <ul style="list-style-type: none"> (I) Information from the Internet based Cal-Adapt tool (II) Information from the most recent version of the California Adaptation Planning Guide (III) Information from local agencies on the types of assets, resources, and populations that will be sensitive to various climate change exposures (IV) Information from local agencies on their current ability to deal with the impacts of climate change (V) Historical data on natural events and hazards, including locally prepared maps of areas subject to previous risk, areas that are vulnerable, and sites that have been repeatedly damaged (VI) Existing and planned development in identified at-risk areas, including structures, roads, utilities, and essential public facilities (VII) Federal, state, regional, and local agencies with responsibility for the protection of public health and safety and the environmental, including special districts and local offices of emergency services <p>Mandatory Goals, Policies, and Objectives (Gov. Code 65302(g)(4)(B))</p>



Statutory Citation	Brief Description of Requirements
<p>Gov. Code 65302(g)(4)</p> <p>CONTINUED</p>	<ul style="list-style-type: none"> • Create a set of adaptation and resilience goals, policies, and objectives based on the information above for the protection of the community <p>Feasible Mitigation (Gov. Code 65302(g)(4)(C))</p> <ul style="list-style-type: none"> • Create a set of feasible implementation measures designed to carry out the goals, policies, and objectives identified above, including but not limited to, all of the following: <ol style="list-style-type: none"> (i) Feasible methods to avoid or minimize climate change impacts associated with new uses of land (ii) The location, when feasible, of new essential public facilities outside of at-risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in at-risk areas. (iii) The designation of adequate and feasible infrastructure located in an at-risk area (iv) Guidelines for working cooperatively with relevant local, regional, state, and federal agencies (v) The identification of natural infrastructure that may be used in adaptation projects, where feasible. Where feasible, the plan shall use existing natural features and ecosystem processes, or the restoration of natural features and ecosystem processes, when developing alternatives for consideration. For the purposes of the clause, "natural infrastructure" means preservation or restoration of ecological systems, or utilization of engineered systems that use ecological processes, to increase resiliency to climate change, manage other environmental hazards, or both. This may include but is not limited to floodplain and wetlands restoration or preservation, combining levees with restored natural systems to reduce flood risk, and urban tree planting to mitigate high heat days. <p>Other documents (Gov. Code 65302(g)(4)(D)(i), 65302(g)(4)(D)(ii))</p> <ul style="list-style-type: none"> • If a city or county has adopted the local hazard mitigation plan, or other climate adaptation plan or document that fulfills commensurate goals and objectives and contains the information required pursuant to this paragraph, separate from the general plan, an attachment of, or reference to, the local hazard mitigation plan or other climate adaptation plan or document • Cities or counties that have an adopted hazard mitigation plan, or other climate adaptation plan or document that substantially complies with this section or have substantially equivalent provisions to this subdivision in their general plans, may use with this section, or have substantially equivalent provisions, climate adaptation plan or document, specifically showing how each requirement of this subdivision has been met.
<p>Gov Code 65302(g)(5)-(g)(8)</p>	<p>Other Considerations</p> <ul style="list-style-type: none"> • Cities and counties that have floodplain management ordinances that have been approved by FEMA that substantially comply with this section, or have substantially equivalent provisions to this subdivision in their general plans, may use that information in the safety element to comply with this subdivision, and shall summarize and incorporate by reference into the safety element the other general plan provisions or the flood plain ordinance, specifically showing how each requirement of this subdivision has been met. • Prior to the periodic review of its general plan and prior to preparing or revising its safety element, each city and county shall consult the California Geological Survey of the Department of Conservation, the Central Valley Flood Protection Board, if the city or county is located within the boundaries of the Sacramento and San Joaquin Drainage District, as set forth in Section 8501 of the Water Code, and the Office of Emergency Services for the purpose of including information known by and available to the department, the agency, and the board required by this subdivision. • To the extent that a county's safety element is sufficiently detailed and contains appropriate policies and programs for adoption by a city, a city may adopt that portion of the county's safety element that pertains to the city's planning area in satisfaction of the requirement imposed by this subdivision.



Statutory Citation	Brief Description of Requirements
	<ul style="list-style-type: none"> Review the safety element for fire and flood impacts upon each Housing Element update. Review the safety element for climate change at each update to the Local Hazard Mitigation Plan, Jurisdiction may also choose to do a comprehensive review of the safety element upon each housing element update to streamline review.

HEALTH AND SAFETY ELEMENT

Planning for growth and development requires the consideration of a wide range of public safety issues. Many of the health and safety risks associated with development, including risks to buildings and infrastructure, can be avoided through siting decisions made at the planning stages of development, while others may be lessened through the use of mitigation measures in the planning and land use review process. This element outlines Fresno County's strategy for ensuring the maintenance of a healthy and safe physical environment. Applicable goals and policies are presented below.

Emergency Management and Response

Policies listed in **Table 69. Fresno County Emergency Management and Response Goals** seek to create an effective emergency response and management system by ensuring that vital public infrastructure is designed to remain operational during and after a major disaster event, by siting critical emergency response facilities as far from potential disaster impact areas as is practical, and through continuing public education and outreach on emergency preparedness and disaster response programs.

Table 69. Fresno County Emergency Management and Response Goals

Goal or Policy	Description
Goal HS-A	To protect public health and safety by preparing for, responding to, and recovering from the effects of natural or technological disasters.
Policy A.1	The County shall, through the Fresno County Operational Area Master Emergency Services Plan and the Fresno County Multi-Hazard Mitigation Plan, maintain the capability to effectively respond to emergency incidents, including maintenance of an emergency operations center.
Policy HS-A.2	In coordination with cities, special districts, and other State and Federal agencies, the County shall maintain the Fresno County Multi- Jurisdictional Hazard Mitigation Plan to identify and mitigate, to the extent feasible, natural, and human-made hazards within the county.
Policy HS-A.3:	The County shall, within its authority and to the best of its ability, ensure that emergency dispatch centers, emergency operations centers, communications systems, vital utilities, and other essential public facilities necessary for the continuity of government are designed in a manner that will allow them to remain operational during and following an earthquake or other disaster.
Policy HS-A.4:	The County shall ensure that the siting of critical emergency response facilities such as hospitals, fire stations, sheriff's offices and substations, dispatch centers, emergency operations centers, and other emergency service facilities and utilities are sited and designed to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, landslides, avalanche, and explosions as required by State regulations. This includes locating new essential public facilities outside of Very High Fire Hazard Severity Zones, if feasible. Exception to this policy shall be allowed on the condition that the only alternative location would be so distant as to jeopardize the safety of the community, given that precautions are taken to protect the facility.
Policy HS-A.5	The County shall maintain coordination with other local, State, and Federal agencies to provide coordinated disaster response, especially to the most impacted populations in the County.



Goal or Policy	Description
Policy HS-A.6:	The County shall support local fire agencies through distribution of information during the permit process, through links on County websites, and by providing assistance at public meetings, in promoting the education of County residents concerning emergency preparedness, defensible space, and safety, as described in the Fresno-King Unit Fire-Plan information and public education outreach programs, focusing on the most vulnerable at-risk communities such as those in the Very High Fire Hazard Severity Zone.
Policy HS-A.7	The County shall review the design of all buildings and structures in the Very High Fire Hazard Severity Zones and State Responsibility Areas to ensure they are designed and constructed to State and local regulations and standards as part of the building permit plan check process.
Policy HS-A.8	The County shall continue to improve community transportation corridors to allow for effective evacuation routes for the public and effective access for emergency responders, including in areas that lack more than two emergency access routes.
Policy HS-A.9	The County shall prevent and control the spread of vector-borne diseases through best practice vector control techniques on County properties and will encourage use of these practices on other properties.
Policy HS-A.10	The County, as part of its five-year Capital Improvement Plan, shall conduct an evaluation of all County facilities including those operated by County first responders to determine retrofits that may be needed for long-term resilience to climate change hazards including wildfire and drought.
Policy HS-A.11	The County shall invest in sustainable backup power sources as funding becomes available to provide redundancy and continued services for critical facilities in the event of a power outage triggered by a climate event.
Policy HS-A.12	Establish minimum standards for evacuation, including in the Very High Fire Hazard Severity areas, in the Emergency Operations Plan and continuously reassess access and evacuation route capacity and put mitigation measures and improvement plans in place if needed.
Policy HS-A.13	The County shall periodically evaluate the ability of County facilities to function after a major disaster as well as project and assess future emergency needs.

FIRE HAZARDS

Policies in this section and in **Table 70. Fresno County Fire Hazard Goals and Policies** are designed to ensure that new developments are constructed to minimize potential fire hazards, minimize the risk of fire in already developed areas, and to provide public education concerning fire prevention.

Table 70. Fresno County Fire Hazard Goals and Policies

Goal or Policy	Description
Goal HS-B:	To minimize the risk of loss of life, injury, and damage to property and natural resources resulting from fire hazards.
Policy HS-B.1:	The County shall review project proposals to identify potential fire hazards and to evaluate the effectiveness of preventive measures to reduce the risk to life and property.
Policy HS-B.2:	The County shall ensure that development in high fire hazard areas is designed and constructed in a manner that minimizes the risk from fire hazards by increasing resistance of structures to heat, flames, and embers. The County shall review current building code standards and other applicable statutes, regulations, requirements, and guidelines regarding construction, and specifically the use and maintenance of non-flammable materials (both residential and commercial) and consider adopting amendments to Title 15 of the County Ordinance Code (Building and Construction) to implement appropriate standards. Special consideration shall be given to the use of fire-resistant construction in the underside of eaves, balconies, unenclosed roofs and floors, and other similar horizontal surfaces in areas of steep slopes.

4. Risk Assessment



Goal or Policy	Description
Policy HS-B.3:	The County shall coordinate with telecommunication service entities to fire-harden communications.
Policy HS-B.4:	The County shall require that new discretionary development including residential subdivisions and large commercial proposals in high-fire- hazard areas have fire-resistant vegetation, cleared fire breaks separating communities or clusters of structures from native vegetation, or a long-term comprehensive vegetation and fuel management program. Fire hazard reduction measures shall be incorporated into the design development projects in fire hazard areas.
Policy HS-B.5:	In consultation with the local fire agency and CalFire, the County shall require structures to be sited to maximize low-flammability landscape features to buffer against wildfire spread. Consultation with the local fire agency will be necessary to make this determination.
Policy HS-B.6:	The County shall require that new foothill and mountain subdivisions and residential areas in Very High Fire Hazard Severity Zones provide for safe and ready access for fire and other emergency equipment, for routes of escape that will safely handle evacuations, and for roads and streets designed to be compatible with topography while meeting fire safety needs.
Policy HS-B.7:	The County shall require new discretionary development projects to have adequate access for fire and emergency vehicles and equipment. All major subdivisions shall have a minimum of two (2) points of ingress and egress. The County shall implement feasible recommendations in AB2911 Office of the State Fire Marshall Subdivision Survey Reports, which survey subdivisions without a secondary means of egress routes for evacuation and other fire safety factors.
Policy HS-B.8:	The County shall work with local fire protection agencies, local wildfire mitigation groups, the California Department of Forestry and Fire Protection, and the U.S. Forest Service to promote the maintenance of existing fuel breaks and emergency access routes for effective fire suppression and in managing wildland fire hazards.
Policy HS-B.9:	The County shall require that community fire breaks be coordinated with overall fire break plans developed by CalFire and local foothill and mountain fire agencies for Very High Fire Hazard Severity Zones and State Responsibility Areas. Firebreak easements in subdivisions of more than four parcels or in built-up areas shall include access for firefighting personnel and motorized equipment. Easements shall be dedicated for this purpose.
Policy HS-B.10:	The County shall refer development proposals in the Very High Fire Hazard Severity Zones and State Responsibility Areas of the unincorporated county to the appropriate local fire agencies for review of compliance with fire safety standards. If dual responsibility exists, both agencies shall review and comment relative to their area of responsibility. If standards are different or conflicting, the more stringent standards shall apply.
Policy HS-B.11:	The County shall work with Cal Fire and local fire agencies to establish development requirements for year-round fire protection in foothill and mountain areas having existing or proposed population concentrations that need structural fire protection, and for agricultural land uses located in and bordering fire hazard zones.
Policy HS-B.12:	The County shall work to design new and modify existing County buildings of public assembly to incorporate adequate fire protection measures to reduce potential loss of life and property in accordance with State and local codes and ordinances and include consideration for filtration systems that improve air quality.
Policy HS-B.13:	The County shall permit development only within areas that have adequate water resources available, to include water pressure, onsite water storage, or fire flows.
Policy HS-B.14:	The County shall require new discretionary development to have water systems that meet fire flow requirements as determined by applicable California Fire Code requirements and/or National Fire Protection Association (NFPA) standards under the authority of the Chief Fire Code Official and as referenced in County Ordinance Code. Where minimum fire flow is not available to meet these standards, alternate fire protection measures, including sprinkler systems and on-site water supply or storage, shall be identified, and may be incorporated into development if approved by the appropriate fire protection agency. The County shall require that all public water providers maintain the long-term integrity of adequate water supplies and flow to meet fire suppression needs.
Policy HS-B.15:	The County shall ensure that any new development will have adequate fire protection, including proximity to adequate emergency services, adequate provisions for fire flow and emergency vehicle access and fire hardened communication, including high speed internet service.

4. Risk Assessment



Goal or Policy	Description
Policy HS-B16:	The County shall restrict or require mitigation for new discretionary development along steep slopes and amidst rugged terrain to limit rapid fire spread and increase accessibility for firefighting.
Policy HS-B17:	The County shall promote installation and maintenance of smoke detectors in existing residences and commercial facilities that were constructed prior to the requirement for their installation.
Policy HS-B18:	The County shall work with local fire agencies to develop high-visibility fire prevention programs, including education programs and voluntary home inspections.
Policy HS-B19:	The County shall require all new discretionary development consisting of major residential subdivisions and large commercial projects in the Very High Fire Hazard Severity Zone and State Responsibility Areas to develop site- specific fire management plans to maintain adequate access for emergency vehicles, including two points of access for subdivisions and multifamily developments, address fuel modification and/or incorporation of open space or other defensible space areas, maintain vegetation clearance on public and private roads, and include disclosure requirements to future property owners or residents as required by state law. Require ongoing maintenance and upkeep to be incorporated or recorded as part of building covenants or homeowner covenants, conditions, and restrictions.
Policy HS-B20:	As part of the next update to the Fresno County Multi-Hazard Mitigation Plan, the County, working with emergency service agencies, shall evaluate evacuation route capacity, safety, and viability under a range of emergency scenarios to facilitate fire, law enforcement, and ambulance access and resident egress, consistent with the existing goals and objective of the Fresno County Multi-Hazard Mitigation Plan.
Policy HS-B21:	The County shall collaborate with federal agencies to better manage fuel loads and hazards that could impact County owned/operated infrastructure on federally owned or managed lands.
Policy HS-B22:	The County shall make available and promote educational materials for defensible space standards, or vegetation "clear zones," and vegetation compliance for all existing and new structures in areas that are designated by the California Department of Forestry and Fire Protection and Local Ordinance 15.60 as State Responsibility Areas or Very High Fire Hazard Severity Zones.
Policy HS-B23:	The County, working with applicable fire agencies, shall make reasonable effort to minimize the risk to existing developments in Very High Fire Hazard Severity Zones and State Responsibility Areas by educating property owners and responsible entities of the benefits of improving such developments to contemporary fire safe standards, in terms of road standards and vegetative hazard, and require all development to meet or exceed the County's Title 15 – Building and Construction, Chapter 15.60 State Responsibility Area Fire Safe Regulations of the County under the County's Code of Ordinances and applicable updates.
Policy HS-B24:	The County shall require all new discretionary development consisting of major residential subdivisions and large commercial projects to provide, and existing development to maintain, adequate access for emergency vehicles, including two points of access for subdivisions and multifamily developments.
Policy HS-B25:	Require development to adhere to standards that meet or exceed Title 14, CCR, Division 1.5, Chapter 7, Subchapter 2, Articles 1-5 (commencing with Section 1299.01) (Fire Hazard Reduction Around Buildings and Structures Regulations) for State Responsibility Areas and/or Very High Fire Hazard Severity Zones.
Policy HS-B26:	The County shall maintain and update its Master Emergency Services Plan, as necessary, to include an assessment of current emergency service and projected emergency service needs, and goals or standards for emergency service training for County staff and volunteers.
Policy HS-B27:	In the event of a large fire, the County shall evaluate re-development within the impacted fire zone to conform to contemporary fire safe standards and require all development to meet or exceed the County's Title 15 - Building and Construction, Chapter 15.60 State Responsibility Area Fire Safe Regulations of the County under the County's Code of Ordinances, and applicable updates.
Policy HS-B28:	The County shall coordinate with local and state fire agencies to ensure that all new developments and applicable re-constructions (as defined by state law) in the very high fire hazard severity zone and State Responsibility Areas, comply with defensible space regulations, home and street addressing and signage, the latest fire-safe standards, Board of Forestry and Fire Protection fire safe regulations and the most current version of the California Building Code and California Fire Code.



Goal or Policy	Description
Policy HS-B29:	Coordinate with Southern California Edison and Pacifica Gas and Electric Company to implement an electrical undergrounding plan with a focus on critical evacuation roadways and areas with highest wildfire risk.
Policy HS-B30:	The County shall, if necessary, revise the Health and Safety Element upon each revision of the Housing Element or Fresno County Multi- Hazard Mitigation Plan, but not less than once every eight years, to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the county.
Policy HS-B31:	The County shall work with relevant agencies such as CAL FIRE, Fresno County Sheriff's Office, Caltrans, Fresno County Public Works and Planning, and private Homeowners Associations, to restrict parking periodically (e.g., on red flag days) along critical evacuation routes.

FLOOD HAZARDS

Policies in this section and in **Table 71. Fresno County Flood Hazard Goals and Policies** are designed to minimize flood hazards by restricting development in flood-prone areas, requiring development that does occur in floodplains to be designed to avoid flood damage, and through public education about flood hazards.

Table 71. Fresno County Flood Hazard Goals and Policies

Policy or Goal	Description
Goal HS-C	To minimize the risk of loss of life, injury, and damage resulting from flood hazards.
Policy HS-C.1	The County shall coordinate with the cities in Fresno County to develop and maintain a countywide flood emergency plan that is consistent with the Fresno County General Plan and city general plans.
Policy HS-C.2	The County shall prohibit new development in existing undeveloped areas (i.e., areas devoted to agriculture or open space that are not designated for development) protected by a State flood control project without appropriately considering significant known flooding risks and taking reasonable and feasible action to mitigate the potential property damage to the new development resulting from a flood.
Policy HS-C.3	The County shall not enter into a development agreement, approve any building permit or entitlement, or approve a tentative or parcel map unless it finds one of the following: a. The flood control facilities provides 200-year level of protection in urban and non-urban areas consistent with the current Central Valley Flood Protection Plan. b. Conditions imposed on the development will protect the property at a 200-year level of protection in urban and non-urban areas consistent with the current Central Valley Flood Protection Plan; or c. The local flood management agency has made "adequate progress" on the construction of a flood protection system which will result in protection equal or greater than the 200-year flood event in urban and non-urban areas consistent with the current Central Valley Flood Protection Plan.
Policy HS-C.4	The County shall require new flood control projects or developments within areas subject to 100- and 200-year frequency floods are designed and constructed in a manner that will not cause floodwaters to be diverted onto adjacent property or increase flood hazards to property located elsewhere.
Policy HS-C.5	The County shall encourage all agencies that operate public facilities, such as wastewater treatment plants, gas, electrical, and water systems, located within areas subject to 100- and 200-year frequency floods to locate and construct facilities to minimize or eliminate potential flood damage.
Policy HS-C.6	The County shall encourage, as applicable, expansion of stormwater and flood protection infrastructure capacity to accommodate changes in precipitation and extreme weather events including the establishment or expansion of recharge basins.



Policy or Goal	Description
Policy HS-C.7	The County shall support State and local flood management agencies to provide relocation assistance or other cost-effective strategies for reducing flood risk to existing economically- disadvantaged communities located in non- urbanized areas.
Policy HS-C.8	The County shall work with local, regional, State, and Federal agencies to maintain an adequate information base, prepare risk assessments, and identify strategies to mitigate flooding impacts.
Policy HS-C.9:	The County shall encourage the Fresno Metropolitan Flood Control District to control stormwater flows originating in the streams of the Fresno County Stream Group and the stormwater resulting from urban development by means of construction of dams or joint-use flood control and recharge facilities at appropriate locations.
Policy HS-C.10:	The County shall require that the design and location of dams and levees be in accordance with applicable design standards and specifications and accepted design and construction practices.
Policy HS-C.11:	The County shall require that the design and location of dams and levees be in accordance with applicable design standards and specifications and accepted design and construction practices.
Policy HS-C.12:	The County shall encourage the performance of appropriate investigations to determine the 200- year water surface elevations for the San Joaquin River, considering recent storm events and existing channel conditions, to identify the potential extent and risk of flooding. New development, including public infrastructure projects, shall not be allowed along the river until the risk of flooding at the site has been determined and appropriate flood risk reduction measures identified.
Policy HS-C.13:	Where existing development is in a flood hazard area, the County shall require that construction of flood control facilities proceed only after a complete review of the environmental effects and a project cost/benefit analysis.
Policy HS-C.14:	The County shall promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Existing irrigation canals shall be used to the extent possible to remove excess stormwater. Retention-recharge basins should be located to best utilize natural drainage patterns.
Policy HS-C.15:	The County shall continue to participate in the Federal Flood Insurance Program by ensuring compliance with applicable requirements.
Policy HS-C.16:	The County shall continue to implement and enforce its Floodplain Management Ordinance. During the building permit review process, the County shall ensure project compliance with applicable Federal Emergency Management Agency (FEMA) standards pertaining to residential and non-residential development in the floodplain, floodway, or floodway fringe.
Policy HS-C.17:	The County shall prohibit the construction of essential facilities (e.g., hospitals, police and fire facilities) in the 100- and 200-year floodplains, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.
Policy HS-C.18:	The County shall encourage open space uses in all flood hazard areas. Land Conservation contracts and open space and scenic easements should be made available to property owners.
Policy HS-C.19:	The County shall consider dam failure inundation maps of all reservoirs in making land use and related decisions.
Policy HS-C. 20:	The County shall continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation.

SEISMIC AND GEOLOGICAL HAZARDS

Policies in this and in **Table 72. Fresno County Seismic and Geological Hazard Goals and Policies** section seek to ensure that new buildings and facilities are designed to withstand seismic and geologic hazards.

Table 72. Fresno County Seismic and Geological Hazard Goals and Policies

Policy or Goal	Description
Goal HS-D:	To minimize the loss of life, injury, and property damage due to seismic and geologic hazards.
Policy HS-D.1:	The County shall continue to support scientific geologic investigations that refine, enlarge, and improve the body of knowledge on active fault zones, unstable areas, severe ground shaking, avalanche potential, and other hazardous geologic conditions in Fresno County.
Policy HS-D.2:	The County shall ensure that the General Plan and/or County Ordinance Code is revised, as necessary, to incorporate geologic hazard areas formally designated by the state geologist (e.g., earthquake fault zones and seismic hazard zones). Development in such areas, including public infrastructure projects, shall not be allowed until compliance with the investigation and mitigation requirements established by the state geologist can be demonstrated.
Policy HS-D.3:	The County shall require that a soils engineering and geologic-seismic analysis be prepared by a California-registered engineer or engineering geologist prior to permitting development, including public infrastructure projects, in areas prone to geologic or seismic hazards (i.e., fault rupture, ground shaking, lateral spreading, lurchcracking, fault creep, liquefaction, subsidence, settlement, landslides, mudslides, unstable slopes, or avalanche).
Policy HS-D.4:	The County shall require all proposed structures, additions to structures, utilities, or public facilities situated within areas subject to geologic-seismic hazards as identified in the soils engineering and geologic-seismic analysis to be sited, designed, and constructed in accordance with applicable provisions of the Uniform Building Code (Title 24 of the California Code of Regulations) and other relevant professional standards to minimize or prevent damage or loss and to minimize the risk to public safety.
Policy HS-D.5:	Pursuant to the Alquist-Priolo Earthquake Fault Zoning Act (Public Resources Code, Chapter 7.5), the County shall not permit any structure for human occupancy to be placed within designated earthquake fault zones unless the specific provisions of the act and Title 14 of the California Code of Regulations have been satisfied.
Policy HS-D.6:	The County shall ensure compliance with state seismic and building standards in the evaluation, design, and siting of critical facilities, including police and fire stations, school facilities, hospitals, hazardous material manufacture and storage facilities, bridges, large public assembly halls, and other structures subject to special seismic safety design requirements.
Policy HS-D.7:	The County shall require a soils report by a California-registered engineer or engineering geologist for any proposed development, including public infrastructure projects, that requires a County permit and is located in an area containing soils with high "expansive" or "shrink-swell" properties. Development in such areas shall be prohibited unless suitable design and construction measures are incorporated to reduce the potential risks associated with these conditions.
Policy HS-D.8:	The County shall seek to minimize soil erosion by maintaining compatible land uses, suitable building designs, and appropriate construction techniques. Contour grading, where feasible, and revegetation shall be required to mitigate the appearance of engineered slopes and to control erosion.
Policy HS-D.9:	The County shall require the preparation of drainage plans for development or public infrastructure projects in hillside areas to direct runoff and drainage away from unstable slopes.
Policy HS-D.10:	The County shall not approve a County permit for new development, including public infrastructure projects where slopes are over 30 percent unless it can be demonstrated by a California-registered civil engineer or engineering geologist that hazards to public safety will be reduced to acceptable levels.
Policy HS-D.11:	In known or potential landslide hazard areas, the County shall prohibit avoidable alteration of land in a manner that could increase the hazard, including concentration of water through drainage, irrigation, or septic systems, undercutting the bases of slopes, removal of vegetative cover, and steepening of slopes.
Policy HS-D.12:	The County shall not approve a County permit for new development, including public infrastructure projects, in known or potential avalanche hazard areas unless it can be demonstrated by a California-registered engineer or engineering geologist that the structures will be safe under anticipated snow loads and avalanche conditions.
Policy HS-D.13:	Whenever zoning is employed to restrict the use of land subject to severe geologic hazards (e.g., landslides), the County shall designate parcels so restricted for open space uses.



HAZARDOUS MATERIALS

Policies in this section and in **Table 73. Fresno County Hazardous Materials Goals and Policies** are designed to ensure that development projects minimize public risks associated with both intended and unintended exposure to hazardous materials and wastes.

Table 73. Fresno County Hazardous Materials Goals and Policies

Goal or Policy	Description
Goal HS-F	To minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.
Policy HS-F.1:	The County shall require that facilities that handle hazardous materials or hazardous wastes be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.
Policy HS-F.2:	The County shall require that applications for discretionary development projects that will use hazardous materials or generate hazardous waste in large quantities include detailed information concerning hazardous waste reduction, recycling, and storage.

ADAPTATION AND RESILIENCY

Goals and policies in this section set climate change adaptation and resiliency standards and seek to protect life and property from the effects of climate change. This element is new and has been updated in the County's General Plan since the 2018 plan update, described in **Table 74. Fresno County Adaptation and Resiliency Goals and Policies**.

Table 74. Fresno County Adaptation and Resiliency Goals and Policies

Goal or Policy	Description
Goal HS-G	To improve the sustainability and resiliency of the County through continued efforts to reduce the causes of adapt to climate change.
Policy HS-G.1:	The county shall support plans, standards, regulation, incentives, and investments to reduce the impacts of climate change.
Policy HS-G.2:	The county shall monitor information from Federal, State, and regional agencies on the effects of climate change to determine if the County should implement additional adaptation strategies
Policy HS-G.3	The County shall continue to collaborate with Federal, State, and regional, and local agencies, business and property owners, and residents to reduce generation of GHG and other emissions that contribute to climate change and adapt to potential effects of climate change
Policy HS-G.4	The County shall support programs to provide financial assistance for the retrofitting of low-income homes (such as energy efficiency upgrades, improved insulation, renewable energy upgrades, and use of electric appliances).

AGRICULTURE AND LAND USE ELEMENT

Applicable goals and policies from the Agriculture and Land Use Element are presented below.



RESOURCE LANDS

This section addresses land that will remain primarily open in character. The goals, policies, and implementation programs for these topics reflect a basic commitment to preserve the existing open rural character of the County and its natural and managed resources. While necessarily protective and restrictive, the policies also recognize the need to maintain economic productivity and allow for urban growth. The intent of the policies is not to preclude intensive development but to direct it to minimize loss of valuable open space.

AGRICULTURE

Policies in this section and in **Table 75. Fresno County Agricultural Goals and Policies** seek to sustain agriculture by protecting agricultural activities from incompatible land uses, promoting agricultural land preservation programs, developing programs to preserve or maintain soil conditions or improve soil productivity, facilitating agricultural production by supplying adequate land for support services, and controlling expansion of nonagricultural development onto productive agricultural lands.

Table 75. Fresno County Agricultural Goals and Policies

Goal or Policy	Description
Goal LU-A:	To promote the long-term conservation of productive and potentially- productive agricultural lands and to accommodate agricultural-support services and agriculturally- related activities that support the viability of agriculture and further the County's economic development goals.
Policy LU-A.13:	The County shall protect agricultural operations from conflicts with nonagricultural uses by requiring buffers between proposed non-agricultural uses and adjacent agricultural operations.
Policy LU-A.14:	The County shall ensure that the review of discretionary permits includes an assessment of the conversion of productive agricultural land and that mitigation be required where appropriate.
Policy LU-A.20:	The County shall adopt and support policies and programs that seek to protect and enhance surface water and groundwater resources critical to agriculture.
Policy LU-A.22	The County shall adopt and support policies and programs that seek to minimize the impact of reoccurring drought conditions on ground water supply and the agricultural industry.

WESTSIDE RANGELANDS

Policies in this section and in **Table 76. Fresno County Rangelands Goals and Policies** seek to preserve rangelands by maintaining their open space character, minimizing grading and erosion, maintaining grazing and agricultural operations, accommodating mineral resource recovery, and protecting biological resources from development.

Table 76. Fresno County Rangelands Goals and Policies

Goal or Policy	Description
Goal LU-B:	To preserve the unique character of the Westside Rangelands, which includes distinctive geologic and topographic landforms, watersheds, important agricultural activities, and significant biological resources, while accommodating agriculture, grazing, recreation, resource recovery, and other limited uses that recognize the sensitive character of the area.
Policy LU-B.12:	The County shall require a preliminary soils report for discretionary development projects when the project site is subject to moderate or high-risk landslide potential and has slopes in excess of 15

Goal or Policy	Description
	percent. If the preliminary soil report indicates soil conditions could be unstable, a detailed geologic report by a registered geologist and registered civil engineer, or a registered engineeringgeologist, shall be required indicating the suitability of any proposed or additional development.

RIVER INFLUENCE AREAS

Policies in this section and in **Table 77. Fresno County River Influence Areas Goals and Policies** seek to preserve and enhance the County's River influence areas by avoiding adverse impacts from development and encouraging environmentally friendly recreational and agricultural activities.

Table 77. Fresno County River Influence Areas Goals and Policies

Goal or Policy	Description
Goal LU-C:	To preserve and enhance the value of the river environment as a multiple use, open space resource; maintain the environmental and aesthetic qualities of the area; protect the quality and quantity of the surface and groundwater resources; provide for long term preservation of productive agricultural land; conserve and enhance natural wildlife habitat; and maintain the flood-carrying capacity of the channel at a level equal to the 1 percent flood event (100-year flood).
Policy LU-C.7:	Fresno County shall take into consideration the presence of the regulatory floodway or other designated floodway, the FEMA-designated 100-year floodplain, estimated 250-year floodplain, the Standard Project Flood, and the Fresno Metropolitan Flood Control District (FMFCD) Riverine Floodplain Policy in determining the location of future development within the San Joaquin River Parkway area. Any development sited in a designated 100-year floodplain shall comply with regulatory requirements at a minimum and with the FMFCD Riverine Floodplain Policy criteria, or requirements of other agencies having jurisdiction, where applicable.

RURAL DEVELOPMENT

This section guides development in areas designated Rural Residential, Rural Settlement Area, and Planned Rural Community. The policies provide for the continued development of areas within these designations in a manner that minimizes environmental impacts and public infrastructure investments, but generally limits expansion of these designations.

NONAGRICULTURAL RURAL DEVELOPMENT

Policies in this section and in **Table 78. Fresno County Non-Agricultural Rural Development Goals and Policies** provide for appropriate development in rural areas by directing development away from productive and potentially productive agricultural areas, limiting expansion of existing designated rural residential areas, and minimizing the environmental and service impacts of continued development within areas already designated for rural development.

Table 78. Fresno County Non-Agricultural Rural Development Goals

Goal or Policy	Description
Goal LU-E:	To provide for the continued development of areas already designated for rural-residential development in a manner that minimizes environmental impacts and public infrastructure and service costs while restricting designation of new areas for such development.
Policy LU-E.1:	<p>The County shall allow by right in areas designated Rural Residential single-family dwellings and limited agricultural uses related to the production of food and fiber. The County may allow by discretionary permit certain other agricultural uses and non-agricultural uses, including rural commercial centers. For proposed rural commercial centers, the following criteria shall apply:</p> <ul style="list-style-type: none"> a. Commercial uses should be clustered in centers instead of single uses. b. The use shall provide a needed service to the surrounding rural residential community which cannot be provided more efficiently within urban centers. c. To minimize proliferation of commercial centers and overlapping of trade areas, commercial centers shall be located a minimum of two (2) miles from a city sphere of influence. d. New commercial uses should be located within or adjacent to existing centers. e. Commercial centers should not encompass more than one-quarter (1/4) mile of road frontage, or one-eighth (1/8) mile if both sides of the road are involved, and should not provide potential for development exceeding ten (10) separate business activities, exclusive of caretakers' residences. f. The center shall be a minimum of four (4) miles from any agricultural commercial center, or designated rural settlement area, or the nearest existing or designated commercial area, or newly established rural residential commercial centers. g. The center should be located at the corner of an intersection where at least one of the roads is classified as an arterial road on the Transportation and Circulation Element of the General Plan. h. Distance from other existing commercial zoning and uses should be considered when siting commercial centers.
Policy LU-E.2:	The County shall permit the Rural Commercial (RCC) zone district to remain in areas designated Rural Residential if the land was so zoned prior to September 20, 1990. Commercial uses legally established prior to that date shall be deemed conforming, but expansion or addition of new commercial uses shall require a discretionary permit subject to the criteria in Policy LU-E.1.
Policy LU-E.3:	The County shall maintain two (2) acres as the minimum permitted lot size, exclusive of all road and canal rights-of-way, recreation easements, permanent water bodies, intermittent stream easements, and public or quasi-public common use areas, except as provided for in policies LU-E.6 and LU-E.7.
Policy LU-E.4:	The County shall recognize legal lots of less than two (2) acres that existed under separate ownership at the time of zone adoption within the rural residential zone districts.
Policy LU-E.5:	The County may allow planned residential developments in areas designated Rural Residential subject to Policies LU-H.6 and LU- H.7b (for developments permitted under Policy LU-E.7), and Policies LU- H.7e through LU- H7k.
Policy LU-E.6:	<p>The County shall allow planned residential developments in areas that are currently designated for rural residential development subject to the following conditions:</p> <ul style="list-style-type: none"> a. The minimum lot area shall be two (2) acres. b. The buildable portion of the lot shall be a minimum of thirty-six thousand (36,000) square feet. c. Dwellings shall be limited to single family structures. d. The ratio of lot depth to width shall not exceed four (4) to one (1). e. Individual wells and septic systems, or community water and sewer systems may be used. f. The size and configuration of the buildable portion of the lot shall be based on sufficient geological and hydrological investigations. g. Common open space areas that provide a portion of the two-acre lot should not include road and canal rights-of-way, reservations, permanent water bodies, intermittent stream easements, and common use areas that are occupied by buildings, streets, maintenance sheds, tennis courts, parking lots, and similar uses that are not of an open character. h. Common open space areas that provide a portion of the two-acre lot shall be vested in fee title ownership to each individual property owner, but may be used for common use purposes.
Policy LU-E.7:	In existing Rural Residential Areas, the County may allow, by a Conditional Use Permit, planned residential developments of at least one hundred (100) acres that incorporates drought- tolerant open



Goal or Policy	Description
	<p>space (active and passive) where the minimum lot size is thirty-six thousand (36,000) square feet and the overall project density is one (1) dwelling unit per two (2) acres. The following standards shall apply:</p> <ul style="list-style-type: none"> a. Community water and sewer systems may be used. b. Drought-tolerant open space (active and passive) may be included in the calculation of the required one (1) unit per two (2) acre density. c. Drought-tolerant open space (active and passive) shall be considered as common area and maintained through means acceptable to the County. The lake(s) or pond(s) shall be permanently filled with water, except for periods when surface water is not available, or maintenance requires temporary drainage. d. Drought-tolerant open space (active and passive) shall constitute a minimum of twenty- five (25) percent of the open space of the project. e. Common open space areas that provide a portion of the two- (2) acre density shall be designated as open space and zoned to the Open Conservation (O) District. f. Use of a permanent water body shall only be approved consistent with the water policies of this plan.
Policy LU-E.8:	<p>The County shall not allow further parcelization of uncommitted (designated) Rural Residential areas lying northeast of the Enterprise Canal due to potential groundwater supply problems. These areas shall be zoned to a Limited Agricultural Zone District. However, rezoning and development for Rural Residential use may be permitted subject to the following criteria:</p> <ul style="list-style-type: none"> a. The parcel to be developed is not productive agricultural land, and agricultural use of the property is not feasible. b. The County shall make a determination of the availability of an adequate water supply to serve the proposed development. If surface water is proposed, it must come from a reliable source and the supply must be made "firm" by water banking or other suitable arrangement. If groundwater is proposed, a "hydrogeologic investigation" or other information acceptable to the County shall be required to confirm the availability of groundwater in amounts necessary to meet project demand. c. The County shall make a determination of the impact that the use of the proposed water supply will have on other water users in Fresno County. If use of surface water is proposed, its use must not have a significant impact on agriculture or other water users within Fresno County. If use of groundwater is proposed, a hydrogeologic investigation shall be required. Should the hydrogeologic investigation determine that significant pumping-related impacts will extend beyond the boundary of the property in question, those impacts shall be mitigated. d. The County shall make a determination that the proposed water supply is sustainable or that there is an acceptable plan to achieve sustainability. The plan must be structured such that it is economically, environmentally, and technically feasible. In addition, its implementation must occur prior to long-term and/or irreversible physical impacts, or significant economic hardship, to surrounding water users.
Policy LU-E.9:	<p>The County shall limit development of the thirty (30)-acre Friant Rural Residential area to twelve (12) housing units.</p>
Policy LU-E.10:	<p>The County shall require new subdivisions within areas designated Rural Residential be designed to use individual on-site sewer and water systems. All proposals shall be reviewed by the County to determine the appropriate minimum lot size based on local hydro- geological conditions. Community systems and lots less than two (2) acres may be permitted only in conjunction with a Planned Residential Development pursuant to Policy LU-E.7; where consistent with the policies of the Sierra-North and Sierra-South Regional Plans; or where a graduated transition of density is needed to protect existing rural residential developments from land use conflicts at the interface with urban development on land outside and adjacent to the sphere-of-influence of a city.</p>
Policy LU-E.11:	<p>The County shall require subdividers of rural residential lots to install, provide, or participate in an effective means for utilization of available surface water entitlements for the area included in the subdivision, such as:</p> <ul style="list-style-type: none"> a. Facilities to deliver surface water to each parcel; b. To develop a single recharge basin for the entire development (with necessary arrangements for its operation and maintenance); or c. To participate in the activities of a public agency to recharge the available supplies for the beneficial use of the properties within the development and the FCMA. The division shall not render inoperative any existing canal.
Policy LU-E.12:	<p>The County shall ensure through discretionary permit approvals and other development regulations that development within areas designated Rural Residential does not encroach upon natural water channels</p>



Goal or Policy	Description
	or restrict natural water channels in such a way as to increase potential flooding damage. Land divisions shall not render inoperative any existing channel.
Policy LU-E.13:	The Special Commercial designation comprising approximately 150 acres on the south side of Shaw Avenue at the Indianola alignment recognizes an existing recreational facility and provides for consideration of potential future expansion of the facility and the development of additional compatible commercial recreational uses. Application of consistent zoning, which may include conditional zoning, and approval of any subsequent discretionary permit(s) shall include a finding that expansion of the facility will be compatible with the surrounding land uses.
Policy LU-E.14:	The County shall not designate additional land for Rural Residential or Foothill Rural Residential development, except for unique circumstances to be determined by the Board of Supervisors.
Policy LU-E.15:	Except as provided in this section, development within areas designated Foothill Rural Residential shall comply with the policies and standards of the Sierra-North Regional Plan and the Sierra-South Regional Plan.
Policy LU-E.16:	The County shall apply the Rural Settlement Area designation only to those areas where a small concentration of housing and commercial or industrial uses serves the surrounding agricultural area. The following locations are designated as Rural Settlements: Bowles, Centerville, Monmouth, and Cantua Creek.
Policy LU-E.17:	The County shall allow by right in areas designated Rural Settlement Area, single-family dwellings and limited agricultural uses related to the production of food and fiber. The County may allow by discretionary permit non- agricultural uses that provide a needed service to the surrounding rural area. Other uses consistent with the intent and purpose of these rural settlement policies may be added by amendment of the Rural Settlement Area zone district.
Policy LU-E.18:	The County may approve land divisions in areas designated Rural Settlement Area when the following criteria are met: a. The minimum net lot size shall be two (2) acres, except as allowed by LU-E.23c below. b. The ratio of lot depth width shall not exceed four (4) to one (1). c. A minimum of thirty-six thousand (36,000) square feet per lot shall be permitted if community water facilities are available and soils are suitable for individual septic systems.
Policy LU-E.19:	The County may allow expansion of existing Rural Settlement Areas to include vacant parcels, parcels wholly or partially committed to existing industrial uses, or parcels currently devoted to agricultural use if all of the following conditions are satisfied: a. The parcel is less than eighty (80) acres in area; b. The parcel is contiguous to properties in the Rural Settlement Area; c. Productive agricultural use of the parcel is not economically feasible because incompatible non-agricultural uses on contiguous properties severely restrict normal agricultural practices; and d. The parcel is needed for the expansion of an existing use within the Rural Settlement Area or to establish an essential service for the Settlement and/or the surrounding agricultural area.
Policy LU-E.20:	The County shall require that the development of new commercial uses in Rural Settlement Areas be guided by the following criteria: a. The total number of existing and proposed commercial uses should not exceed fifteen (15), exclusive of caretakers' residence. b. The development should be designed to be compatible with existing uses on adjacent properties. c. The location of the proposed development shall satisfy one of the following conditions: d. The development should be on a major street or an intersection. e. The development should front on a road with existing commercial activity and should be within six hundred and sixty (660) feet of the nearest commercial use. f. Building height should not exceed the height of adjacent structures. g. Off-street parking should be sufficient for the proposed use.
Policy LU-E.21:	The County shall require that industrial zone districts within the Monmouth Rural Settlement Area be consistent with the following criteria: a. Parcels shall be wholly or partially committed to existing industrial uses; and b. Industrial zoning shall be conditioned to permit only agriculturally related industry.



Goal or Policy	Description
Policy LU-E.22:	The County shall allow development within the designated Quail Lakes Planned Rural Community to proceed in accordance with the Specific Plan adopted at the time the designation was granted by the County. The County may grant amendments to the Specific Plan provided the overall density of development is not increased and the plan continues to demonstrate the following: <ul style="list-style-type: none"> a. The development will have no significant adverse impacts on groundwater; b. Public improvements within a Planned Rural Community shall be designed and constructed in a manner that is not growth inducing but would not preclude future annexation to a city; c. Impacts on Fresno County for the provision of services including, but not limited to, police, fire protection, schools, and other essential public services are adequately mitigated; d. The development will not have a net adverse fiscal effect on Fresno County; e. Provide a service delivery plan and a maintenance and operation program which will assure appropriate delivery of services and funding measures for the development; and f. Provide for monitoring of mitigation measures established by the required Environmental Impact Report.
Policy LU-E.23:	The County shall not approve expansion of the existing Planned Rural Community designation or designate additional areas for such development.
Policy LU-E.24:	The Rural Residential designation comprising an approximate 481-acre area generally bounded by Friant Road/Willow Avenue to the west, Garonne Avenue to the south, those parcels immediately east and adjacent to Auberry Road to the east and generally the Birkhead Road alignment to the north and encompassing those parcels immediately to the west, northeast, and east of the full length of Willow Bluff Avenue. This is an area committed to rural-sized parcels. The Limited Agricultural zoning reflects potential water resource constraints in the general vicinity. Future rezoning of this area to the implementing Rural Residential zoning district shall maintain a minimum five-acre parcel size and shall be subject to a determination of adequate water supply per Agriculture and Land Use Policy LU-E.8, and adequate road access and road maintenance as determined by the Director of the Department of Public Works and Planning

PUBLIC FACILITIES AND SERVICES ELEMENT

Applicable goals and policies from the Public Facilities and Services Element are presented below.

WATER SUPPLY AND DELIVERY

Policies in this section and in **Table 79. Fresno County Water Supply and Delivery Goals and Policies** seek to ensure an adequate water supply for both domestic and agricultural users by providing necessary facility improvements, ensuring water availability, and utilizing water conservation measures.

Table 79. Fresno County Water Supply and Delivery Goals and Policies

Goal or Policy	Description
Goal PF-C:	To ensure the availability of an adequate and safe water supply for domestic and agricultural consumption.
Policy PF-C.1:	The County shall engage in and support the efforts of others within Fresno County to retain existing water supplies and develop new water supplies.
Policy PF-C.2:	The County shall actively engage in efforts and support the efforts of others to import flood, surplus, and other available waters for use in Fresno County.



Goal or Policy	Description
Policy PF-C.3:	To reduce demand on the County's groundwater resources, the County shall encourage the use of surface water to the maximum extent feasible.
Policy PF-C.4:	The County shall support efforts to expand groundwater and/or surface water storage that benefits Fresno County.
Policy PF-C.5:	The County shall support water banking when the program has local sponsorship and involvement and provides new benefits to the County.
Policy PF-C.6:	The County shall recommend to all cities and urban areas within the County that they adopt the most cost-effective urban best management practices published and updated by the California Urban Water Agencies, California Department of Water Resources, or other appropriate agencies as a means of meeting some of the future water supply needs.
Policy PF-C.7:	The County shall require preparation of water master plans for areas undergoing urban growth.
Policy PF-C.8:	The County shall work with local irrigation districts to preserve local water rights and supply.
Policy PF-C.10:	The County shall actively participate in the development and implementation of Sustainable Groundwater Management Plans to ensure an on-going water supply to help sustain agriculture and accommodate future growth.
Policy PF-C.11:	The County shall approve new development only if an adequate sustainable water supply to serve such development is demonstrated.
Policy PF-C.12:	In those areas identified as having severe groundwater level declines or limited groundwater availability, the County shall limit development to uses that do not have high water usage or that can be served by a surface water supply.
Policy PF-C.13:	The County shall require that water supplies serving new development meet U.S. Environmental Protection Agency and California Department of Public Health and other water quality standards.
Policy PF-C.15:	If the cumulative effects of more intensive land use proposals are detrimental to the water supplies of surrounding areas, the County shall require approval of the project to be dependent upon adequate mitigation. The County shall require that costs of mitigating such adverse impacts to water supplies be borne proportionately by all parties to the proposal.
Policy PF-C.16:	The County shall, prior to consideration of any discretionary project related to land use, undertake a water supply evaluation.
Policy PF-C.17:	In the case of lands entitled to surface water, the County shall approve only land use-related projects that provide for or participate in effective use of the surface water entitlement.
Policy PF-C.21:	The County shall promote the use of surface water for agricultural use to reduce groundwater table reductions.
Policy PF-C.23:	The County shall require that all new development within the county use water conservation technologies, methods, and practices as established by the County.
Policy PF-C.24:	The County shall encourage the use of reclaimed water where economically, environmentally, and technically feasible.
Policy PF-C.25:	The County shall require that all new development within the county use water conservation technologies, methods, and practices as established by the County.



Goal or Policy	Description
Policy PF-C.24:	The County shall encourage the use of reclaimed water where economically, environmentally, and technically feasible.
Policy PF-C.25:	The County shall participate in integrated Regional Water Management Planning efforts with other local and regional water stakeholders to plan for the efficient use, enhancement, and management of surface and groundwater supplies.
Policy PF-C.29:	The County shall encourage agricultural water conservation where economically, environmentally, and technically feasible.
Policy PF-C.28	The County shall participate in integrated Regional Water Management Planning efforts with other local and regional water stakeholders to plan for the efficient use, enhancement, and management of surface and groundwater supplies.
Policy PF-C.29:	The County shall encourage agricultural water conservation where economically, environmentally, and technically feasible.

STORM DRAINAGE AND FLOOD CONTROL

Policies in this section and in **Table 80. Fresno County Storm Drainage and Flood Control Goals and Policies** seek to ensure safe, efficient, and environmentally sound means to drain, divert and retain stormwater and provide flood control by providing necessary facility improvements, ensuring adequate funding, providing a means to detain/retain runoff, and ensuring the facilities meet state environmental regulations. This includes retention strategies that could lessen the county's vulnerability to drought and wildfire.

Table 80. Fresno County Storm Drainage and Flood Control Goals and Policies

Goal or Policy	Description
Goal PF-E:	To provide efficient, cost-effective, and environmentally sound storm drainage and flood control facilities that protect both life and property and to divert and retain stormwater runoff for groundwater replenishment.
Policy PF-E.1:	The County shall coordinate with the agencies responsible for flood control or storm drainage to assure that construction and acquisition of flood control and drainage facilities are adequate for future urban growth authorized by the County General Plan and city general plans.
Policy PF-E.2:	The County shall encourage the agencies responsible for flood control of storm drainage to coordinate the multiple use of flood control and drainage facilities with other public agencies.
Policy PF-E.3:	The County shall encourage the Fresno Metropolitan Flood Control District to spread the cost of construction and acquisition of flood control and drainage facilities in the most equitable manner consistent with the growth and needs of this area.
Policy PF-E.4:	The County shall encourage the local agencies responsible for flood control or storm drainage to require that storm drainage systems be developed and expanded to meet the needs of existing and planned development.

4. Risk Assessment



Goal or Policy	Description
Policy PF-E.5:	The County shall only approve land use-related projects that will not render inoperative any existing canal, encroach upon natural channels, and/or restrict natural channels in such a way as to increase potential flooding damage.
Policy PF-E.6:	The County shall require that drainage facilities be installed concurrently with and as a condition of development activity to ensure the protection of the new improvements as well as existing development that might exist within the watershed.
Policy PF-E.7:	The County shall require new development to pay its fair share of the costs of Fresno County storm drainage and flood control improvements within unincorporated areas.
Policy PF-E.8:	The County shall encourage the local agencies responsible for flood control or storm drainage to precisely locate drainage facilities well in advance of anticipated construction, thereby facilitating timely installation and encouraging multiple construction projects to be combined, reducing the incidence of disruption of existing facilities.
Policy PF-E.9:	The County shall require new development to provide protection from the 100-year flood as a minimum.
Policy PF-E.10:	In growth areas within the jurisdiction of a local agency responsible for flood control or storm drainage, the County shall encourage that agency to design drainage facilities as if the entire areas of service were developed to the pattern reflected in the adopted general plans to assure that the facilities will be adequate as the land use intensifies.
Policy PF-E.11:	The County shall encourage project designs that minimize drainage concentrations and maintain, to the extent feasible, natural site drainage patterns.
Policy PF-E.12:	The County shall coordinate with the local agencies responsible for flood control or storm drainage to ensure that future drainage system discharges comply with applicable State and Federal pollutant discharge requirements.
Policy PF-E.13:	The County shall encourage the use of natural stormwater drainage systems to preserve and enhance natural drainage features.
Policy PF-E.14:	The County shall encourage the use of retention-recharge basins for the conservation of water and the recharging of the groundwater supply.
Policy PF-E.15:	The County should require that retention-recharge basins be suitably landscaped to complement adjacent areas and should, wherever possible, be made available to the community to augment open space and recreation needs.
Policy PF-E.16:	The County shall minimize sedimentation and erosion through control of grading, cutting of trees, removal of vegetation, placement of roads and bridges, and use of off-road vehicles. The County shall discourage grading activities during the rainy season, unless adequately mitigated, to avoid sedimentation of creeks and damage to riparian habitat.
Policy PF-E.17:	The County shall encourage the local agencies responsible for flood control or storm drainage retention-recharge basins located in soil strata strongly conducive to groundwater recharge to develop and operate those basins in such a way as to facilitate year-round groundwater recharge.
Policy PF-E.18:	The County shall encourage the local agencies responsible for flood control or storm drainage to plan retention-recharge basins on the principle that the minimum number will be the most economical to acquire, develop, operate, and maintain.
Policy PF-E.19:	In areas where urbanization or drainage conditions preclude the acquisition and use of retention-recharge basins, the County shall encourage the local agencies responsible for flood control or



Goal or Policy	Description
	stormwater drainage to discharge storm or drainage water into major canals and other natural water courses subject to established conditions.
Policy PF-E.20:	The County shall require new development of facilities near rivers, creeks, reservoirs, or substantial aquifer recharge areas to mitigate any potential impacts of release of pollutants infloodwaters, flowing rivers, streams, creeks, or reservoir waters.
Policy PF-E.21:	The County shall require the use of feasible and practical best management practices (BMPs) to protect streams from the adverse effects of construction activities and shall encourage the urbanstorm drainage systems and agricultural activities to use BMPs.
Policy PF-E.22:	The County shall encourage the local agencies responsible for flood control or storm drainage tocontrol obnoxious odors or mosquito breeding conditions connected with any agency facility by appropriate measures.

FIRE PROTECTION AND EMERGENCY MEDICAL SERVICES

Policies in this section and in **Table 81. Fresno County Fire Protection and Emergency Medical Service Goals and Policies** seek to ensure the prompt and efficient provision of fire and emergency medical facility and service needs, ensure adequate funding is available in new development areas, and protect the life and property of residents of and visitors to Fresno County.

Table 81. Fresno County Fire Protection and Emergency Medical Service Goals and Policies

Goal or Policy	Description
Goal PF-H:	To ensure the prompt and efficient provision of fire and emergency medical facility and service needs, to protect residents of and visitors to Fresno County from injury and loss of life, and to protect property from fire.
Policy PF-H.1:	The County shall work cooperatively with local fire protection districts to ensure the provision of effective fire and emergency medical services to unincorporated areas within the County.
Policy PF-H.2:	Prior to the approval of a development project, the County shall determine the need for fire protection services. New development in unincorporated areas of the county shall not be approved until such time that fire protection facilities and services acceptable to the Public Works and Planning Director in consultation with the appropriate fire district are provided.
Policy PF-H.3:	The County shall require that new fire stations be located to achieve and maintain a service level capability consistent with services for existing land uses.
Policy PF-H.4:	The County shall reserve adequate sites for fire and emergency medical facilities in unincorporated locations in the County.
Policy PF-H.5:	The County shall require that new development be designed to maximize safety and minimize fire hazard risks to life and property.
Policy PF-H.6:	The County shall limit development to very low densities in areas where emergency response times will be more than 20 minutes.
Policy PF-H.7:	The County shall encourage local fire protection agencies in the County to maintain the following as a minimum fire protection standards (expressed as Insurance Service Organization (ISO) ratings): ISO 4 in urban areas; ISO 6 in suburban areas; and ISO 8 in rural areas.



Goal or Policy	Description
Policy PF-H.10:	The County shall ensure that all proposed developments are reviewed for compliance with fire safety standards by responsible local fire agencies per the California Fire Code and other State and local ordinances.

OPEN SPACE AND CONSERVATION ELEMENT

The Open Space and Conservation Element is concerned with protecting and preserving natural resources, preserving open space areas, managing the production of commodity resources, protecting and enhancing cultural resources, and providing recreational opportunities. Applicable goals and policies are presented below.

PRODUCTIVE RESOURCES

WATER RESOURCES

Policies in this section and in **Table 82. Fresno County Water Resources Goals and Policies** seek to protect and enhance the surface water and groundwater resources in the County. The policies address broad water planning issues, groundwater recharge, the relationship of land use decisions to water issues, and water quality problems.

Table 82. Fresno County Water Resources Goals and Policies

Goal or Policy	Description
Goal OS-A:	To protect and enhance the water quality and quantity in Fresno County's streams, creeks, and groundwater basins.
Policy OS-A.1:	The County shall provide active leadership in the regional coordination of water resource management efforts affecting Fresno County and shall continue to monitor and participate in, as appropriate, regional activities affecting water resources, groundwater, and water quality.
Policy OS-A.2:	The County shall provide active leadership in efforts to protect, enhance, monitor, and manage groundwater resources within its boundaries.
Policy OS-A.3	The County shall support efforts to create additional storage that benefits Fresno County, and is economically, environmentally, and technically feasible.
Policy OS-A.4:	The County shall support public education programs designed to increase public participation in water conservation and water quality awareness.
Policy OS-A.5:	The County shall permit and encourage, where economically, environmentally, and technically feasible, overirrigation of surface water as a means to maximize groundwater recharge.
Policy OS-A.6	The County shall ensure that new development does not limit the capacity or function of groundwater recharge areas.
Policy OS-A.7	The County shall direct, to the extent feasible, its available water resources to groundwater recharge areas.
Policy OS-A.8	The County should, in cooperation with respective groundwater sustainability agencies, develop and maintain an inventory of sites within the County that are suitable for groundwater recharge.
Policy OS-A.9:	The County shall support and/or engage in water banking (i.e., recharge and subsequent extraction for direct and/or indirect use on lands away from the recharge area) based on criteria.



Goal or Policy	Description
Policy OS-A.14:	The County shall require the protection of floodplain lands and, where appropriate, acquire public easements for purposes of flood protection, public safety, wildlife preservation, groundwater recharge, access, and recreation.
Policy OS-A.15:	The County shall support the policies of the San Joaquin River Parkway Master Plan to protect the San Joaquin River as an aquatic habitat, recreational amenity, aesthetic resource, and water source.

NATURAL RESOURCES

WETLAND AND RIPARIAN AREAS

Policies in this section and in **Table 83. Fresno County Wetland and Riparian Areas Goals and Policies** seek to protect riparian and wetland habitats in the County while allowing compatible uses where appropriate.

Table 83. Fresno County Wetland and Riparian Areas Goals and Policies

Goal or Policy	Description
Goal OS-D:	To conserve the function and values of wetland communities and related riparian areas throughout Fresno County while allowing compatible uses where appropriate. Protection of these resource functions will positively affect aesthetics, water quality, floodplain management, ecological function, and recreation/tourism.
Policy OS-D.1:	The County shall support the "no-net-loss" wetlands policies of the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, and the California Department of Fish and Game. Coordination with these agencies at all levels of project review shall continue to ensure that appropriate mitigation measures and the concerns of these agencies are adequately addressed.
Policy OS-D.2:	The County shall require new development to fully mitigate wetland loss for function and value in regulated wetlands to achieve "no-net-loss" through any combination of avoidance, minimization, or compensation. The County shall support mitigation banking programs that provide the opportunity to mitigate impacts to rare, threatened, and endangered species and/or the habitat that supports these species in wetland and riparian areas.
Policy OS-D.3:	The County shall require development to be designed in such a manner that pollutants and siltation do not significantly degrade the area, value, or function of wetlands. The County shall require new developments to implement the use of best management practices to aid in this effort.
Policy OS-D.7:	The County shall support the management of wetland and riparian plant communities for passive recreation, groundwater recharge, nutrient storage, and wildlife habitats.

VEGETATION

Policies in this section and in **Table 84. Fresno County Vegetarian Goals and Policies** seek to protect native vegetation resources primarily on private land within the County.

Table 84. Fresno County Vegetarian Goals and Policies

Goal or Policy	Description
Goal OS-F:	To preserve and protect the valuable vegetation resources of Fresno County.
Policy OS-F.1:	The County shall encourage landowners and developers to preserve the integrity of existing terrain and natural vegetation in visually-sensitive areas such as hillsides and ridges, and along important transportation corridors, consistent with fire hazard and property line clearing requirements.
Policy OS-F.2:	The County shall require developers to use native and compatible nonnative plant species, especially drought-resistant species, to the extent possible, in fulfilling landscaping requirements imposed as conditions of discretionary permit approval or for project mitigation.
Policy OS-F.6:	The County shall require that development on hillsides be limited to maintain valuable natural vegetation, especially forests and open grasslands, and to control erosion.
Policy OS-F.7:	The County shall require developers to take into account a site's natural topography with respect to the design and siting of all physical improvements in order to minimize grading.
Policy OS-F.9:	The County shall support the continued use of prescribed burning to mimic the effects of natural fires to reduce fuel volumes and associated fire hazards to human residents and to enhance the health of biotic communities.

RECREATION AND CULTURAL RESOURCES

PARKS AND RECREATION

Policies in this section and in **Table 85. Fresno County Parks and Recreation Goals and Policies** seek to enhance recreational opportunities in the County by encouraging the further development of public and private recreation lands and requiring development to help fund additional parks and recreation facilities.

Table 85. Fresno County Parks and Recreation Goals and Policies

Goal or Policy	Description
Goal OS-H:	To designate land for and promote the development and expansion of public and private recreational facilities to serve the needs of residents and visitors.
Policy OS-H.10:	The County shall support the policies of the San Joaquin River Parkway Master Plan to protect the San Joaquin River as an aquatic habitat, recreational amenity, aesthetic resource, and water source.
Policy OS-H.12:	The County shall require that structures and amenities associated with the San Joaquin River Parkway be designed and sited to ensure that such features do not obstruct flood flows, do not create a public safety hazard, or result in a substantial increase in off-site water surface elevations, and that they conform to the requirements of other agencies having jurisdiction. For permanent structures, such as bridge overcrossings, the minimum level of flood design protection shall be the greater of the Standard Project Flood (which is roughly equivalent to a 250-year event) or the riverine requirements of other agencies having jurisdiction to ensure flood flows are not dammed and to prevent flooding on surrounding properties.

HISTORIC, CULTURAL, AND GEOLOGICAL RESOURCES

Policies in this section and in **Table 86. Fresno County Historical, Cultural, and Geological Resources Goals and Policies** seek to preserve the historic, archeological, paleontological,



geological, and cultural resources of the County through development review, acquisition, encouragement of easements, coordination with other agencies and groups, and other methods.

Table 86. Fresno County Historical, Cultural, and Geological Resources Goals and Policies

Goal or Policy	Description
Goal OS-J:	To identify, protect, and enhance Fresno County's important historical, archeological, paleontological, geological, and cultural sites and their contributing environment.
OS-J.1	The County shall encourage preservation of any sites and/or buildings identified as having historical significance pursuant to the list maintained by the Fresno County Historic Landmarks and Records Advisory Commission.
OS-J.2	The County shall consider historic resources during preparation or evaluation of plans and discretionary development projects.
OS-J.3	Whenever a historical resource is known to exist on a proposed project site, the County (i.e., Fresno County Historic Landmarks and Records Advisory Commission) shall evaluate and make recommendations to minimize potential impacts to said resource.
Policy OS-J.4:	The County shall require that discretionary development projects, as part of any required CEQA review, identify and protect important historical, archeological, paleontological, and cultural sites and their contributing environment from damage, destruction, and abuse to the maximum extent feasible. Project-level mitigation shall include accurate site surveys, consideration of project alternatives to preserve archeological and historic resources, and provision for resource recovery and preservation when displacement is unavoidable.

FRESNO COUNTY ORDINANCES

The Fresno County General Plan provides policy direction for land use, development, open space protection, and environmental quality, but this policy direction must be carried out through numerous ordinances, programs, and agreements. The following ordinances are among the most important tools for implementing the general plan and/or are critical to the mitigation of hazards identified in this plan.

EMERGENCY ORGANIZATION (TITLE 2, CHAPTER 2.44)

The declared purposes of this chapter are to provide for the preparation and carrying out of plans for the protection of persons and property within the County in the event of an emergency; the direction of the emergency organization; and the coordination of the emergency functions of the County with all other public agencies, corporations, organizations, and affected private persons.

FRESNO-KINGS-MADERA REGIONAL HEALTH AUTHORITY (TITLE 8, CHAPTER 8.75)

This health authority is a three-county regional health authority representing Fresno, Kings, and Madera Counties. The health authority shall design and operate a program or programs that:

1. Delivers primary care via a contracted provider network which significantly improves access to primary care and related specialty and ancillary services for enrolled Medi-Cal recipients.
2. Includes mechanisms for assuring that health authority financed medical care services meet appropriate quality of care standards.



3. Incorporates a plan of service delivery and implements reimbursement mechanisms which will promote the long-term viability of a locally operated Medi-Cal managed care system and participating "safety net" providers herein defined as Medi-Cal disproportionate share hospitals, county clinics, and licensed community and rural clinics.
4. Implements a financial plan which includes the creation of a prudent reserve within three years of commencing operations and which provides that if additional surplus funds accrue, they shall be used to expand access, improve benefits, and augment provider reimbursement.
5. Gives a high priority to increasing prevention, education, and early intervention services for enrolled recipients.
6. Ensures that all statutory, contractual, or other program obligations shall be the obligations solely of the health authority and shall not be the obligations of Fresno County, Kings County, Madera County, or the State.
7. Implements programs and procedures to ensure that a high level of member satisfaction is maintained. The health authority shall also be authorized to contract with public insurers, payors, or plan sponsors to offer and/or administer their health care programs and to contract with private insurers or plan sponsors to administer their health care programs. The purpose of the health authority is to negotiate a contract with the California Department of Health Care Services and to provide a "Medi-Cal Managed Care Program" (the "program") and to arrange for the provision of health care services to qualifying individuals under such program in Fresno County, Kings County, and Madera County pursuant to Chapter 7 (commencing with Section 14000) of Part 3 of Division 9 of the Welfare and Institutions Code.

GROUNDWATER MANAGEMENT (TITLE 14, CHAPTER 14.03)

This chapter protects the County's important groundwater resources by requiring a permit from the County to extract, on a long-term basis, groundwater for transfer outside the County, including groundwater extracted to replace a surface water supply that has been, is being, or will be transferred for long-term use outside of Fresno County. This chapter is limited to requiring a permit for the long-term direct or indirect transfer of groundwater outside the County and is not intended to regulate groundwater in any other way.

BUILDING CODE (TITLE 15, CHAPTER 15.08)

This chapter adopts the 2022 California Building Code, including the Appendices as referenced in the 2022 California Building Code Standards and the Uniform International Building Code Standards is adopted by reference.

FIRE CODE (TITLE 15, CHAPTER 15.10)

This chapter adopts the 2022 California Fire Code as referenced in the 2022 California Building/Residential Code, is adopted by reference.



GRADING AND EXCAVATION (TITLE 15, CHAPTER 15.28)

This chapter establishes that Chapter 18, Chapter 33, Chapter 33, and Appendix J of the 2022 California Building Code and Chapter 4, Division 4.1 of the California Green Building Standards Code are adopted by reference and except as herein otherwise provided are applicable to and shall cover all grading and excavation within the unincorporated area of the County of Fresno.

FLOOD HAZARD AREAS (TITLE 15, CHAPTER 15.48)

It is the purpose of this chapter to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health
- Minimize expenditure of public money for costly flood control projects
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public
- Minimize prolonged business interruptions
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage
- Ensure that potential buyers are notified that property is in an area of special flood hazard; and
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

This chapter includes methods and provisions to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters
- Control filling, grading, dredging, and other development that may increase flood damage
- Prevent or regulate the construction of flood barriers that will unnaturally divert floodwaters or that may increase flood hazards in other areas

Requirements of this chapter apply to all new developments, substantial improvements, minor improvements, and conversions of existing nonresidential structures to residential uses within flood hazard areas. Notably, it requires that a development permit be obtained before start of construction or beginning of development within any area of special flood hazard. It appoints the director of the Public Works and Planning Department to administer and implement the chapter by granting or denying development permit applications in accordance with its provisions.



This chapter addresses the following for construction in areas of special flood hazard:

- Standards of construction
- Standards for storage of materials and equipment
- Standards for utilities
- Standards for subdivisions
- Standards for manufactured homes and manufactured home parks and subdivision
- Provisions for floodway development

CALIFORNIA DEPARTMENT OF FORESTRY STATE RESPONSIBILITY AREA FIRE SAFE REGULATIONS OF THE COUNTY (TITLE 15, CHAPTER 15.60)

This chapter provides for basic emergency access, perimeter wildfire protection measures, signing and building numbering, private water supply reserves for emergency fire use, and vegetation modification.

Development requirements in this chapter address setbacks for structures, road improvements, road width, cul-de-sacs and dead-end roads, one-way roads, driveways, gates, road signs, building signs, flammable vegetation and fuels, water supply, and hydrant locations.

FIRE DISTRICT DEVELOPMENT IMPACT MITIGATION FEES (TITLE 15, CHAPTER 15.64)

The purpose of this chapter is to implement the Fresno County General Plan policy providing for the adoption of development impact mitigation fees and for the collection of such fees at the time of the issuance of building permits or other permits. Subject to the requirements of this chapter, such fees are to be allocated to a fire district within the Fresno County for the acquisition of capital facilities to ensure the provision of the capital facilities necessary to maintain current levels of fire protection services necessitated by new development.

SUBDIVISIONS (TITLE 17, CHAPTERS 17.01-17.60)

Chapters 17.04 through 17.60 makeup Fresno County's subdivision ordinance, which is deemed necessary to protect the public health, safety, and general welfare. It addresses orderly growth and development of the County; beneficial use of land in the public interest; and conservation, stabilization, and protection of property values and assures adequate provision for necessary utilities, public roads, and other public conveniences in subdivided areas. The subdivision ordinance regulates the design and improvement of land divisions and the dedication of public improvements needed in connection with land divisions. All land divisions must by law be consistent with the general plan and the zoning ordinance.

DRAINAGE OF LAND (TITLE 17, CHAPTER 17.64)

Since the development of land for urban uses substantially accelerates the concentration of surface water and stormwater, it is necessary to require the construction of, and to establish and collect fees to defray the actual or estimated cost of, planned local drainage facilities for the control and safe disposal of surface water and stormwater from local drainage areas to promote and protect the public welfare, safety, peace, comfort, convenience, and the general welfare.



FRESNO COUNTY ZONING ORDINANCE

The purpose of the zoning ordinance is to regulate the use of land in each zoning district. The ordinance typically establishes a list of land uses permitted in each district plus a series of specific standards governing lot size, building height, and required yard and setback provisions in the unincorporated area of Fresno County in a manner consistent with the Fresno County General Plan. This ordinance incorporates zoning regulations implementing the Fresno County General Plan and all of its elements.

One of the zones created by the ordinance is the Open Space Conservation District (Section 815). This zone is intended to provide for permanent open spaces in the community and to safeguard the health, safety, and welfare of the people by limiting developments in areas where police and fire protection, protection against flooding by stormwater, and dangers from excessive erosion are not possible without excessive costs to the community.



PLANNING MITIGATION CAPABILITIES

Table 87. Fresno County Planning Capabilities identifies the plans related to mitigation and loss prevention in Fresno County.

Table 87. Fresno County Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes	No	
Climate Resiliency or Adaptation Plan	Yes	Yes	Climate Vulnerability Assessment Adopted 2/20/24
Community Wildfire Protection Plan (CWPP)	No	No	
Comprehensive Emergency Management Plan	Yes	Yes	Expected Completion June 2024
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes	Yes	Adopted February 2024
Continuity of Operations Plan (COOP)	No	Yes	Unknown
Disaster Recovery Plan	Yes	Yes	Expected Completion July 2024
Economic Development Plan	Yes	No	
Emergency Operations Plan (EOP)	Yes	Yes	Expected Completion July 2024
Evacuation Plan	No	Yes	Unknown
Flood Response Plan	No	Yes	Unknown
Floodplain Management Plan/Flood Mitigation Plan	No	No	
Hazard Mitigation Plan	Yes	Yes	Expected Completion July 2024
Historic Preservation Plan	No	No	
Natural Resources Protection Plan (NRPP)	No	No	
Open Space Management Plan (Parks and Rec/Greenway Plan)	No	No	
Threat Hazard Identification and Risk Assessment	No	No	

FRESNO AREA REGIONAL GROUNDWATER MANAGEMENT PLAN

The Fresno Area Regional Groundwater Management Plan is a comprehensive strategy to enhance and maintain the quantity and quality of local groundwater resources. It provides a vehicle for future groundwater management actions. As part of a regional effort, other basin- specific plans have also been developed for the Kings River and San Joaquin River basins. There are also efforts to create a statewide water management plan. All plans are coordinated for the County through the Public Works and Planning departments.



FRESNO COUNTY HAZARDOUS WASTE MANAGEMENT PLAN

The Fresno County Hazardous Waste Management Plan is designed to ensure that safe, effective, and economical facilities for the management of hazardous wastes are available when they are needed. To attain this goal, the plan establishes goals, policies, and programs to encourage the safe handling, storage, and transportation of hazardous materials. The Fresno County Environmental Health Department administers this plan.

SPECIAL DISTRICTS

There are numerous special districts that provide a variety of public services in Fresno County. Special districts can provide one or more types of public services, facilities, or infrastructure within a prescribed boundary, and they play an important role in growth management because the availability of their services can encourage or discourage new development. Special districts can tax the properties within their boundaries to pay for the services they provide. Monthly fees may also be assessed. Some of the special districts that provide mitigation-related services in Fresno County are presented below.

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

The Fresno Metropolitan Flood Control District is a special act district. It was created to provide fully coordinated and comprehensive stormwater management and related services on a regional basis through a quasi-joint powers' relationship between the Cities of Fresno and Clovis and the County of Fresno. The district service area includes most of the Fresno-Clovis metropolitan area (excluding the community of Easton), and unincorporated lands to the east and northeast.

The mission of the district is to provide to the citizens living within its boundaries the ability to control and manage the water resources of the area so as to prevent damage, injury, and inconvenience; to conserve such waters for local, domestic, and agricultural use; and to maximize the public use and benefit of the district's programs and infrastructure. The district maintains a services plan that presents district goals, program objectives, current program descriptions, and implementation strategies.

(See Annex M: Fresno Metropolitan Flood Control District for more information.)

LOWER SAN JOAQUIN LEVEE DISTRICT

The Lower San Joaquin Levee District is a special act district. It was created to operate, maintain, and repair levees, bypasses, and other facilities built in connection with the Lower San Joaquin River Flood Control Project. The district encompasses approximately 468 square miles in Fresno, Madera, and Merced counties, of which 94 square miles are in Fresno County.

(See Annex N: Lower San Joaquin Levee District for more information.)

KINGS RIVER CONSERVATION DISTRICT

The Kings River Conservation District is a special act district. It is responsible for planning for the proper management of water within its service area, including essential flood control and groundwater



management services. The district contains about 2,049 square miles in Fresno, Kings, and Tulare counties. The Fresno County portion has 1,001 square miles. It encompasses the Cities of Clovis, Fresno, Fowler, Kerman, Kingsburg, Parlier, Reedley, San Joaquin, Sanger, and Selma and intervening agricultural lands.

FRESNO COUNTY FIRE PROTECTION DISTRICTS

Fire protection districts provide a variety of services, which may include fire protection, rescue, emergency medical, hazardous material emergency response, and ambulance services.

- Bald Mountain Fire Protection District
- Fig Garden Fire Protection District
- Fresno County Fire Protection District
- North Central Fire Protection District
- Orange Cove Fire Protection District

FRESNO COUNTY IRRIGATION DISTRICTS

Irrigation districts provide water for irrigation to users within their boundaries. They may also use water under their control for other beneficial purposes and provide flood protection measures.

- Alta Irrigation District
- Central California Irrigation District
- Consolidated Irrigation District
- Fresno Irrigation District
- Hills Valley Irrigation District
- James Irrigation District
- Laguna Irrigation District
- Orange Cove Irrigation District
- Riverdale Irrigation District
- Tranquility Irrigation District

FRESNO COUNTY DRAINAGE DISTRICTS

Drainage districts control storm and other waste waters within a district's boundaries, protect property and infrastructure within a district from damage by stormwater or wastewater, and conserve stormwater and wastewater for beneficial purposes.

- Camp 13 Drainage District
- Dos Palos Drainage District
- Panoche Drainage District
- Silver Creek Drainage District



FRESNO COUNTY MOSQUITO ABATEMENT DISTRICTS

Mosquito abatement districts provide mosquito surveillance and control.

- Coalinga-Huron Mosquito Abatement District
- Consolidated Mosquito Abatement District
- Fresno Mosquito and Vector Control District
- Fresno-Westside Mosquito Abatement District

FRESNO COUNTY PEST CONTROL DISTRICTS

Pest control districts are comprised of local growers to control, eradicate, or respond to the effects of pests and/or diseases affecting crops.

- Central Valley Pest Control District
- West Fresno County Red Scale Protective District

RECLAMATION DISTRICTS

Reclamation districts reclaim and protect anybody of swampland and overflowed salt marsh, tidelands, or other lands subject to overflow to irrigate lands inside or outside their boundaries. Services include drainage, levee maintenance, and irrigation services.

- No. 1606
- Zalda No. 801

FRESNO COUNTY RESOURCE CONSERVATION DISTRICTS

Resource conservation districts address a wide variety of conservation issues such as forest fuel management, water and air quality, wildlife habitat restoration, soil erosion control, conservation education, and much more.

- Excelsior/Kings River Resource Conservation District
- Firebaugh Resource Conservation District
- James Resource Conservation District
- Los Banos Resource Conservation District
- Panoche Resource Conservation District
- San Luis Resource Conservation District
- Sierra Resource Conservation District (See Annex P)
- Tranquility Resource Conservation District
- Westside Resource Conservation District



FRESNO COUNTY WATER DISTRICTS (CALIFORNIA)

Water districts provide water services. Powers may include the acquisition and operation of works for the production, storage, transmission, and distribution of water for irrigation, domestic, industrial, and municipal purposes and any related drainage or reclamation works.

- Broadview Water District
- Eagle Field Water District
- Farmers Water District
- Firebaugh Canal Water District
- Fresno Slough Water District
- Garfield Water District
- International Water District
- Kings River Water District
- Liberty Water District
- Mercy Springs Water District
- Mid-Valley Water District
- Oro Loma Water District
- Pacheco Water District
- Panoche Water District
- Pleasant Valley Water District
- Raisin City Water District
- San Luis Water District
- Stinson Water District
- Tri-Valley Water District
- Westlands Water District
- Wildren Water District

FRESNO COUNTY WATER DISTRICTS (COUNTY)

County water districts furnish imported water.

- Freewater County Water District
- Malaga County Water District
- Pinedale County Water District

FRESNO COUNTY LOCAL BOARDS, COMMISSIONS, AND COMMITTEES

There are several local boards, commissions, and committees in Fresno County. Those that have responsibilities related to hazard mitigation are described briefly below.



- **Agricultural Land Conservation Committee:** This committee reviews cancellation of land conservation contracts and makes recommendations to the Board of Supervisors.
- **Association of Metropolitan Water Agencies:** This organization is charged with providing sufficient quality water to satisfy future requirements for municipal, industrial, and agricultural uses within the areas served by the member agencies.
- **Planning Commission:** This commission is charged with the review and approval or denial of discretionary land use permits. The Commission is also advisory to the Board of Supervisors on proposed amendments to the General Plan and the Zoning Ordinance.

FIRE SAFE COUNCILS

The Fire Safe Council provides resources for establishing and maintaining local fire safe councils to mobilize Californians to protect their homes, communities, and environments from wildfire. These councils serve as forums for stakeholders to share and validate fire safety and fire planning information. There are two fire safe councils in Fresno County:

- Highway I-168 Fire Safe Council (northeastern Fresno County)
- Highway I-80 Oak to Timberline Fire Safe Council (southeastern Fresno County)

FRESNO COUNTY'S ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 88. Fresno County's Administrative and Technical Mitigation Capabilities identifies the County personnel responsible for activities related to mitigation and loss prevention in Fresno County.

Table 88. Fresno County's Administrative and Technical Mitigation Capabilities

Staff or Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		Single Staff Member	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Department	County Staff
Fiscal Management or Procurement Specialists	X			County Staff
Floodplain Manager	X			County Staff
Land Surveyors	X		Department	County Staff
Land Use/Management/Development Planning	X		Department	County Staff
Planners or engineers with an understanding of natural and/or human-caused hazards	X		Department	
Resource Development Staff or Grant-writing	X		Department	
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS) or HAZUS	X		Department	County Staff
Staff with education or expertise to assess the community's vulnerability to hazards	X			

FRESNO COUNTY DEPARTMENT OF PUBLIC HEALTH

A number of important mitigation and emergency management programs and services are located in the Fresno County Department of Public Health, which provides health promotion, surveillance, and disease prevention services to protect public health.

OFFICE OF EMERGENCY SERVICES AND ITS MISSION

The Fresno County Office of Emergency Services (OES) is a program located within the Department of Public Health, Environmental Health Division. Fresno County OES coordinates planning and preparedness, response and recovery efforts for disasters occurring within the unincorporated area of the County. The mission of the Fresno County Office of Emergency Services is to develop and maintain the capability to prepare for, mitigate, respond to, and recover from emergencies and disasters, and to ensure the most effective use of all available resources. To accomplish this mission OES communicates and coordinates with all levels of government and many other entities in order to minimize the impact of disasters and enable affected communities to return to pre-disaster conditions as soon as possible.



On November 14, 1995, the Fresno County Board of Supervisors adopted the State's Standardized Emergency Management System (SEMS), established the geographic area of the County of Fresno as the Fresno County Operational Area, and designated Fresno County as the Operational Area Lead Agency. Fresno County OES is mandated by the California Emergency Services Act (Chapter 7, Division 1, Title 2 of Government Code) to serve as the liaison between the State and all the local government political subdivisions comprising Fresno County. As the Operational Area lead agency, Fresno County OES maintains ongoing communication with local government agencies (County Departments, Incorporated Cities, Special Districts, and Public School Districts) as well as many state and federal agencies and nonprofit organizations to maintain and enhance the capability to respond to and recover from disasters.

During a Disaster

The Office of Emergency Services provides the initial staffing and coordination of the County's Emergency Operations Center (EOC), which is the primary coordination point for response to major emergencies and disasters. During a disaster event OES staff gathers information from the affected jurisdictions and determines the level of response required. OES acts as the link between local government agencies and the State to transmit emergency related information and to request necessary State and Federal assistance.

Between Disasters

The Office of Emergency Services coordinates a wide variety of emergency management functions including developing and updating response plans, maintaining and enhancing the emergency operations center and related equipment, administering emergency preparedness grants, assisting county agencies and local jurisdictions with emergency related activities, and identifying and coordinating appropriate emergency training activities.

FRESNO COUNTY OPERATIONAL AREA MASTER EMERGENCY SERVICES PLAN

The program coordinates the development and maintenance of the Fresno County Operational Area Master Emergency Services Plan, which serves as a guide for the County's response to emergencies/disasters in the Fresno County Operational Area, and to coordinate and assist with disaster response in jurisdictions both within and outside of the Fresno County Operational Area.

Certified Unified Program Agency

The Certified Unified Program Agency (CUPA) is responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that require hazardous materials business plans, require California accidental release prevention plans or federal risk management plans, operate storage tanks, generate hazardous waste(s), and have onsite treatment of hazardous waste(s)/tiered permits.

Land Use Program

Land Use program staff are responsible for reviewing proposed land use development applications submitted to the various planning agencies in the County and providing comments regarding project compliance with the appropriate environmental health standards relative to the staff's areas of



expertise. The Land Use Program evaluates proposed land developments for compliance with laws and regulations pertaining to domestic and public water supplies, sewage and solid waste disposal, community noise and vector control.

Water Surveillance Program

The Water Surveillance Program permits, monitors, and inspects small public water systems and state small water systems within Fresno County and permits new water well construction, reconstruction of existing wells, and destruction of abandoned wells within unincorporated Fresno County. These activities are designed to help assure that a reliable supply of pure, wholesome, and potable water is provided to small public and state small water systems within Fresno County. In addition, the water well permitting program helps assure that private water wells are constructed to minimize the potential for contamination of the groundwater supply and eliminate safety hazards associated with abandoned wells.

Communicable Disease Division

The Communicable Disease Division of the Public Health Department participates in hazard mitigation in several ways, including immunizations, education, and preventive medication to prevent and/or control the spread of disease. The ultimate result is a reduction in human suffering, medical costs, and lost productivity.

In the case of a pandemic influenza or bio-terrorism event, the division would mobilize to mitigate the effects on the general population as well as first responders and essential personnel by administering antivirals, antibiotics, and immunizations. The County has a pandemic response plan that is implemented by this division.

Education and Prevention Services

Education and Prevention Services supports the public health objectives of the Department of Public Health. It conducts research on current health issues and, where appropriate, develops and implements programs to provide information, education, and services that promote and improve the public health and safety within the Fresno community. Staff also participate in a variety of public health partnerships with schools, community-based organizations, health and safety coalitions, public health agencies, managed care, medical institutions, and community members. Activities include:

- Conducting research and development on identified unmet public health needs;
- Developing, implementing, and evaluating primary prevention interventions intended to address targeted health needs of children, youth, and families;
- Providing consumer, youth, and employer health and wellness education;
- Creating and implementing informational marketing campaigns on health and safety topics;
- Coordinating selected training, assessment, and evaluation activities for the department.

Public Health Laboratory

The Public Health Laboratory provides surveillance and detects the presence of disease producing agents that have the potential to adversely affect the health of an entire community. The information generated by this testing is furnished to other agencies and departments to be used for the purpose of



monitoring infectious disease outbreaks and environmental threats to the public's health. The information can then be used to plan containment strategies and assess the effectiveness of various health education programs.

Fresno County Heat Emergency Contingency Plan

Administered by a number of departments within the Department of Public Health, the Fresno County Heat Emergency Contingency Plan was developed to reduce the incidence of morbidity and mortality associated with local extreme heat events. The plan describes County operations during heat-related emergencies and provides guidance for County departments and personnel.

FRESNO COUNTY DEPARTMENT OF PUBLIC WORKS AND PLANNING

The Fresno County Department of Public Works and Planning is responsible for a wide variety of programs and activities related to planning, zoning, permits, water, community service districts, housing, community and economic development, and roads and bridges for the unincorporated portion of Fresno County. Most of the department's mitigation activities take place in the Development Services Division, which consists of the following sections:

- **Building and Safety Section**—Responsibilities include administration of building codes and regulations to ensure the public's safety.
- **Land Development, Policy Planning, and Environmental Analysis Units** - Responsibilities include processing of land use applications, land division, administration of the County's general plan, Regional, Community and specific plans, urban growth management, and project-related amendments to General Plan and the Zoning Ordinance.
- **Development Engineering** – Responsibilities include processing grading permits, processing parcel maps and lot line adjustments.

Development Engineering is also responsible for floodplain administration and administers the National Flood Insurance Program (NFIP) for unincorporated areas of the County. The NFIP is a FEMA program that makes flood insurance available to communities that have enacted local ordinances restricting development within the 100-year floodplain. Fresno County has been an NFIP participant since 1982.

Floodplain management in Fresno County is based on mapping associated with the 2016 FEMA Flood Insurance Study, which contains revised and updated information on flood hazards in the geographic area of Fresno County, including the Cities of Clovis, Coalinga, Firebaugh, Fowler, Fresno, Huron, Kerman, Kingsburg, Mendota, Orange Cover, Parlier, Reedley, Sanger, San Joaquin, and Selma and the unincorporated areas of Fresno County. This study developed flood- risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management.

COMMUNITY DEVELOPMENT

The Community Development Division is responsible for implementing a variety of grants and programs to develop and promote viable communities by improving housing, providing a suitable living environment, and expanding economic opportunities.



Community Development Programs are provided solely through the use of grant funds such as the Community Development Block Grant, HOME Investment Partnerships Program, Neighborhood Stabilization Program and other Federal and State grants. Agritourism funding is provided by the Fresno County Board of Supervisors. The programs the department provides include:

- Affordable Housing Programs
- Community Development Grants
- Economic Development
- Housing Element and Community Plans

FRESNO COUNTY DEPARTMENT OF AGRICULTURE

The Fresno County Department of Agriculture, under direction of the California Department of Food and Agriculture, is responsible for conducting regulatory and service functions pertaining to the multi-billion-dollar agricultural industry in Fresno County. The primary purpose and objective of the department is the promotion and protection of the County agricultural industry and the general public. The services the department provides across its offices include:

Main Office

- Pesticide Regulatory Program office
- Fruit and Vegetable Program office
- Certified Producers Certificates
- Public information requests
- ACP Bulk Citrus Compliance Agreement Issuance
- Weights and Measures Program Office

Administrative Office

- Plant Quarantine office
- Administration staff
- Business Services Division
- Entomologist/Pest Identification

District Offices

- Phytosanitary Certification of export commodities
- Restricted Materials Permit and Operator Identification Number Issuance
- ACP Bulk Citrus Compliance Agreement Issuance
- Disposal Orders
- Regulatory Guidance



COUNTY ADMINISTRATIVE OFFICE

The County Administrative Office functions as the operations arm of the Board of Supervisors to deliver the highest quality public services to Fresno County residents. There are 21 Departments with 7,200 employees dedicated to finding better and more effective ways to meet the needs of our community.

We administer the County's \$4.1 billion dollar budget that funds services in public safety, law enforcement, agriculture, public works, human services, libraries and elections. The CAO office takes the lead in activities to improve the quality of life in Fresno County, including economic development, capital improvements, and tourism.

FRESNO COUNTY PUBLIC LIBRARY

The Fresno County Public Library provides collections and services through its Central Resource Library and 34 branches. It is part of the San Joaquin Valley Library System, a cooperative network of ten public library jurisdictions in the counties of Fresno, Kern, Kings, Madera, Mariposa, and Tulare. The library is an excellent resource for information about hazards and emergency preparedness.

STATE AND FEDERAL PROGRAMS

A number of state and federal programs exist to provide technical and financial assistance to local communities for hazard mitigation. Some of the primary agencies/departments that are closely involved with local governments in the administration of these programs include:

- California Governor's Office of Emergency Services
- State of California Multi-Hazard Mitigation Plan
- California Department of Water Resources (San Joaquin District)*
- San Joaquin River Management Plan
- California Department of Forestry and Fire Protection (Fresno King's Unit)*
- California Environmental Protection Agency
- California Department of Fish and Game*
- California Department of Transportation (Caltrans)
- California Highway Patrol
- California State Parks and Recreation Department*
- California State Lands Commission*
- San Joaquin River Conservancy*
- Federal Emergency Management Agency (Region IX)
- U.S. Army Corps of Engineers (South Pacific Division/Sacramento District)*
- Bureau of Reclamation (Mid-Pacific Region, Hollister planning area)*
- USDA Forest Service (Pacific Southwest Region)*
- National Parks Service (Pacific West Region)*
- USDA Natural Resources Conservation Service (Fresno Service Center)*



- U.S. Environmental Protection Agency (Region IX)
- American Red Cross (Fresno/Madera)

*Owns and/or manages land and/or facilities (or has some sort of administrative role, e.g., fire protection) in the County, potential partner for mitigation activities

SERVICE PROVIDERS FOR PEOPLE WITH ACCESS AND FUNCTIONAL NEEDS

A number of local organizations provide services and support to people with Access and Functional Needs in Fresno County. These include:

- **Central Valley Regional Center (CVRC)**
 - Serves clients with intellectual deficits, autism, cerebral palsy, epilepsy, and other conditions requiring similar services (including brain injuries). Many of their clients experience behavioral challenges, mobility issues, vision and hearing deficits, cognitive deficits, and health conditions that require special equipment.
 - They estimate that there are 13,389 people residing in Fresno County with this type of disability as of March 2024, and serve 28,000 clients across six counties.
 - CVRC can provide disaster-related assistance to their large population of clients, and has staff that speak a variety of languages (including English, Spanish, and Hmong)
- **American Red Cross**
 - Serves hundreds of clients with mobility issues and who are hard of hearing during disasters.
 - Provides sheltering, feeding, and wrap-around services (recovery, damage assessments, and disaster emergency supplies)
- **The Fresno-Madera Area Agency on Aging**
 - Serves older clients who frequently experience vision and hearing impairments, cognitive impairment, and mobility challenges.
 - Serves approximately 1,000 clients per month between MSSP, Linkages, and HDM programs, in addition to serving approximately 5,800 meals at congregate sites.
 - Can provide support in identifying clients that need evacuation assistance and provide emergency meals and durable medical equipment.
- **Amputees of Central California**
 - Serves clients who have lost one or more limbs, many of whom do not use prosthetics and need additional support in ambulating during an emergency.
 - Serves 400-500 clients, of the estimated 700-800 amputees in Fresno County.
- **Lloyd's Liberty Homes**
 - Provides housing services to clients who blind and visually impaired, deaf and hard of hearing, non-ambulatory, elderly, non-verbal, and with behavioral health issues.
 - Houses 38 clients across two facilities



FRESNO COUNTY'S FISCAL MITIGATION CAPABILITIES

Table 89. Fresno County's Fiscal Mitigation Capabilities identifies financial tools or resources that the County could potentially use to help fund mitigation activities.

Table 89. Fresno County's Fiscal Mitigation Capabilities

Staff or Personnel Resources	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)			X	
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fees	X			
Water/Sewer Fees			X	
Stormwater Utility Fees			X	
Development Impact Fees			X	
General Obligation, Revenue, and/or Special Tax Bonds			X	
Partnering Agreements or Intergovernmental Agreements			X	
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)			X	
Homeland Security Grants (HSGP)			X	
USDA Rural Development Agency Grants			X	
US Economic Development Administration Grants			X	
Infrastructure Investment and Jobs Act (IIJA)	X			

VULNERABILITY ASSESSMENT

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

With Fresno County's hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that each hazard would have on the County. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to natural hazards and estimates potential losses. This section focuses on the risks to the County as a whole. Data from the individual participating jurisdictions was also evaluated and is integrated here and in the jurisdictional annexes and noted where the risk differs for a particular jurisdiction within the planning area.

Data used to support this assessment included the following:

- County GIS data (hazards, base layers, and assessor's data)
- Statewide GIS datasets compiled by the California Governor's Office of Emergency Services to support mitigation planning
- California Department of Forestry and Fire Protection GIS datasets including tree mortality data
- FEMA's HAZUS-MH for earthquake modelling
- Written descriptions of inventory and risks provided by participating jurisdictions
- A refined flood loss estimation by jurisdiction with the use of geospatial analysis 1% and 0.2% annual chance flooding as well as the 200-year floodplain.
- Existing plans and studies
- Personal interviews with planning team members and staff from the County and participating jurisdictions

FRESNO COUNTY VULNERABILITY AND ASSESTS AT RISK

As a starting point for analyzing the planning area's vulnerability to identified hazards, the HMPC used a variety of data to define a baseline against which all disaster impacts could be compared. This section describes significant assets at risk in the planning area. Data used in this baseline assessment included:

- Total values at risk
- Critical facility inventory
- Historic, cultural, and natural resources
- Growth and development trends
- Social vulnerability

TOTAL VALUES AT RISK

The following data from the Fresno County Assessor's Office is based on the certified roll values as of February 2024. This data should only be used as a guideline to overall values in the County, as the information has some limitations. The most significant limitation is created by Proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is likely low and does not reflect current market value of properties within the County. It is also important to note, in regard to a disaster, it is generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. **Table 89. Assets at Risk** shows the building values for the entire Fresno County planning area (e.g., the total values at risk) by jurisdiction. The values for unincorporated Fresno County are provided in **Table 90. Assets at Risk by Parcel Type** by property type. For more information on building exposure for each jurisdiction, see the appropriate annex.

Table 89. Assets at Risk

Jurisdiction	Parcel Count	Building Count	Improved Value	Land Value	Total Value
Clovis	42,692	37,893	\$14,224,851,294	\$3,332,745,410	\$17,565,413,960
Coalinga	3,762	4,807	\$40,376,700	\$11,159,350	\$51,536,050
Firebaugh	2,201	2,077	\$24,317,302	\$13,330,297	\$41,994,899
Fowler*	2,381	2,296			
Fresno	156,104	152,956	\$74,325,635,573	\$14,859,345,930	\$89,998,576,963
Huron*	1,142	1,066			
Kerman	4,043	4,045	\$289,394,719	\$94,670,178	\$392,488,007
Kingsburg	4,166	4,393	\$195,880,186	\$77,170,690	\$277,098,036
Mendota	2,361	2,331	\$5,429,577	\$2,154,143	\$7,593,820

4. Risk Assessment

Jurisdiction	Parcel Count	Building Count	Improved Value	Land Value	Total Value
Orange Cove*	1,718	2,126			
Parlier	2,813	3,102	\$7,642,462	\$1,930,661	\$9,573,123
Reedley	7,153	7,132	\$4,566,516,130	\$313,583,124	\$4,890,722,514
San Joaquin*	795	854			
Sanger	7,513	7,870	\$340,931,729	\$91,625,847	\$432,668,326
Selma	6,558	7,149	\$141,103,950	\$68,244,144	\$209,749,314
Unincorporated	82,580	94,849	\$2,990,240,616	\$2,155,125,277	\$5,399,450,613

*Tax Parcel Ownership Value table for Fresno County does not contain valuations for these 4 jurisdictions

Source: Based on information from Fresno County Assessor 2/28/2024 and Microsoft-Bing Building Footprints U.S. Dataset, 2019

Table 90. Assets at Risk by Parcel Type

Property Type	Parcel Count	Building Count	Improved Value	Land Value	Total Value
Agricultural	4,867	4,594	\$1,614,009,984	\$1,414,695,221	\$3,128,491,075
Commercial	2,425	1,109	\$6,571,839,262	\$1,967,206,317	\$8,604,594,489
Government	23	3	\$240,514	\$1,333,289	\$1,573,803
Industrial	730	899	\$1,475,735,060	\$522,248,712	\$2,922,628,472
School	29	43	\$28,202,029	\$7,365,482	\$35,612,811
Hospital	16	3	\$341,363,536	\$17,708,710	\$359,072,246
Multi-Residential (Apartments or Condos)	12,554	3,438	\$78,143,455,036	\$13,343,869,743	\$91,487,380,379
Group Housing/Lodging	27	62	\$123,195,002	\$27,027,675	\$152,511,457
Mobile/Manufactured Home	379	1,007	\$219,791,066	\$337,554,097	\$557,363,573
Open Space	1,194	395	\$1,624,248,027	\$473,461,965	\$2,107,438,892
Single-Family Residential	34,844	33,773	\$6,783,498,693	\$2,510,390,338	\$9,293,925,341
Recreation	53	29	\$23,510,572	\$10,083,948	\$33,645,020
Utilities	22	42	\$7,711,634	\$19,469,825	\$27,181,459
Unknown or Vacant	6,742	289,027	\$56,529,540	\$343,157,723	\$400,037,763
Total	63,905	334,424	\$97,013,329,955	\$20,995,573,045	\$119,111,456,780

Source: Based on information from Fresno County Assessor 2/28/2024 and Microsoft-Bing Building Footprints U.S. Dataset, 2019

CRITICAL FACILITY INVENTORY

Of significant concern with respect to any disaster event is the location of critical facilities in the planning area. Critical facilities are often defined as those services and facilities essential during a major emergency and that, if damaged, would result in severe consequences to public health and safety or facilities that, if unusable or unreachable because of a major emergency, would seriously and adversely affect the health, safety, and welfare of the public. Critical facilities include, but are not limited to:

- Schools and other publicly owned facilities.
- Hospitals, nursing homes, and housing likely to have occupants who may not be sufficiently mobile to avoid injury or death during a major disaster.
- Police stations, fire stations, vehicle and equipment storage facilities, and emergency operations centers that are needed for response activities before, during, and after an event.
- Public and private utility facilities that are vital to maintaining or restoring normal services to damaged areas before, during, and after an event; and
- Structures or facilities that produce, use, or store highly volatile, flammable, explosive, toxic, and/or water-reactive materials.

An updated inventory of critical facilities in the planning area based on data from a combination of Fresno County GIS and the Homeland Infrastructure Foundation-Level Data (HIFLD 2022; 2023) is provided in **Table 91. Critical Facilities in Fresno County**. A noted limitation is the lack of facilities for water and power which was not available in the County or HIFLD datasets. Critical facilities in the County are illustrated in **Figure 58. Fresno County Critical Facilities and Critical Infrastructure**, with more detail shown in **Figure 59. Western Fresno County Critical Facilities and Critical Infrastructure**, **Figure 60. Central Fresno County Critical Facilities and Critical Infrastructure**, and **Figure 61. Western Fresno County Critical Facilities and Critical Infrastructure**. More information on critical facilities in the participating jurisdictions can be found in the jurisdictional annexes.

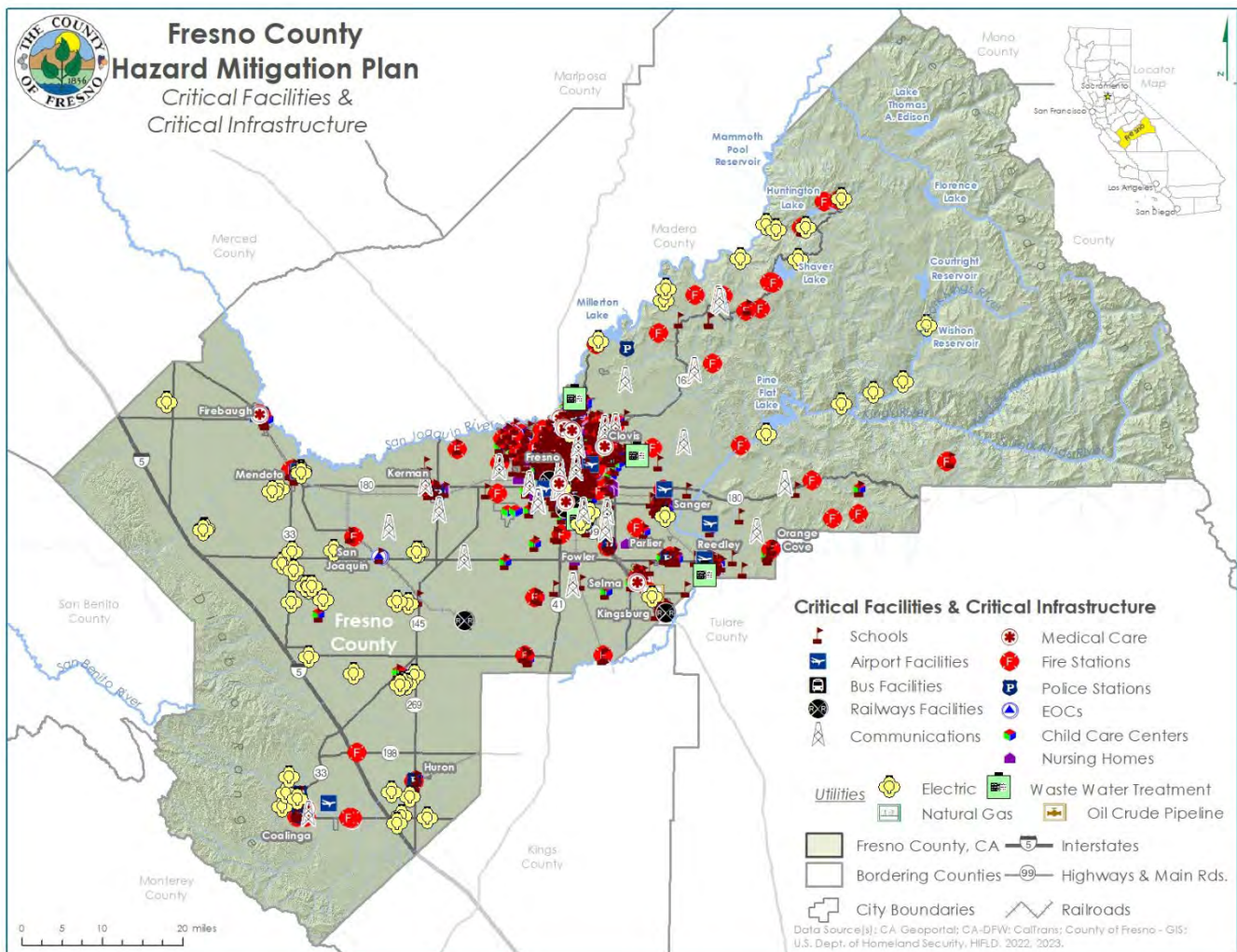
4. Risk Assessment



Table 91. Critical Facilities in Fresno County

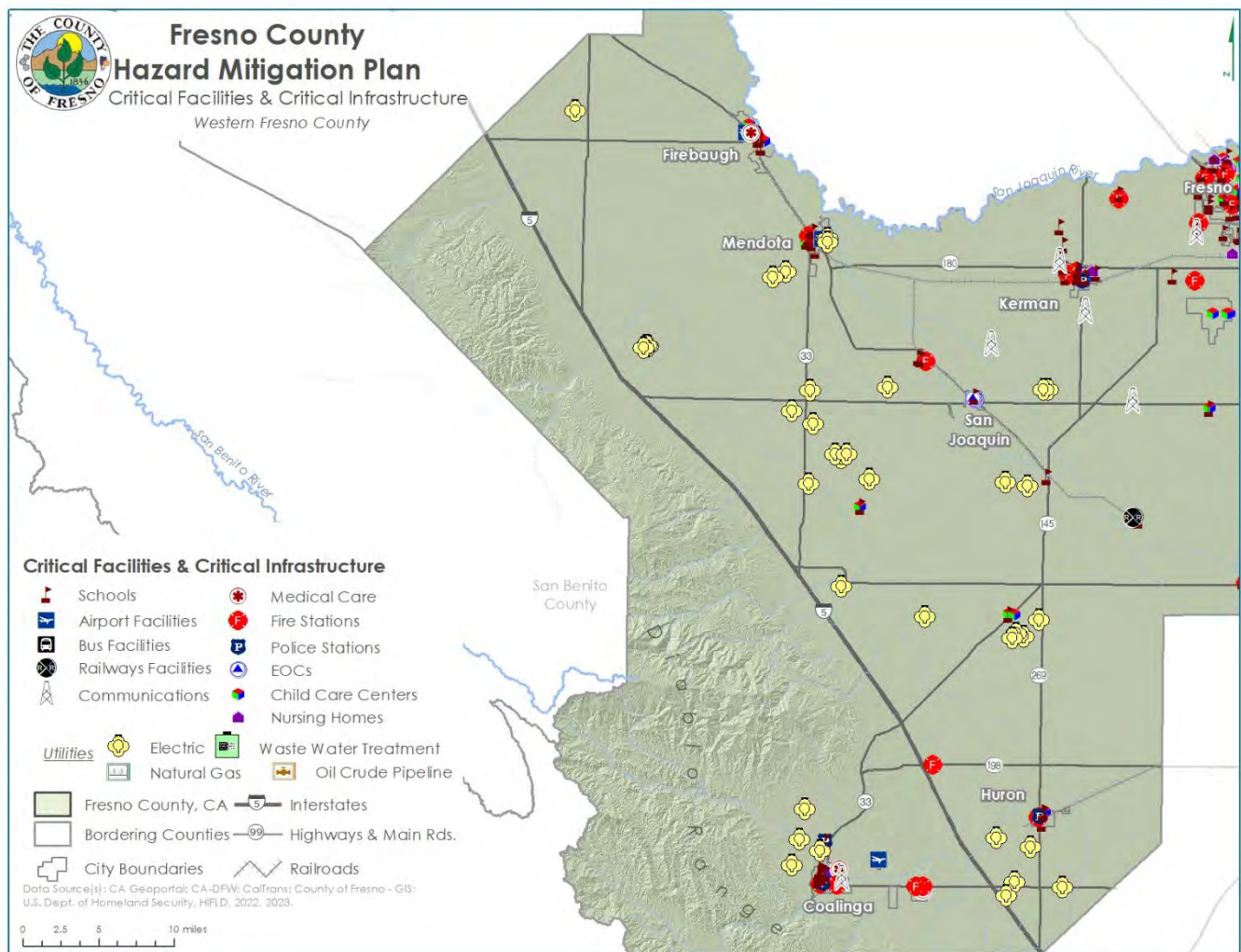
Jurisdiction	Airport Facilities	Bus Facilities	Comms. Facilities	Electric Power Facilities	EOCs	Fire Stations	Natural Gas Facilities	Medical Care Facilities	Oil Crude Pipeline Facilities	Police Stations	Railways Facilities	Schools	Waste water Treatment Facilities	Total
Clovis	0	0	2	0	0	6	0	1	0	2	0	39	1	51
Coalinga	1	0	1	0	1	3	0	2	0	3	0	10	0	21
Firebaugh	1	0	0	0	2	1	0	0	0	1	0	6	0	11
Fowler	0	0	0	0	1	1	0	0	0	1	0	8	0	11
Fresno	2	1	5	2	1	21	0	13	0	11	4	182	1	243
Huron	0	0	0	0	0	1	0	0	0	1	0	3	0	5
Kerman	0	0	0	0	1	1	0	0	0	1	0	6	0	9
Kingsburg	0	0	0	1	0	1	0	0	1	1	1	10	0	15
Mendota	1	0	0	2	0	1	0	0	0	0	0	7	0	11
Orange Cove	0	0	0	0	0	1	0	0	0	0	0	5	0	6
Parlier	0	0	0	0	0	1	0	0	0	1	0	7	0	9
Reedley	2	0	0	0	0	1	0	1	0	1	0	14	1	20
San Joaquin	0	0	0	0	2	0	0	0	0	0	0	1	0	3
Sanger	1	0	0	1	0	3	0	0	0	1	0	14	0	20
Selma	0	0	0	0	0	2	0	1	0	1	0	11	0	15
Unincorporated	0	0	34	54	0	33	1	0	0	1	4	71	1	199

Figure 58. Fresno County Critical Facilities and Critical Infrastructure



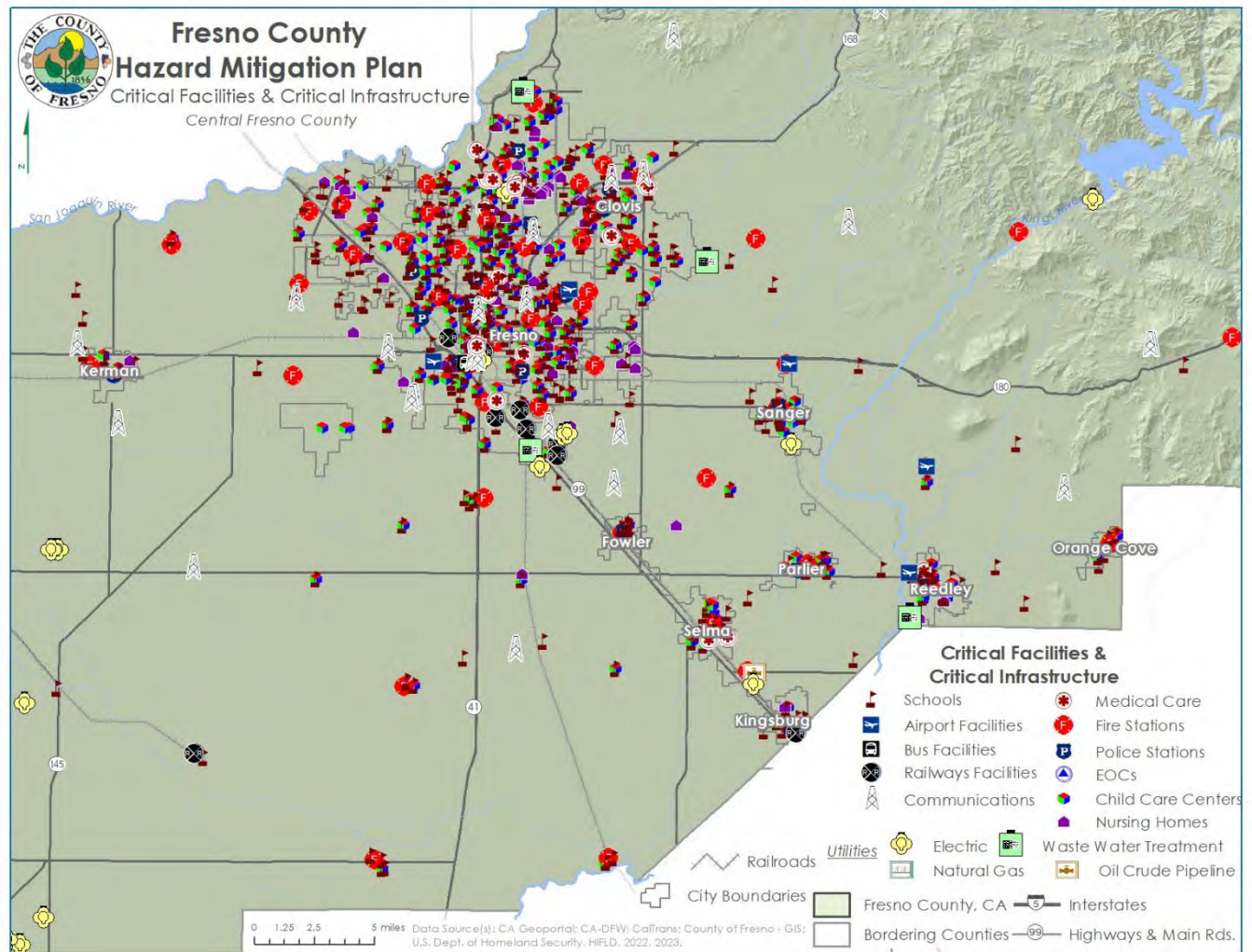
Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Department of Homeland Security, HIFLD, 2022, 2023

Figure 59. Western Fresno County Critical Facilities and Critical Infrastructure



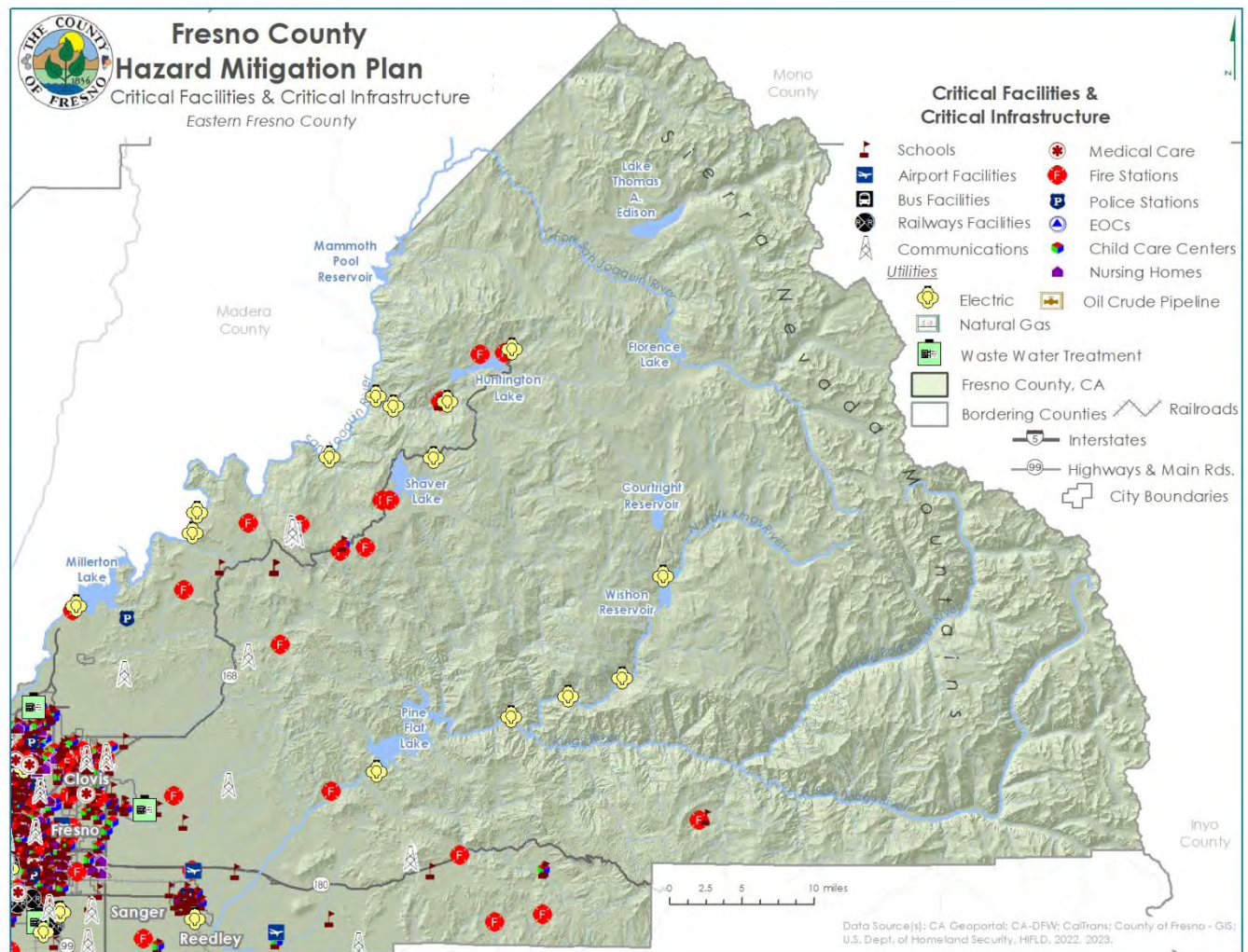
Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Department of Homeland Security, HIFLD, 2022, 2023

Figure 60. Central Fresno County Critical Facilities and Critical Infrastructure



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Department of Homeland Security, HIFLD, 2022, 2023

Figure 61. Western Fresno County Critical Facilities and Critical Infrastructure



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Department of Homeland Security, HIFLD, 2022, 2023

HISTORIC, CULTURAL, AND NATURAL RESOURCES

Assessing the vulnerability of Fresno County to disaster also involves inventorying the historic, cultural, and natural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian habitat help absorb and attenuate floodwaters.

HISTORIC AND CULTURAL RESOURCES

Fresno County has a large stock of historically significant homes, public buildings, and landmarks. To inventory these resources, the HMPC collected information from several sources. The California Department of Parks and Recreation Office of Historic Preservation (OHP) was the primary source of information. The OHP is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of California's irreplaceable archaeological, and historical resources. OHP administers the National Register of Historic Places, the California Register of Historical Resources, the California Historical Landmarks, and the California Points of Historical Interest programs. Each program has different eligibility criteria and procedural requirements.

- The **National Register of Historic Places** is the Nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.
- The **California Register of Historical Resources** program encourages public recognition and protection of resources of architectural, historical, archeological and cultural significance; identifies historical resources for state and local planning purposes; determines eligibility for state historic preservation grant funding; and affords certain protections under the California Environmental Quality Act. The register is the authoritative guide to the state's significant historical and archeological resources.
- **California Historical Landmarks** are sites, buildings, features, or events that are of statewide significance and have anthropological, cultural, military, political, architectural, economic, scientific, technical, religious, experimental, or other value. Landmarks #770 and above are automatically listed in the California Register of Historical Resources.
- **California Points of Historical Interest** are sites, buildings, features, or events that are of local (city or county) significance and have anthropological, cultural, military, political, architectural, economic, scientific, technical, religious, experimental, or other value. Points designated after December 1997 and recommended by the State Historical Resources Commission are also listed in the California Register.

4. Risk Assessment

Historical resources included in the programs above are identified in **Table 92. Fresno County Historical Resources.**

Table 92. Fresno County Historical Resources

Name (Landmark Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City
Arroyo De Cantua (344)		X		8/8/1939	Coalinga
Azteca Theater	X			4/05/2017	Fresno
Bank of Italy (N1140)	X			10/29/1982	Fresno
Ben Gefvert Rank Historic District	X			1/01/2011	Fresno
Big Creek Hydroelectric System Historic District	X			7/26/2016	Big Creek
Birdwell Rock Petroglyph Site (N2193)	X			3/12/2003	Coalinga
Brix, H.H., Mansion (N1235, P438)	X		X	9/15/1983 (N) 10/1/1975 (P)	Fresno
Coaling Station A (P7)			X	12/16/1966	Coalinga
Coalinga Polk Street School (N1099)	X			5/6/1982	Coalinga
Dinkey Creek Bridge (N1957)	X			9/5/1996	Dinkey Creek
Einstein House (N554, P440)	X		X	1/31/1978 (N) 10/1/1975 (P)	Fresno
Fig Garden Woman's Club (P799)			X	7/18/1994	Fresno
Forestiére Underground Gardens (N524, 916)	X	X		10/28/1977 (N) 1/31/1978	Fresno
Fort Miller (584)		X		5/22/1957	Friant
Fowler's Switch (P299)			X	5/2/1973	Fowler
Fresno Bee Building (N1158)	X			11/1/1982	Fresno
Fresno Brewing Company Office and Warehouse (N1260)	X			1/5/1984	Fresno

4. Risk Assessment

Name (Landmark Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City
Fresno City (488)		X		8/7/1951	Tranquility
Fresno County Hall of Records	X			12/22/2011	Fresno
Fresno Memorial Auditorium (N1867)	X			5/10/1994	Fresno
Fresno Republican Printery Building (N738)	X			1/2/1979	Fresno
Fresno Sanitary Landfill (N2140)	X			8/7/2001	Fresno
Gamlin Cabin (N471)	X			3/8/1977	Wilsonia
Holy Trinity Armenian Apostolic Church (N1450)	X			7/31/1986	Fresno
Hotel Californian (N2235)	X			4/21/2004	Fresno
John Muir Memorial Shelter	X			8/15/2016	Grant Cove
Kearney, M. Theo, Park and Mansion (N335, P5)	X		X	3/13/1975 (N) 8/5/1966 (P)	Fresno
Kindler, Paul, House (N1141)	X			10/29/1982	Fresno
Kingsburg Railroad Depot (P694)			X	3/30/1988	Kingsburg
Knapp Cabin (N727)	X			12/20/1978	Cedar Grove
Maulbridge Apartments (N1100)	X			5/6/1982	Fresno
Meux House (N324, P437)	X		X	1/13/1975 (N) 10/1/1975 (P)	Fresno
Milwood Townsite (P4)			X	8/5/1966	Miramonte
Old Administration Building, Fresno City College (N282)	X			5/1/1974	Fresno
Old Fresno Water Tower (N114)	X			10/14/1971	Fresno
Orange Cove Santa Fe Railway Depot (N658)	X			8/29/1978	Orange Cove

4. Risk Assessment

Name (Landmark Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City
Pantages, Alexander, Theater (N559)	X			2/23/1978	Fresno
Physicians Building (N701)	X			11/20/1978	Fresno
Reedley National Bank (N1344)	X			2/28/1985	Reedley
Reedley Opera House Complex (N1276)	X			4/5/1984	Reedley
Rehorn House (N982)	X			1/8/1982	Fresno
Romain, Frank, House (N986)	X			1/11/1982	Fresno
San Joaquin Light & Power Corporation Building (N2310)	X			1/3/2006	Fresno
Santa Fe Hotel (N1673)	X			3/14/1991	Fresno
Santa Fe Passenger Depot (N443)	X			11/7/1976	Fresno
Settlement of Academy (P45)			X	9/22/1967	Toll House
Shorty Lovelace Historic District (N555) *	X			1/31/1978	Pinehurst
Site of First Junior College in California (803)		X		6/28/1965	Fresno
Site of the Fresno Free Speech Fight of the Industrial Workers of the World (873)		X		7/19/1974	Fresno
Southern Pacific Passenger Depot (N561)	X			3/21/1978	Fresno
Stoner House (N1390)	X			10/17/1985	Sanger
Sycamore Point (P226)			X	10/5/1971	Friant
Temporary Detention Camps for Japanese Americans-Fresno		X		5/13/1980	Fresno

4. Risk Assessment

Name (Landmark Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City
Assembly Center (934)					
Temporary Detention Camps for Japanese Americans- Pinedale Assembly Center (934)		X		5/13/1980	Pinedale
Tollhouse (P145)			X	11/3/1969	Toll House
Tower Theatre (N1795)	X			9/24/1992	Fresno
Twining Laboratories (N1681)	X			3/26/1991	Fresno
Warehouse Row (N564)	X			3/24/1978	Fresno
YWCA Building (N673, P439)	X		X	9/21/1978(N) 10/1/1955 (P)	Fresno

Source: National Park Service, National Register of Historic Places

The National Park Service administers two programs that recognize the importance of historic resources, specifically those pertaining to architecture and engineering. While inclusion in these programs does not give these structures any sort of protection, they are valuable historic assets. Note: Since these structures are not protected, it is possible that they no longer exist.

The Historic American Buildings Survey (HABS) documents America's architectural heritage. The following are the HABS structures in Fresno County:

- Albert G. Wishon House, 340 North Fulton Street, Fresno, Fresno County, CA
- Burnett Nurse's Home, 120 North Howard Street, Fresno, Fresno County, CA
- Charles H. Cobb House, 271 North Yosemite Avenue, Fresno, Fresno County, CA
- Dinkey Ranger Station, Warehouse, Dinky-Shaver Road at Dinky Creek, Shaver Lake, Fresno County, CA
- George H. Larsen House, 486 North Poplar Avenue, Fresno, Fresno County, CA
- Ira H. Brooks House, 350 North Fulton Avenue, Fresno, Fresno County, CA
- Ivan Carter McIndoo House, 310 North Fulton Street (Moved from 410 North Van Ness Avenue), Fresno, Fresno County, CA
- John G. Porter House, 316 North Fulton Street (Moved from 420 North Van Ness Avenue), Fresno, Fresno County, CA
- Lamb Townhouse, 254 North Roosevelt Avenue, Fresno, Fresno County, CA

4. Risk Assessment

- Matthew McIndoo House, 345 North Van Ness Avenue, Fresno, Fresno County, CA
- Newman J. Levinson House, 1636 Broadway Street (moved from 439 North Van Ness Avenue), Fresno, Fresno County, CA
- O'Brien House, 136-138 North Roosevelt Avenue, Fresno, Fresno County, CA
- William W. Hangar House, 6118 Greenwood Avenue (Moved from 425 North Van Ness Avenue, Fresno, CA), Clovis, Fresno County, CA

The Historic American Engineering Record documents historic sites and structures related to engineering and industry. The following are the HAER structures in Fresno County:

- Hume Lake Dam, Sequoia National Forest, Hume
- Belmont Avenue Subway, Traffic Circle, and Bridge, Belmont Avenue, Fresno, Fresno County, CA
- Big Creek Hydroelectric System, Bear Creek Diversion Dam, Sierra National Forest, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Big Creek Town, Operator House Garage, Orchard Avenue south of Huntington Lake Road, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Big Creek Town, Operator House, Orchard Avenue south of Huntington Lake Road, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Cottage 112, 53996 Huntington Lake Road, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Cottage 113, 53934 Huntington Lake Road, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Cottage 115, 54347 Cedar Street, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Florence Lake Dam, Sierra National Forest, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Powerhouse 1, North Bank of Big Creek, 100 feet from Big Creek Road, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Powerhouse 2 and 2A, South Bank of Big Creek, approximately 3.5 miles west of Big Creek, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Powerhouse 3 Penstock Standpipes, Big Creek, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Powerhouse 3, San Joaquin River, near confluence of Italian Bar Road and Million Dollar Road, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Powerhouse 8, Confluence of Big Creek and San Joaquin River, about 4.8 miles west of Big Creek, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Powerhouse 8, Operator Cottage, Big Creek, Big Creek, Fresno County, CA
- Big Creek Hydroelectric System, Vincent 220kV Transmission Line, 224-mile transmission line extending from Big Creek to Antelope Substation, Big Creek, Fresno County, CA
- Hume Lake Dam, Sequoia National Forest, Hume, Fresno County, CA

4. Risk Assessment

- Weber Avenue Overcrossing, Weber Avenue above East Belmont Avenue, Fresno, Fresno County, CA

The Fresno County General Plan Background Report identifies the following, some of which are already mentioned above, as historic properties in Fresno County:

- Azteca Theater (836-840 F Street)
- Lake Moon Company Building (914-920 F Street)
- Industrial Bank of Fresno/Bank of Italy Building (947-951 F Street)
- Basque Hotel (1102 F Street)
- Gundelfinger Home (2201 Calaveras Street)
- Temple Beth Israel (2336 Calaveras Street)
- Bolitho Home (33 N. Calaveras Street)
- McGee-Macias Home (115 N. Calaveras Street)
- John C. Fox Home (128 N. Calaveras Street)
- Ernest J. Huntzicker Memorial Hall (245 N. Calaveras Street)
- Eugene Mathewson Home (319 N. Calaveras Street)
- Shipp-Selland Home (1919) 1002 E. Cambridge Avenue
- George Riddell Miller Home (617 E. Carmen Ave.)
- Deacon-Eilert Home (660 E. Carmen Ave.)
- Bates Home (718 E. Carmen Ave.)
- Frank Chance Field Site (1935) Southwest corner of Cedar Avenue and Ventura Street
- Fresno Trolley Cars/Standard Diner (1731 S. Cherry Avenue)
- Holt Lumber Company (1916 S. Cherry Avenue)
- Shuttera Home (ca. 1904) 320 S. Chestnut Avenue
- Bing Kong Association Building (921-929 China Alley)
- Bow On Tong Association Building (935 China Alley)
- McKay Home (201 N. Clark Street)
- Shipp Home (305 N. Clark Street)
- Anderson Home (329 N. Clark Street)
- Wild Home (1929) 567 E. Clinton Avenue
- George W. Smith Home (109 N. College Avenue)
- Henry & Emily Banta Home (228 N. College Avenue)
- John B. Frinchaboy Home (243 N. College Avenue)
- Moore-Koop Home (258 N. College Avenue)

4. Risk Assessment

- Alfred and Minnie Cherin Home (1949) 233 E. Cornell Avenue
- Hewitt Home (175 N. Diana Street)
- E. E. Wyman/Santa Fe Land Improvement Co. Boarding House (209 N. Diana Street)
- Graff Home (916 E. Divisadero Street)
- Flora Montague Bungalow Court (950 E. Divisadero Street)
- Ohannesian Home (1225 E. Divisadero Street)
- Mary Matson Home (1440 E. Divisadero Street)
- Hopkins Home (1458 E. Divisadero Street)
- J. R. Turner Home (ca. 1910) 815 E. Dudley Avenue
- Free Evangelical Lutheran Cross Church (208 E Street)
- Legler Home (305 E Street)
- First Mexican Baptist Church (1061 E Street)
- John B. Marshall Homes (164 N. Echo Avenue)
- Whitney-Huntting Home (1105 N. Echo Avenue)
- George & Adelpia Rowell Home (1903) 153 N. Effie Street
- Weems Home (3121 E. El Monte Way)
- William Saroyan Home (3204 E. El Monte Way)
- Vartanian Home (362 F Street)
- Gibbs Home (369 N. Ferger Avenue)
- Solorio Home (415 N. Ferger Avenue)
- Hughes Home (1917) 743 S. Fourth Street
- William F. Jones Home (1911) 1112 E. Franklin Avenue)
- Fresno Fire Department No. 3 (1406-1430 Fresno Street)
- Fresno City Hall (2326 Fresno Street)
- Fresno Memorial Auditorium (2425 Fresno Street)
- Old Fresno Water Tower (2444 Fresno Street)
- Twining Laboratories (2527 Fresno Street)
- Physicians Building (2607 Fresno Street)
- H. H. Brix Mansion (2844 Fresno Street)
- City Fire Alarm Station (2945 Fresno Street)
- Eaton Flats Apartments (126 N. Fresno Street)
- San Joaquin Grocers Wholesale Warehouse (104 Fulton Street)
- J. M. Menend/Murray Ice Cream Co. Building (175 Fulton Street)
- Sham's Rio Grande Service Station (205 Fulton Street)

4. Risk Assessment

- White Company Trucks/Electric Motor Company Building (245 Fulton Street)
- Rustigian Building (701-723 Fulton Street)
- Sun Stereo Warehouse (736 Fulton Street)
- Fresno Photo Engraving Building (748-752 Fulton Street)
- Radin-Kamp Department Store (959 Fulton Mall)
- Bank of Italy Building (1001 Fulton Mall)
- Fresno Daily Expositor Building (1029-1031 Fulton Mall)
- Mason Building (1044 Fulton Mall)
- Pacific Southwest Building (1060 Fulton Mall)
- Helm Building (1101 Fulton Mall)
- Mattei Building (1177 Fulton Mall)
- Pantages Theatre (1400-1430 Fulton Street)
- San Joaquin Light & Power Company (1401 Fulton Street)
- Wilson Theater (1445-1463 Fulton Street)
- P. G. & E. Building (1544 Fulton Street)
- Kutner Home (174 N. Fulton Street)
- Ira Brooks Home (226 N. Fulton Street)
- Alexander Home (235 N. Fulton Street)
- Farr Home (245 N. Fulton Street)
- McIndoo-Phillips Home (310 N. Fulton Street)
- Sample Sanitarium (311 N. Fulton Street)
- Porter-Bernard Home (320 N. Fulton Street)
- Amazon S. Hays Home (330 N. Fulton Street)
- A. G. Wishon Home (340 N. Fulton Street)
- Ridge Electric Motor Company Building (1968) 1235 G Street)
- Henry C. Offutt Home (227 N. Glenn Avenue)
- Thompson Home (274 N. Glenn Avenue)
- Cardwell Home (357 N. Glenn Avenue)
- John H. Fearon / Efren J. Diaz-Muñoz Home (1906) 2540 E. Grant Avenue)
- William Saroyan Home (1963) 2729 W. Griffith Way)
- Hobbs Parsons Produce Company (903 H Street)
- Dale Bros. Coffee Company Sign (1420 H Street)
- Benham Ice Cream/Dale Bros. Coffee Company (1420-1432 H Street)
- Jacob Parret Home (1900) 2069 E. Harvey Avenue)

4. Risk Assessment

- Old Barn (ca. 1900) 2919 E. Heaton Avenue)
- Cearley-Twining Home (625 E. Home Avenue)
- Old Saint Agnes Hospital (603 W. Home Avenue)
- Ray & Jessie Prior Home (1921) 458 N. Howard Avenue)
- Dr. Oliver Howard Home (3263 E. Huntington Boulevard)
- Fred J. & Mary Dow Home (3369 E. Huntington Boulevard)
- Clarence & Bessie Bernhauer Home (3428 E. Huntington Boulevard)
- A. G. & Henrietta Wishon Home (3555 E. Huntington Boulevard)
- Fred & Virginia Billings Home (3650 E. Huntington Boulevard)
- F. Rex & Vera Sporleder Home (3702 E. Huntington Boulevard)
- C. M. & Gertrude Prescott Home (3707 E. Huntington Boulevard)
- Bekins-McClatchy Home (3729 E. Huntington Boulevard)
- Blum Home (3870 E. Huntington Boulevard)
- Eugene & Elsie Brinker Home (3965 E. Huntington Boulevard)
- Johnson Home (1907) 3811 E. Illinois Avenue)
- Liberty Laundry Building (1928) 1830 Inyo Street)
- Kearney Boulevard Gateway (Kearney Boulevard & Fresno Street)
- Thomas Arrioto Home (505 E. Kearney Boulevard)
- St. Alphonsus Catholic Church (307 E. Kearney Boulevard)
- Teilman Home (919 W. Kearney Boulevard)
- Clovis M. Cole Home (1914) 3615 E. Kerckhoff Avenue)
- Fresno Buddhist Temple (1340 Kern Street)
- Komoto's Department Store and Hotel (1536-1542 Kern Street)
- Hotel Virginia (2125-2139 Kern Street)
- Fresno Republican Printery (2130 Kern Street)
- Old Post Office Substation (2404 Kern Street)
- Scottish Rite Temple (1455 L Street)
- Harvey Swift Home (1605 L Street)
- Montgomery Thomas Home (1642 L Street)
- Kutner Home (1651 L Street)
- Bean Home (1705 L Street)
- Towne Apartments (1717 L Street)
- Long (Black) Home (1727 L Street)
- Helm Home (1749 L Street)

4. Risk Assessment

- Fresno Brewing Company (100 M Street)
- Squirt Bottling Company Building (152 M Street)
- Neverman Home (309 M Street)
- Hoonanian Home (496 M Street)
- Valley Lahvosh Baking Company (502 M Street)
- Louis Einstein Home (1600 M Street)
- Y.W.C.A. Residence Hall (1660 M Street)
- Fresno Unified School District Office (2348 Mariposa Street)
- Fresno Unified School District Office (2348 Mariposa Mall)
- St. John's Hall School (2811 Mariposa Street)
- St. John's Cathedral Catholic Church (2814 Mariposa Street)
- St. John's Rectory (2814 Mariposa Street)
- Normandy Village Apartments (ca. 1935) 840-852 E. Brown Avenue/2617-2645 N. Maroa Avenue
- Edward B. Waterman Home (2535 E. McKenzie Avenue)
- Mrs. C. C. S. Tufts Home (2635 E. McKenzie Avenue)
- George & Jessie Hare Home (1918) 815 E. McKinley Avenue
- Thomas & Sadie Elliott Home (ca. 1904) 934 E. Mildreda Avenue
- Proffitt Home (1911) 5218 N. Millbrook Avenue
- Senator Ray W. & Marie Hays Home (1937) 1616 S. Minnewawa Avenue
- Fresno Planing Mill Company (1917) 1820 Monterey Street
- Mink Home (344 N Street)
- McVey Homes (1322-1326 N Street)
- Walley Residence (1338 N Street)
- First Church of Christ Scientist (1615 N Street)
- Lewis Insurance Company Office (431 E. Olive Avenue)
- Smith/Staniford Home (437 E. Olive Avenue)
- Kindler Home (1520 E. Olive Avenue)
- Robinson Home (1900) 1003 S. Orange Avenue
- United Grocers Inc. Wholesale Grocery Building (414 P Street)
- Berven Rug Mills Inc./Wellman-Peck & Company (616 P Street)
- Fresno Consumers Ice Company (702 P Street)
- Western Meat Company (754 P Street)
- Wormser Building (764 P Street)
- Frank J. Craycroft Home (1927) 6545 N. Palm Avenue

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- Donahoo Home (103 N. Park Avenue)
- Waller Home (306 N. Park Avenue)
- Cowdrey Home (330 N. Park Avenue)
- John Eulless Home (1913) 373 S. Peach Avenue
- Nis Johnson Home (601 E. Pine Avenue)
- Gustav & Edith Manheim Home (617 E. Pine Avenue)
- Gates-Twining Home (640 E. Pine Avenue)
- Mosgrove Home (660 E. Pine Avenue)
- Main Home (1914) 520 W. Princeton Avenue
- State Center Warehouse (747 R Street)
- United Grocers Inc. Warehouse & Distribution Center (801 R Street)
- Thomas R. Meux Home (1007 R Street)
- Collins Home (1107 R Street)
- C. W. Harlow Home (1913) 986 N. Roosevelt Avenue)
- Aten Home (1133 S Street)
- Central Packaging Supply Company (1920) 2534 San Benito Street)
- Romain Home (1905) 2055 San Joaquin Street)
- First Congregational Church (11 N. San Pablo Avenue)
- Woolfolk Home (267 N. San Pablo Avenue)
- C. Jarman Home (385 N. Pablo Avenue)
- Spencer Home (395 N. San Pablo Avenue)
- W. H. Spencer Home (401-403 N. San Pablo Avenue)
- Vincent Home (921 N. San Pablo Avenue)
- Schmidt Home (1908) 2320 Santa Clara Street)
- Santa Fe Hotel (1913) 935 Santa Fe Avenue)
- Martin Home (1002 T Street)
- Gundelfinger Home (1020 T Street)
- Goodman Home (1060 T Street)
- Anderson Home (1120 T Street)
- Van Valkenburgh Home (1125 T Street)
- Albert C. Wilke Home (532 E. Terrace Avenue)
- C. J. Ryland Home (573 E. Terrace Avenue)
- St. Genevieve's Catholic Church (1127 Tulare Street)
- Southern Pacific Depot (1713 Tulare Street)

4. Risk Assessment

- Southern Pacific Lines Pullman Shed (1713 Tulare Street)
- T. W. Patterson Building (2014 Tulare Street)
- Rowell Building (2100 Tulare Street)
- Fresno County Hall of Records (2281 Tulare Street)
- U.S. Post Office (2309 Tulare Street)
- Maubridge Apartments (2344 Tulare Street)
- Santa Fe Depot (2650 Tulare Street)
- F. K. Prescott Home (2983 Tulare Street)
- Theodore Roosevelt High School (4250 E. Tulare Street)
- Emmanuel Lutheran Church (1115 U Street)
- Gerlitz Home (121 North U Street)
- Frank L. Smith Home (245 North U Street)
- Fresno City College Old Administration Building (1101 E. University Avenue)
- Fresno City College Library (1122 E. University Avenue)
- Roessler Home (4881 E. University Avenue)
- Van Ness Gate Entrance (2208 S. Van Ness Avenue)
- Judy Tobacco Building (155 Van Ness Avenue)
- Bekins Van and Storage (301 Van Ness Avenue)
- Elia Home (634/640 Van Ness Avenue)
- James Phelan Building (700 Van Ness Avenue)
- Pilibos Building (830 Van Ness Avenue)
- Hotel California (851 Van Ness Avenue)
- Kern Kay Hotel (906-912 Van Ness Avenue)
- Liberty Theater (944 Van Ness Avenue)
- Fresno Bee Building (1545 Van Ness Avenue)
- Sadler Office Supply Company (1717 Van Ness Avenue)
- Adam Baird Home (136 N. Van Ness Avenue)
- Barkalew Home (153 N. Van Ness Avenue)
- McAlpine Home (171 N. Van Ness Avenue)
- Eugene & Eleanor Risley Home (243 N. Van Ness Avenue)
- John Fairweather Home (248 N. Van Ness Avenue)
- W. D. Coates Home (264 N. Van Ness Avenue)
- Fathy Home (844 N. Van Ness Avenue)
- Maracci Home (985 N. Van Ness Avenue)

4. Risk Assessment

- Porteous Home (1095 N. Van Ness Avenue)
- Russ Clements Service Station (2740 N. Van Ness Avenue)
- Holy Trinity Armenian Apostolic Church (2226 Ventura Street)
- J. B. Inderrieden Co. Packing Plant (2721 Ventura Street)
- Frank Chance Field Site (Southwest corner of Cedar Avenue and Ventura Street)
- Owen Home (1902) 2631 E. Washington Avenue)
- Floyd W. Cowan Home (642 E. Weldon Avenue)
- W. P. Stanton Home (650 E. Weldon Avenue)
- Nystrom Home (725 N. Wilson Avenue)
- A. Emory & Cora Wishon Home (1287 N. Wilson Avenue)
- Roessler Winery (1893) 1902 N. Winery Avenue)
- Tower Theatre (1201 N. Wishon Avenue)
- William & Helen Sutherland Home (1460 N. Wishon Avenue)
- Alice & John Williams Home (1525 N. Wishon Avenue)
- Herbert C. Gundelfinger Home (1919) 1038 E. Yale Avenue)
- Thomas Cowan Home (153 N. Yosemite Avenue)
- John Humiston Home (229 N. Yosemite Avenue)
- Christian L. Samuelson Home (232 N. Yosemite Avenue)
- Cobb Home (271 N. Yosemite Avenue)
- Wilbur F. & Edna Marie Chandler Home (520 N. Yosemite Avenue)
- Homer A. Allen Home (548 N. Yosemite Avenue)

A 1988 publication from the state's Office of Historical Preservation identified 16 "ethnic historic sites" in Fresno County. Five Views: An Ethnic Historic Site Survey for California was originally conceived to broaden the spectrum of ethnic community participation in historic preservation activities and to provide better information on ethnic history and associated sites. The 16 sites are as follows:

- Burr Ranch/Smith Brothers Ranch (Black American)
- Fowler City Park (Black American)
- Gabriel Moore Ranch (Black American)
- Young's Place (Black American)
- First Mexican Baptist Church (Mexican American)
- Fresno Buddhist Church (Japanese American)
- Fresno Nihonmachi (Japanese American)
- H. Sumida Company (Japanese American)
- Iseki Labor Camp (Japanese American)

4. Risk Assessment

- Kamikawa Brothers (Japanese American)
- Nihin Byoin-Hashiba Sanitarium (Japanese American)
- Okonogi Hospital Site (Japanese American)
- Reedley Kyogi-Kai Hall (Japanese American)
- Bowles (Japanese American)
- Selma Japanese Mission Church (Japanese American)
- KGST (Mexican American)

The Fresno County General Plan Background Report also identifies 13 museums in Fresno County, most of which are in the City of Fresno. They are all privately owned and operated nonprofit organizations.

- African American Historical And Cultural Museum Of The San Joaquin Valley, Fresno
- Armenian Heritage Museum, Fresno
- Arte Americas, Fresno
- Clovis Museum, Clovis
- Community Heritage Center, Fresno
- Downing Planetarium, Fresno
- Forestiere Underground Gardens, Fresno
- Fresno Art Museum, Fresno
- Fresno County Historical Museum, Fresno
- Fresno Historical Society, Fresno
- Kearney Mansion Museum, Fresno
- Meux Home Museum, Fresno
- Reedley City Museum, Reedley
- Sanger Depot Museum, Sanger
- Veterans Memorial Museum Inc, Fresno
- William Saroyan House-Museum, Fresno

It should be noted that these lists may not be complete, as they may not include those properties currently in the nomination process and not yet listed. Additionally, as defined by the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, if the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by CEQA and NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

NATURAL RESOURCES

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as stores and reduces the force of floodwaters.

CENTRAL COAST RANGE REGION

Only a small portion of the far western edge of Fresno County lies in the central Coast Range region. This area supports a mosaic of summer dry grassland, blue oak and blue oak-foothill pine woodland, and chaparral habitat types. Western Fresno County transitions from the grasslands and agriculture of the Central Valley to the inner coast region. Mostly intermittent streams flow from the inner Coast Range to the valley floor. Some can support riparian habitat that provides additional value to both resident and migratory wildlife.

SAN JOAQUIN VALLEY FLOOR REGION

More than 50 percent of Fresno County lies in the southern San Joaquin Valley subregion of the Central Valley. This southern subregion is generally hotter and drier than the subregion to the north and supports some desert elements. The valley floor region has undergone extensive conversion of native habitats that existed before European settlement of the state. Presently, this region supports extensive amounts of agriculture and urban development around the Fresno, Clovis, and Sanger areas.

In the few remaining areas not converted to urban or agriculture use, unique biological features persist. Mixed in with areas of grassland habitat are freshwater and alkaline vernal pools that support unique native flora and fauna. A few small, isolated areas of sodic vernal pools occur in the northwestern part of the County, primarily at the Kerman reserve. Concentrations of freshwater vernal pools occur in a belt along the northeast edge of the valley floor region north of the Kings River. In the highly modified Central Valley, vernal pool areas are often grazed but remain a unique biological relic of native California species in the natural landscape.

The rivers and streams that flow from the mountains in the east historically meandered through broad floodplain. Because of urbanization and agriculture, these broad floodplains have been restricted to narrower belts along the rivers and streams or otherwise modified for flood control. In the upper San Joaquin River, the floodplains are naturally constrained by high bluffs bordering the river. Within this modified landscape, the remaining riparian habitat provides corridors and linkages to and from the biotic regions of the County and is of great value to resident and migratory wildlife. The San Joaquin and Kings River systems and the Fresno Slough are the major waterways in the County. The biotic regions are identified in **Figure 62. Fresno County Biotic Regions**.

CENTRAL SOUTHERN SIERRA NEVADA FOOTHILLS

Fresno County includes a portion of the central and southern subregions of the Sierra Nevada Mountains that can be further divided into a central/southern Sierra Nevada foothill and central/southern high Sierra Nevada district. The foothill district is best differentiated from the high Sierra and the San Joaquin Valley areas by habitat types that change with topography. The foothills

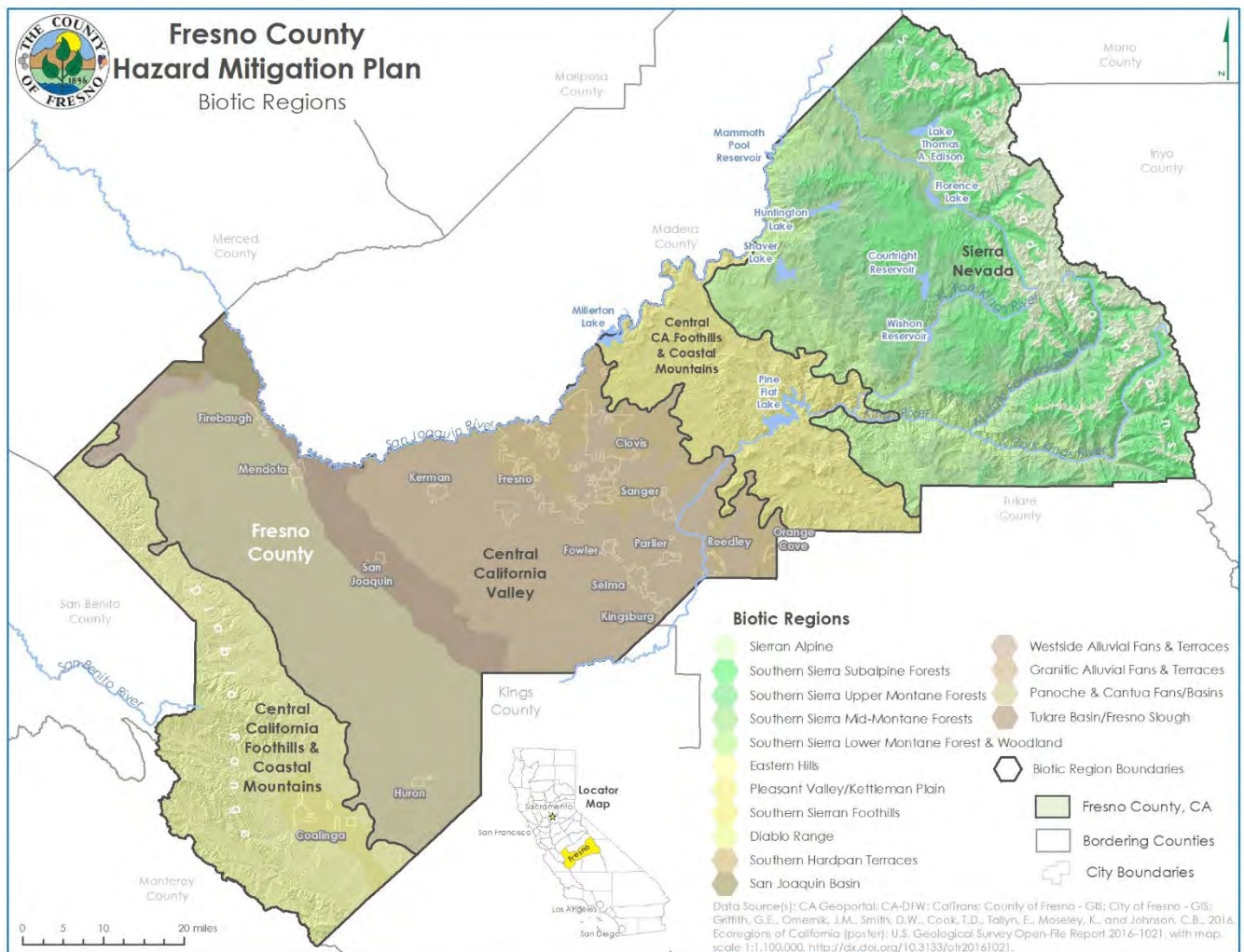
4. Risk Assessment

that are the transition from the valley floor to the high Sierra can be characterized by blue oak and blue oak-foothill pine woodlands and chaparral habitats dotted with areas of serpentine soils. Density and canopy coverage of tree species is highly variable depending on natural conditions such as soils, topography, slope and aspect, and human influences from grazing, hardwood harvesting, and other land clearing activities. Moderate gradient perennial and intermittent streams and rivers support a varied amount of riparian habitat that provide valuable habitat for wildlife.

CENTRAL/SOUTHERN HIGH SIERRA NEVADA

The transition from the foothills to the high Sierra Nevada can be characterized by the addition of ponderosa pine at low elevations into the dominant plant species composition (from around 2,000 feet). The foothills to high Sierra biotic regions make a transition through a mixed hardwood conifer habitat to those habitats dominated by conifers, such as ponderosa pine, white fir, and giant sequoia. In the higher elevations, Jeffrey pine, lodgepole pine, and treeless alpine communities dominate. Rivers and streams are at a higher gradient than their foothill or valley floor reaches and support a montane riparian habitat that, like the others, provides valuable habitat for resident and migratory wildlife. The majority of the high Sierra region in Fresno County is included in the Sequoia and Sierra National Forests and Kings Canyon National Park and managed by their respective federal agencies for recreational, timber, tourism, and wilderness values.

Figure 62. Fresno County Biotic Regions



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno-GIS; City of Fresno-GIS; Griffith, G.E., Omernik, J.M., Smith D.D., Tallyn, E., Moseley, K., and Johnson, C.B., 2016, *Ecoregions of California* (poster): U.S. Geological Survey Open-File Report 2016-2021

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Each region hosts specific habitats that together support a wide variety of vegetation and wildlife (**Table 93. Fresno County's Generalized Biotic Regions and Habitat Mosaic**), and each region has different susceptibilities to hazards such as wildfire, flood, and drought. Fresno County recognizes the importance of protecting, preserving, conserving, and restoring this biodiversity.

Table 93. Fresno County's Generalized Biotic Regions and Habitat Mosaic

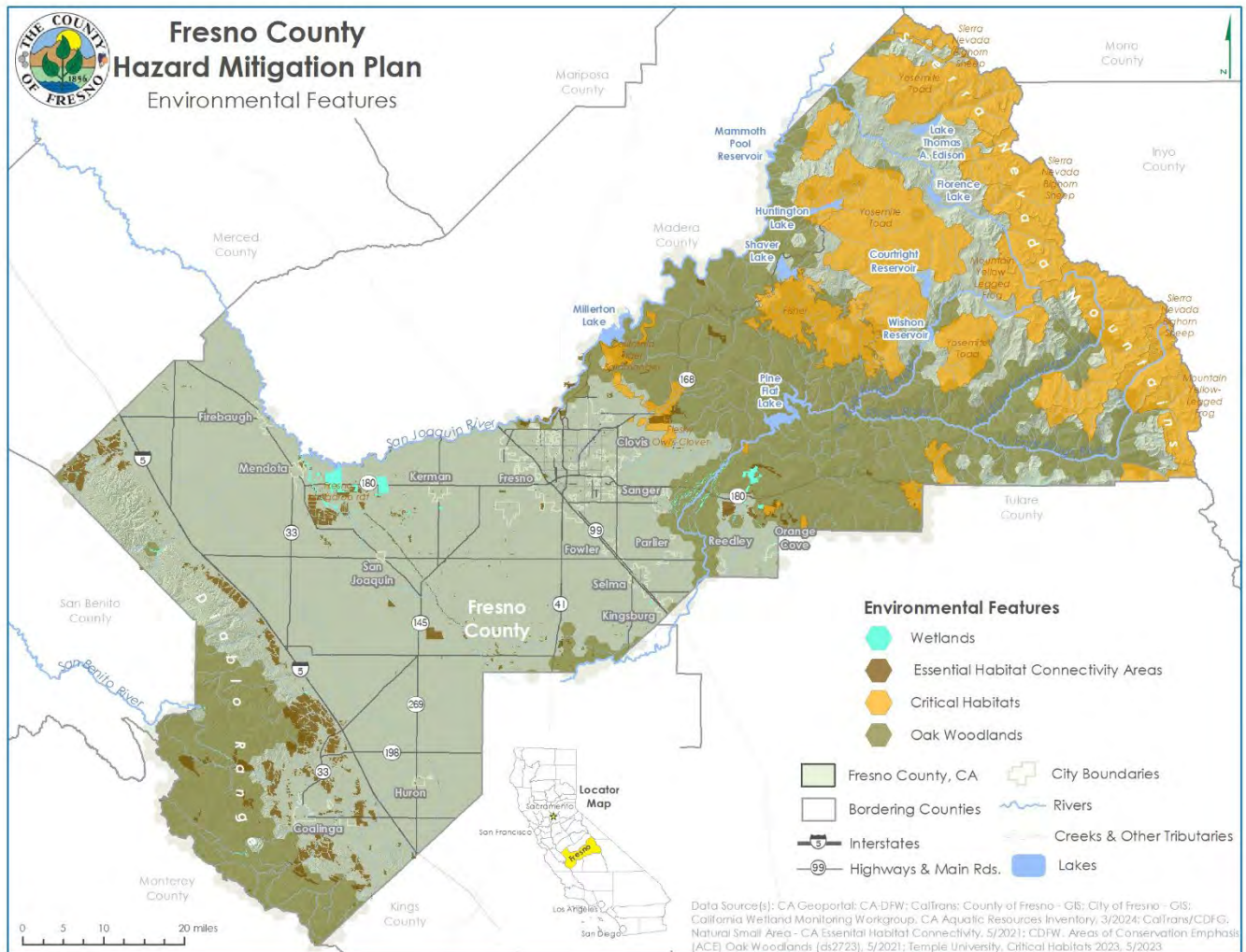
Central Western California Region	Great Central Valley	Sierra Nevada Foothills	High Sierra Nevada
<ul style="list-style-type: none">• Chaparral• Blue Oak-Foothill Pine Woodland• Annual/Ruderal Grassland• Riparian Woodlands• Oak Woodlands• Juniper Woodland• Desert and Alkali Scrub	<ul style="list-style-type: none">• Grasslands• Marshes• Vernal Pools• Alkali Scrubs• Riparian Woodlands• Eucalyptus Forest	<ul style="list-style-type: none">• Grassland• Chaparral• Serpentine Chaparral• Blue Oak Woodlands• Blue Oak-Foothill Pine Woodlands• Riparian Woodlands• Hardwood Stands• Juniper Woodland	<ul style="list-style-type: none">• Montane Conifer and Hardwood Forest• Montane Riparian Woodlands• Montane Chaparral• Alpine Scrub• Hardwood Stands• Aspen Stands• Conifer Forests

Source: Fresno County General Plan, 2024

Approximately one third of the County lies within land under federal jurisdiction. The USDA Forest Service and National Parks Service manage these lands for recreation, biology, wilderness, tourism, timber, and mining under federal guidelines, policies, and laws. The biotic regions that are outside of federal ownership and, therefore, most subject to development are the Central Coast Range, San Joaquin Valley Floor, and the lower Sierra Nevada foothills.

For purposes of this plan, natural resources include special-status species, sensitive habitats, wetlands, and other natural resources identified by the HMPC. **Figure 63. Fresno County Environmental Features** illustrates Fresno County’s environmental features.

Figure 63. Fresno County Environmental Features



Source: CA Geoportal; CA-DFW; Caltrans; County of Fresno – GIS; City of Fresno – GIS; California Wetland Monitoring Workgroup; CA Aquatic Resources Inventory, 3/2024; Caltrans/CDFG, Natural Small Area – CA Essential Habitat Connectivity, 5/2021; CDFW, Areas of Conservation Emphasis (ACE) Oak Woodlands, 5/2021; Temple University, Critical Habitats 2023, 5/2023

SPECIAL-STATUS SPECIES

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the planning area. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

Information from the U.S. Fish and Wildlife Service and the California Natural Diversity Data Base, a program that inventories the status and locations of rare plants and animals in California, was combined to create an inventory of special-status species in Fresno County. The full inventory, along with information about habitat requirements and distribution where available from the Fresno County General Plan Background Report, is available in Appendix B: Special-Status Species in Fresno County.

Table 94. Endangered, Threatened, Rare, and Candidate Species in Fresno County lists national and state endangered, threatened, rare, and candidate species in Fresno County by species type.

Table 94. Endangered, Threatened, Rare, and Candidate Species in Fresno County

Common Name	Scientific Name	Federal Status	California Status
Amphibians			
California tiger salamander	Ambystoma californiense	Threatened	Threatened
Yosemite toad	Anaxyrus canorus	Threatened	None
foothill yellow-legged frog	Rana boylei	None	Endangered
California red-legged frog	Rana draytonii	Threatened	None
southern mountain yellow-legged frog	Rana muscosa	Endangered	Endangered
Sierra Nevada yellow-legged frog	Rana sierrae	Endangered	Threatened
Birds			
tricolored blackbird	Agelaius tricolor	None	Threatened
Swainson's hawk	Buteo swainsoni	None	Threatened
western yellow-billed cuckoo	Coccyzus americanus occidentalis	Threatened	Endangered
willow flycatcher	Empidonax traillii	None	Endangered
bald eagle	Haliaeetus leucocephalus	Delisted	Endangered
bank swallow	Riparia	None	Threatened
great gray owl	Strix nebulosa	None	Endangered
least Bell's vireo	Vireo bellii pusillus	Endangered	Endangered
Fish			
Lahontan cutthroat trout	Oncorhynchus clarkii henshawi	Threatened	None

4. Risk Assessment

Common Name	Scientific Name	Federal Status	California Status
Paiute cutthroat trout	Oncorhynchus clarkii seleniris	Threatened	None
steelhead - Central Valley DPS	Oncorhynchus mykiss irideus	Threatened	None
Invertebrates			
Crotch bumble bee	Bombus crotchii	None	Candidate
western bumble bee	Bombus occidentalis	None	Candidate
longhorn fairy shrimp	Branchinecta longiantenna	Threatened	None
vernal pool fairy shrimp	Branchinecta lynchi	Threatened	None
valley elderberry longhorn beetle	Desmocerus californicus dimorphus	Threatened	None
vernal pool tadpole shrimp	Lepidurus packardii	Endangered	None
Mammals			
Nelson's antelope squirrel	Ammospermophilus nelsoni	None	Threatened
giant kangaroo rat	Dipodomys ingens	Endangered	Endangered
Fresno kangaroo rat	Dipodomys nitratoideus exilis	Endangered	Endangered
California wolverine	Gulo	None	Threatened
Sierra Nevada bighorn sheep	Ovis canadensis sierra	Endangered	Endangered
fisher – Southern Sierra Nevada ESU	Pekania pennant	Candidate	Threatened
San Joaquin kit fox	Vulpes macrotis mutica	Endangered	Threatened
Sierra Nevada red fox	Vulpes necator	Proposed Listing	Threatened
Plants			
Mariposa pussypaws	Calyptridium pulchellum	Threatened	None
San Benito evening-primrose	Camissonia benitensis	Threatened	None
Tompkins' sedge	Carex tompkinsii	None	Rare
tree-anemone	Carpenteria californica		Threatened
succulent owl's-clover	Castilleja campestris var. succulenta	Threatened	Endangered
California jewelflower	Caulanthus californicus	Endangered	Endangered
palmate-bracted salty bird's-beak	Chloropyron palmatum	Endangered	Endangered
Hoover's eriastrum	Eriastrum hooveri	Delisted	None
Tracy's eriastrum	Eriastrum tracyi	None	Rare
Boggs Lake hedge-hyssop	Gratiola heterosepala	None	Endangered
Congdon's lewisia	Lewisia congdonii	None	Rare
San Joaquin woollythread	Monolopia congdonii	Endangered	None

4. Risk Assessment

Common Name	Scientific Name	Federal Status	California Status
San Joaquin Valley Orcutt grass	<i>Orcuttia inaequalis</i>	Threatened	Endangered
Hartweg's golden sunburst	<i>Pseudobahia bahiifolia</i>	Threatened	Endangered
San Joaquin adobe sunburst	<i>Pseudobahia peirsonii</i>	Endangered	None
Keck's checkerbloom	<i>Sidalcea keckii</i>	Endangered	None
Greene's tuctoria	<i>Tuctoria greenei</i>	Endangered	Rare
Reptiles			
blunt-nosed leopard lizard	<i>Gambelia sila</i>	Endangered	Endangered
giant garter snake	<i>Thamnophis gigas</i>	Threatened	Threatened

Sources: Fresno County General Plan 2024

SENSITIVE HABITATS

The California Department of Fish and Game Natural Diversity Data Base identifies 12 sensitive habitat types in Fresno County:

- Big tree forest
- Coastal and valley freshwater marsh
- Great valley mesquite scrub
- Great valley mixed riparian forest
- Monvero residual dunes
- Northern basalt flow vernal pool
- Northern claypan vernal pool
- Northern hardpan vernal pool
- Northern vernal pool
- Sycamore alluvial woodland
- Valley needlegrass grassland
- Valley sink scrub

WETLANDS

Wetlands are habitats in which soil is intermittently or permanently saturated or inundated. Wetland habitats vary from rivers to seasonal ponding of alkaline flats and include swamps, bogs, marshes, vernal pools, and riparian woodlands. Wetlands are waters of the United States and are subject to the jurisdiction of the U.S. Army Corps of Engineers as well as the California Department of Fish and Game (CDF&G). Where the waters provide habitat for federally endangered species, the U.S. Fish and Wildlife Service may also have authority.

4. Risk Assessment

Wetlands are a valuable natural resource for communities due to their benefits to water quality, wildlife protection, recreation, and education and play an important role in hazard mitigation. Wetlands provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation are vital and reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water.

Notable categories of wetlands found in Fresno County include wet meadows in the mountainous region, vernal pools in the foothills, marshes in the valley trough, and reclaimed agricultural lands in western Fresno County. The CDF&G manages several of the major identified wetlands in Fresno County, including the Mendota Wildlife Management Area, Kerman Ecological Reserve, Alkali Sink Ecological Reserve, and smaller wetlands management units along the San Joaquin River. While these lands are currently being adequately protected, environmental concern is primarily focused on wetlands that are not yet identified and protection of remaining vernal pools. Several vernal pool complexes are located near Friant between Friant Road and the Friant-Kern Canal and in the area south of Academy and east of Red Mountain. A large concentration of very high-quality vernal pools is found in these areas, and they are some of the best examples of vernal pools in the state. The County's vernal pools are threatened by urban development and conversion to intensive agriculture.

OTHER NATURAL RESOURCES

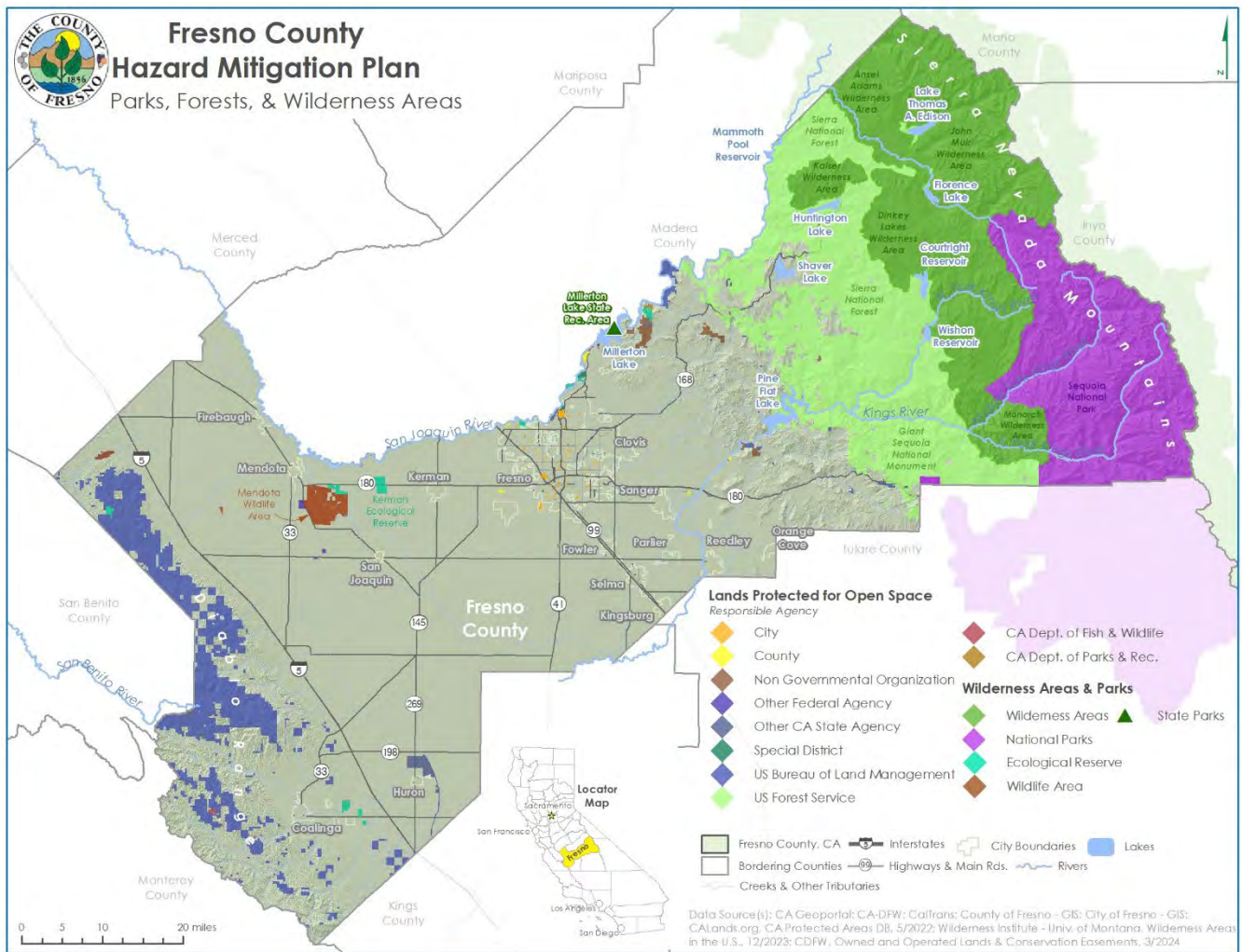
While some of these resources are not owned or managed by the County, they are important assets for the County (**Figure 64. Fresno County Parks, Forests, and Wilderness Areas**).

- Kings Canyon National Park
- Sequoia National Park & Forest
- Sierra National Forest
- Avocado Lake Park - 3625 N. Piedra Rd. Piedra, CA 93649
- China Creek Park – Sanger, CA 93657
- Choinumni Park - 26501 Pine Flat Road Piedra, CA 93649
- County Cemetery / Potter's Field - 242 N. Hughes Avenue Fresno, CA 93706
- Courthouse Park - 1100 Van Ness Avenue Fresno, CA 93721
- Kearney Park - 6725 W. Kearney Blvd. Fresno, CA 93706
- Kings River Green Belt Park - 769 N Piedra Rd, Sanger, CA 93657
- Laton-Kingston Park - 20055 S. Fowler Ave., Laton, CA 93242
- Los Gatos Creek Park - 46240 Los Gatos Creek Rd. Coalinga, CA 93210
- Lost Lake Recreation Area - 16385 N. Friant Road. Friant, CA 93626
- Pine Flat Handicap Fishing Access
- Shaver Lake Launch Ramp - 45795 Tollhouse Road Shaver Lake, CA 93664
- Skaggs Bridge Park - 5901 N. Madera Avenue Kerman, CA 93630
- Thorburn Access Park - CA-180 & N Rio Vista Ave, Sanger, CA 93657

4. Risk Assessment

- Three Rocks Fishing Access
- Veteran's Liberty Cemetery - 1831 W. Belmont Ave. Fresno, CA 93728
- Winton Park - 25314 E Trimmer Springs Road, Sanger, CA 93657

Figure 64. Fresno County Parks, Forests, and Wilderness Areas



Source: CA Geoportal; CA-DFW; County of Fresno – GIS; City of Fresno – GIS; CALands.org, CA Protected Areas DB, 5/2022; Wilderness Institute – University of Montana, Wilderness Areas in the U.S., 12/2023; CDFW, Owned and Operated Lands & Conservation Easements, 3/2024

GROWTH AND DEVELOPMENT TRENDS

As part of the planning process, the HMPC looked at changes in growth and development, both past and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability. According to the Fresno County General Plan, Fresno County is investing in efforts to facilitate the creation of higher paying jobs to account for a high population growth. More specific information on growth and development for each participating jurisdiction can be found in the jurisdictional annexes.

CURRENT STATUS AND PAST DEVELOPMENT

The 2022 estimated population of Fresno County was 1,015,190. This was an increase of 8.9 percent from the 2010 census population of 932,450. In terms of population, Fresno County is the 5th most populous county by populations. The following tables show past growth in Fresno County in terms of population, housing units, and density.

Table 95. Fresno County Population Change by Decade

	1960	1970	1980	1990	2000	2010	2022
Total	365,945	415,599	517,717	672,302	801,288	932,011	1,015,190
Change	--	49,654	102,118	154,585	128,986	130,723	83,179
Percent Change (%)	--	13.5	24.6	29.9	19.2	16.3	8.9

Sources: Social Science Data Analysis Network, www.censusscope.org/; California Department of Finance, www.dof.ca.gov/Research/

Table 96. Fresno County Population Change by Jurisdiction

City	Population 2010	Population 2022	% Change	# Change	% of County	% of Total Growth
Clovis	95,631	124,556	30.25%	28,925	12.27%	30.06%
Coalinga	13,380	17,024	27.23%	3,644	1.68%	3.79%
Firebaugh	7,549	8,418	11.51%	869	0.83%	0.90%
Fowler	5,570	7,154	28.44%	1,584	0.70%	1.65%
Fresno	494,665	545,567	10.29%	50,902	53.74%	52.90%
Huron	6,754	6,240	-7.61%	-514	0.61%	-0.53%
Kerman	13,544	16,208	19.67%	2,664	1.60%	2.77%
Kingsburg	11,382	12,613	10.82%	1,231	1.24%	1.28%
Mendota	11,014	12,618	14.56%	1,604	1.24%	1.67%
Orange Cove	9,078	9,525	4.92%	447	0.94%	0.46%
Parlier	14,494	14,554	0.41%	60	1.43%	0.06%
Reedley	24,194	25,441	5.15%	1,247	2.51%	1.30%
San Joaquin	4,001	4,021	0.50%	20	0.40%	0.02%
Sanger	24,270	26,600	9.60%	2,330	2.62%	2.42%

4. Risk Assessment

City	Population 2010	Population 2022	% Change	# Change	% of County	% of Total Growth
Selma	23,219	24,430	5.22%	1,211	2.41%	1.26%
All Cities	758,745	854,969	12.68%	96,224	84.22%	100.00%
Unincorporated	171,705	160,221	6.69%	-11,484	15.78%	-11.93%
County Totals	930,450	1,015,190	9.11%	87,740	100%	100%

Source: US Census Bureau. <http://factfinder.census.gov/> *Estimate based on 2020 Census

Table 97. Fresno County Housing Units Change by Jurisdiction

Jurisdiction	Housing Units 2010	Housing Units 2020	%Change	#Change	% of County	% of Total Growth
Clovis	35,306	43,954	24.49	8,648	37.75	33.67
Coalinga	4,344	4,658	7.23	314	1.37	1.22
Firebaugh	2,096	2,225	6.15	129	0.56	0.50
Fowler	1,842	2,133	15.80	291	1.27	1.13
Fresno	171,288	184,226	7.55	12,938	56.47	50.38
Huron	1,602	1,610	0.50	8	0.03	0.03
Kerman	3,908	4,512	15.46	15.46	2.64	2.35
Kingsburg	4,069	4,415	8.50	8.50	1.51	1.35
Mendota	2,556	2,875	12.48	319	1.39	1.24
Orange Cove	2,231	2,481	11.21	250	1.09	0.97
Parlier	3,494	3,853	10.27	359	1.57	1.40
Reedley	6,867	7,247	5.53	380	1.66	1.48
San Joaquin	934	937	0.32	3	0.01	0.01
Sanger	7,104	7,787	9.61	683	2.98	2.66
Selma	6,813	7,224	6.03	411	1.79	1.60
All Cities	254,454	280,137	10.09	25,683	100	--
Unincorporated	61,077	58,304	-4.54	-2,773	---	--
County Totals	315,531	338,441	7.26	22,910	100	--

Source: US Census Bureau. <https://factfinder.census.gov/>

Table 98. Fresno County Population and Housing Density Change by Jurisdiction

City	Area in Square Miles	2010 Population Density	2010 Housing Unit Density	2020 Population Density*	2020 Housing Unit Density*
Clovis	25.42	4,108.2	1389	4,726.5	1729
Coalinga	6.85	2,186.7	634	2,569.7	680
Firebaugh	3.52	2,180.4	595	2,302.0	632
Fowler	2.53	2,200.3	728	2,646.1	843

4. Risk Assessment

City	Area in Square Miles	2010 Population Density	2010 Housing Unit Density	2020 Population Density*	2020 Housing Unit Density*
Fresno	115.18	4,418.4	1487	4,706.8	1599
Huron	1.60	4,245.0	1001	3,878.8	1006
Kerman	3.27	4,189.9	1195	4,903.4	1380
Kingsburg	3.72	4,024.3	1094	3,330.6	1187
Mendota	3.39	3,359.6	754	3,712.1	848
Orange Cove	1.79	4,748.6	1246	5,384.5	1386
Parlier	2.14	6,606.9	1633	6,050.6	1800
Reedley	5.51	4,759.2	1246	4,579.2	1315
San Joaquin	1.1	3,637.3	849	3,655.5	852
Sanger	5.77	4,393.7	1231	4,615.4	1350
Selma	5.81	4,520.6	1173	4,248.3	1243
All Cities	162.18	4,678.7	1,569	5,274.7	1726
Unincorporated	5796.20	29.6	11	27.6	10
County Totals	5958.38	156.2	52.96	169.3	56.8

Source: US Census Bureau. <http://factfinder.census.gov/>

FUTURE DEVELOPMENT

As indicated in the previous section, Fresno County has been steadily growing over the last four decades, and this growth is projected to continue through the middle of the century. **Table 99. Population Projections for Fresno County** shows the population projections for the County as a whole through 2060.

Table 99. Population Projections for Fresno County

	2020	2030	2040	2050	2060
Population	1,007,344	1,047,382	1,083,901	1,098,206	1,095,205
Percent Change %	--	3.97%	3.49%	1.32%	0.27%

Source: California Department of Finance, www.dof.ca.gov/Research/

Table 100. Detailed Population Projections for Fresno County shows the population projections for each jurisdiction and the unincorporated area through 2050.

Table 100. Detailed Population Projections for Fresno County

City	2019	2020	2025	2030	2035	2040	2045	2050
Clovis	134,210	134,780	141,700	147,760	153,420	158,370	162,660	166,160
Coalinga	13,530	13,690	14,570	15,210	15,800	16,320	16,770	17,140

4. Risk Assessment

City	2019	2020	2025	2030	2035	2040	2045	2050
Firebaugh	7,720	7,720	8,790	9,200	9,580	9,920	10,210	10,450
Fowler	6,380	6,580	6,930	7,200	7,460	7,680	7,870	8,030
Fresno	592,350	596,060	621,540	647,980	672,650	694,240	712,960	728,200
Huron	5,700	5,700	5,930	6,200	6,460	6,680	6,880	7,030
Kerman	14,220	14,290	15,660	16,340	16,980	17,540	18,020	18,420
Kingsburg	13,350	13,410	14,360	14,960	15,510	15,990	16,410	16,750
Mendota	11,170	11,220	11,830	12,330	12,790	13,200	13,560	13,850
Orange Cove	9,170	9,170	9,660	10,070	10,450	10,780	11,070	11,310
Parlier	14,040	14,140	14,740	15,380	15,980	16,500	16,950	17,320
Reedley	25,170	25,170	26,100	27,240	28,300	29,230	30,040	30,700
Sanger	28,660	28,770	30,090	31,370	32,560	33,600	34,510	35,240
San Joaquin	3,500	3,500	3,610	3,750	3,880	3,990	4,090	4,170
Selma	26,960	27,000	29,130	30,360	31,510	32,520	33,390	34,100
Subtotal Cities	906,130	911,200	954,640	995,350	1,033,330	1,066,560	1,095,390	1,118,870

Source: Fresno County Council of Governments, 2020

FUTURE DEVELOPMENT SUMMARY

According to the projections all areas of the County will continue to grow, but the percentage of growth will decrease over time, through 2050. The Fresno County General Plan assumes that 92.6 percent of the population growth experienced in Fresno County through the year 2020 will be directed to incorporated cities and 7 percent will be absorbed in the unincorporated area. Fresno County recognizes, however, that because of state-mandated directives, including the Regional Housing Needs Allocation, the County may be forced to consider approval of urban development in areas that are not currently planned for such uses. Careful consideration and Board policy direction will be necessary if Fresno County needs to designate new areas for urban development. The Land Resources Inventory verifies that there is no shortage of potentially developable land in Fresno County. Consistent with the County's urban development policy, intensive housing development will be directed to residentially zoned urban areas and established communities where infrastructure and services are available. This policy reflects the commitment to conserve natural and managed resources and to minimize the loss of valuable agriculture land and open space.

SOCIAL VULNERABILITY

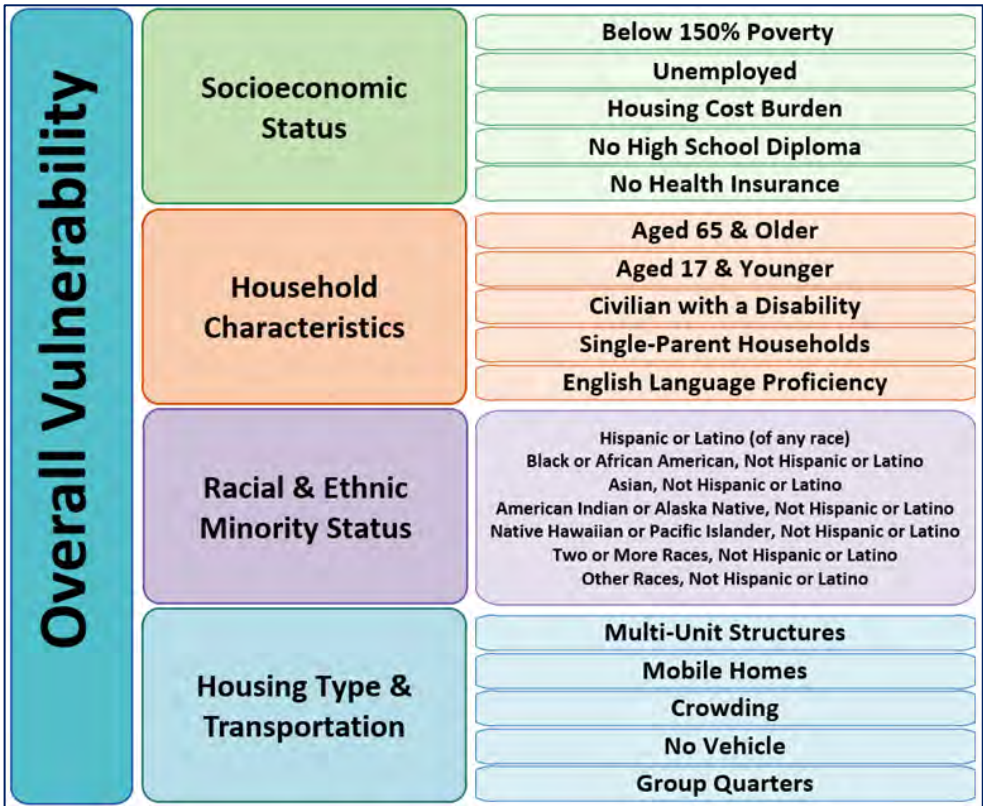
Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. For instance, the COVID-19 pandemic shed light on pre-existing disparities such as limited healthcare access, leading to higher rates of hospitalizations and mortality among vulnerable groups. It's essential to recognize and understand these community-specific limitations and barriers to ensure equitable preparedness, mitigation, and response strategies for future incidents.

4. Risk Assessment

To aid in this, the Centers for Disease Control and Prevention (CDC) developed the Social Vulnerability Index (SVI), a comprehensive tool designed for emergency management planners and practitioners at state, local, and tribal levels. The SVI helps identify communities with high social vulnerability, potentially facing greater impacts during emergencies and disasters. This tool is instrumental in guiding targeted efforts in preparedness, response, and recovery, and in understanding the unique challenges certain communities may face, such as evacuation difficulties due to lack of transportation.

The SVI utilizes 16 variables, including factors like education level, presence of disabilities, and access to transportation, to calculate a community’s vulnerability score. This score ranges from 0 to 1, where higher scores indicate increased vulnerability. The evaluation is percentile-based, with communities in the top 10% (above the 90th percentile) for a variable scoring a 1, denoting high vulnerability, and those in the bottom 10% scoring 0. Additionally, the SVI categorizes these 16 variables into four distinct themes, providing deeper insights into specific vulnerability aspects, shown in **Figure 65. CDC Social Vulnerability Index**. These themes and their constituent variables offer a nuanced understanding of a community’s resilience and ability to handle disasters, both in terms of human impact and financial consequences.

Figure 65. CDC Social Vulnerability Index



Source CDC

Fresno County has one of the highest Social Vulnerability Index in the state of California at .9649, which is very high. These factors of social vulnerability hold many implications for disaster response and recovery and are important considerations when identifying and prioritizing mitigation actions and overall goals and objectives of the plan. **Table 101. Measures of Fresno County's Social**

4. Risk Assessment

Vulnerability describes how disasters can disproportionately impact communities that identify with the SVI indicators and SVI themes described above.

Table 101. Measures of Fresno County's Social Vulnerability

SVI Themes	Inequities in Disasters ¹
Socioeconomic Status	Economically disadvantaged populations are disproportionately affected by disasters. The poor are less likely to have the income or assets needed to prepare for a possible disaster or to recover after a disaster. Although the monetary value of their property may be less than that of other households, it likely represents a larger proportion of total household assets. For these households, lost property is proportionately more expensive to replace, especially without homeowner's or renter's insurance. Moreover, unemployed persons do not have employee benefits plans that provide income and health cost assistance in the event of personal injury or death. High-income populations, on the other hand, may suffer higher household losses in absolute terms, yet find their overall position mitigated by insurance policies, financial investments, and stable employment.
Household Characteristics	Household composition is defined here to include dependent children less than 18 years of age, persons aged 65 years and older, and single-parent households. Also included are people with disabilities. People in any of these categories are more likely to require financial support, transportation, medical care, or assistance with ordinary daily activities during disasters. Children and elders are the most vulnerable groups in disaster events. Children, especially in the youngest age groups, cannot protect themselves during a disaster because they lack the necessary resources, knowledge, or life experiences to effectively cope with the situation. Perhaps because parental responsibility for children is assumed, children are rarely incorporated into disaster-scenario exercises. Thus, local authorities are not adequately prepared to provide specific goods or services for children. Elders living alone and people of any age having physical, sensory, or cognitive challenges are also likely to be more vulnerable to disasters. Many older or disabled people have special needs that require the assistance of others. Family members or neighbors who would ordinarily look in on an elder, or a caretaker responsible for the welfare of a disabled person, might be less able to do so during a crisis or may find the magnitude of the task beyond their capability. The number of traditional households of two parents and children has decreased in the United States. In addition to the usually lower socioeconomic status of single-parent households, such households are especially vulnerable in a disaster because all daily caretaker responsibility falls to the one parent.
Racial & Ethnic Minority Status	The social and economic marginalization and discrimination of certain racial and ethnic groups, including real estate discrimination, has rendered these populations more vulnerable at all stages of disaster. African Americans; Native Americans; and populations of Asian, Pacific Islander, or Hispanic origin are correlated with higher vulnerability rates. In recent decades, the numbers of persons immigrating to the United States from Latin America and Asia have substantially increased. Many immigrants are not fluent in English, and literacy rates for some groups are lower. Communities that have limited English proficiency, disaster communication is made increasingly difficult. This difficulty is especially true in communities whose first language is neither English nor Spanish and for whom translators and accurate translations of advisories may be scarce. Immigrants are likelier to rely on relatives and local social networks (i.e., friends and neighbors) for information.
Housing Type & Transportation	Housing quality is an important factor in evaluating disaster vulnerability. It is closely tied to personal wealth; that is, people in poverty often live in more poorly constructed houses or mobile homes that are especially vulnerable to natural hazards such as strong storms or earthquakes. Mobile homes are not designed to withstand severe weather or flooding, high wind, and typically do not have basements. They are frequently found outside of metropolitan areas and, therefore, may not be readily accessible by interstate highways

¹ A Social Vulnerability Index for Disaster Management (cdc.gov)

https://www.atsdr.cdc.gov/placeandhealth/svi/img/pdf/Flanagan_2011_SVIforDisasterManagement-508.pdf

4. Risk Assessment

SVI Themes	Inequities in Disasters ¹
	<p>or public transportation. Also, because mobile homes are often clustered in communities, their overall vulnerability is increased. Multi-unit housing in densely populated urban areas also poses a heightened risk for tenants. Population densities of cities are much higher than those of suburban or rural areas. People living in high-rise apartments are particularly vulnerable to overcrowding when funneled into a limited number of exit stairwells. Furthermore, large numbers of people exiting in the street can make safe and orderly evacuation of everyone difficult and dangerous. Crowding within housing units exacerbates these difficulties. Rates of automobile ownership are generally lower in urban areas, especially among inner city poor populations. Thus, transportation out of an evacuation zone is difficult for people who do not have access to a vehicle. For some people, fuel costs may prevent vehicle use. At the same time, lower urban auto-ownership rates do not necessarily translate into easy evacuation for people with vehicles because the high-population densities of cities can cause severe traffic congestion on interstate highways and other major roads. Populations residing in group quarters such as college dormitories, farm workers' dormitories, psychiatric institutions, and prisons also present special concerns during evacuation. Residents of nursing homes and long-term care facilities are especially vulnerable because of their special and timely needs and because of understaffing in these institutions in emergencies. Moreover, many institutions can be unprepared to quickly remove their entire staff and residents under conditions that require specialized vehicles</p>

Source: CDC, SVI

Table 102. Fresno County Social Vulnerability Demographic Information by City

	Total Population 2022 Estimate [*]	Total Housing Units 2020	% Females	% Under Age 18	% Age 65 and Over	% Speak Language Other than English in Home ^{**}	% Individuals Below Poverty Level ^{**}	Median Value (\$), Single-Family Owner-Occupied
United States	333,271,411	143,786,655	50.4	21.7	17.3	21.7	11.5	281,900
California	39,040,616	14,627,460	49.9	21.8	15.8	43.9	12.2	659,300
Fresno County	1,015,190	345,493	49.7	27.6	12.9	44.1	18.6	338,200
Clovis	124,556	43,954	51.3	28.9	13.1	24.0	8.4	420,700
Coalinga	17,024	4,658	40.3	23.6	10.9	46.8	18.7	226,000
Firebaugh	8,418	2,225	49.9	35.0	12.6	80.0	43.3	221,000
Fowler	7,154	2,133	53.5	29.6	13.8	43.8	21.0	339,700
Fresno	545,567	184,226	50.1	27.8	11.9	43.2	22.1	321,800
Huron	6,240	1,610	48.9	34.1	2.9	89.5	32.1	234,500
Kerman	16,208	4,512	50.6	32.9	7.6	72.7	21.9	297,900
Kingsburg	12,613	4,415	53.3	25.9	17.4	19.6	9.6	335,300
Mendota	12,618	2,875	48.3	38.5	6.5	87.3	32.7	236,700
Orange Cove	9,525	2,481	48.3	37.8	6.1	84.1	46.5	208,000

4. Risk Assessment

	Total Population 2022 Estimate*	Total Housing Units 2020	% Females	% Under Age 18	% Age 65 and Over	% Speak Language Other than English in Home**	% Individuals Below Poverty Level**	Median Value (\$), Single-Family Owner-Occupied
Parlier	14,554	3,853	49.6	32.4	8.2	80.9	27.4	216,200
Reedley	25,441	7,247	51.0	30.3	10.3	62.5	16.0	268,900
San Joaquin	3,701	937	52.2	42.5	5.4	82.1	33.2	103,100
Sanger	26,600	7,787	47.4	29.2	10.7	52.0	15.9	325,200
Selma	24,430	7,224	48.5	26.8	11.6	51.3	21.2	251,300

Source: U.S. Census Bureau

The California Environmental Protection Agency developed a tool called CalEnviroScreen to identify communities most impacted by poverty and pollution. The Senate Bill 535 Disadvantaged Communities map identifies census tracts that have an overall CalEnviroScreen score of 75 or above, meaning they are among the top 25 percent most vulnerable and burdened by pollution in the state. In Fresno County, most of the western portion of the county's census tracts are identified as disadvantaged communities, shown in **Table 102. Fresno County Social Vulnerability Demographic Information by City.**

VULNERABILITY OF FRESNO COUNTY TO SPECIFIC HAZARDS

The Disaster Mitigation Act regulations require the HMPC to evaluate the risks associated with each of the hazards identified in the planning process. This section summarizes the possible impacts and quantifies, where data permits, the County's vulnerability to each of the hazards. Where specific hazards vary across the County vulnerability is broken out by jurisdiction where feasible; additional information can be found in the jurisdictional annexes. The hazards evaluated further as part of this vulnerability assessment include, in alphabetical order:

- Agricultural Hazards
- Avalanche
- Dam Failure
- Drought
 - Tree Mortality
- Earthquake
- Flood
 - Levee Failure

Human Health Hazards

- Pandemic
- West Nile Virus

Soil Hazards

- Erosion
- Expansive Soil
- Land Subsidence
- Landslide
- Volcano
- Wildfire

Severe Weather

- Extreme Temperatures
- Extreme Cold/Freeze
- Extreme Heat
- Fog
- Heavy Rain/Thunderstorm/Hail/Lightning
- Windstorm
- Winter Storm
- Tornado

4. Risk Assessment

Prioritizing hazards plays a crucial role in helping communities establish objectives and mitigation strategies based on their vulnerabilities. Fresno County employed the Risk Factor (RF) methodology, as described below, to assess and rank hazards according to their threat levels. This ranking underwent scrutiny and evaluation by the HMPC and all stakeholders during the Draft Plan Review phase.

The RF methodology generates numerical values that facilitate the comparison of identified hazards. These values reflect the relative risk posed by each hazard, with higher RF values indicating a greater level of hazard risk. RF values are determined by attributing varying degrees of risk to five categories for each hazard: probability, impact, spatial extent, warning time, and duration. Each degree of risk within these categories is assigned a value ranging from 1 to 4, accompanied by a corresponding weighting factor. The RF approach is summarized in the table below. To calculate the RF value for a particular hazard, one must multiply the assigned risk value for each category by its respective weighting factor. The summation of these values across all five categories yields the final RF value, as illustrated in **Table 103. Risk Factor Methodology**.

Table 103. Risk Factor Methodology

Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a	Negligible	Less than 1% of area affected	1	20%
	Small Moderate	Between 1% and 10.9% of area affected	2	

4. Risk Assessment

Risk Assessment Category	Degree of Risk			Weight Value
	Level	Criteria	Index	
hazard event? Are impacts localized or regional?	Large	Between 11% and 25% of area affected Greater than 25% of area affected	3 4	
Warning Time: Is there usually some lead-time associated with the hazard event? Have warning measures been implemented?	More than 24 hours 12 to 24 hours 6 to 12 hours Less than 6 hours	Self-Defined Self-Defined Self-Defined Self-Defined	Note: Levels of warning time and criteria that define them may be adjusted based on the hazard addressed. 1 2 3 4	10%
Duration: How long does the hazard event usually last?	Less than 6 hours Less than 24 hours Less than 1 week More than 1 week	Self-Defined Self-Defined Self-Defined Self-Defined	Note: Levels of warning time and criteria that define them may be adjusted based on the hazard addressed. 1 2 3 4	10%

A summary of the vulnerability of the County to each identified hazard is provided in each of the hazard-specific sections that follow. Vulnerability generally reflects the hazard significance rating which is also summarized in Section 4.1.1 Table 4.1. Vulnerability/Significance is measured in a summary of the potential impact based on past occurrences, spatial extent, likelihood of future occurrences and impacts (damage and casualty potential). It is categorized into the following classifications:

- **Low:** Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium:** Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. The potential damage is more isolated and less costly than a more widespread disaster.
- **High:** Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.

4. Risk Assessment

VULNERABILITY TO AVALANCHES (LOW)

PEOPLE

Although future avalanches are likely to occur, the spatial extent is limited, and the magnitude is low. Therefore, avalanches are a low significance hazard in the County. It is public safety that is most threatened by this hazard. Outdoor recreationalists who travel into backcountry areas are most at risk. Additionally, while road closures help to mitigate impacts to travelers in avalanche-prone areas, snowplow drivers can still be exposed while clearing roads of snow or avalanche debris.

PROPERTY

In general, structures located below an area at high risk to avalanches are likely to be exposed to the impacts of an avalanche, but no instances of this were known based on available data.

CRITICAL FACILITIES

There are not any known critical facilities likely to be exposed to the impacts of an avalanche.

NATURAL ENVIRONMENT

Avalanches can erode topsoil, cover the environment with debris, and damage surrounding vegetation. For the most part the environment is resilient and would be able to rebound from whatever damages occurred, though this process could take years.

FUTURE DEVELOPMENT

Avalanche vulnerability could increase somewhat with future development and population growth as there will be a higher number of people driving on roadways and taking part in backcountry recreation. It is unlikely that risk to structures will increase as long as future development is planned outside of mapped or suspected avalanche hazard zones. As such, the County holds a policy, Policy HS-A.4: Critical Emergency Response Facility Siting, to ensure that critical emergency response facilities such as hospitals, fire stations, sheriff's offices and substations, dispatch centers, emergency operations centers, and other emergency service facilities and utilities are sites and designed to minimize their exposure and susceptibility to hazards like fire and avalanche. Policy HS-D.12 ensure that new development is not located in avalanche hazard areas.

VULNERABILITY TO AGRICULTURAL HAZARDS (HIGH)

Given the importance of agriculture to Fresno County, agricultural hazards continue to be an ongoing concern. The primary causes of agricultural losses are severe weather events, such as drought and freeze, excessive rain, moisture, and humidity, and hail. According to the HMPC, agricultural losses occur on an annual basis throughout the County and are usually associated with these severe weather events. Recently, the COVID-19 caused massive interruptions to farms based on the spread of the virus, social distancing measures, and other non-pharmaceutical interventions. Farms lost millions of dollars due to disruptions in the whole supply chain system.

PEOPLE

The largest impact to people from a widespread crop loss is pressure on the food supply and distribution. Impacts to the local economy could be substantial as Fresno County is one of the top agricultural producing counties in California, exporting across the United States and internally. Agricultural jobs account for about 20 percent of all jobs in the Fresno area. Natural hazards causing losses to the agricultural industry will impact agricultural employment and cause secondary impacts to income, housing, and food security. Some animal diseases can be transmitted to people which could pose a public health concern as well. In the case of natural hazards and epidemics/pandemics, farmworkers can be exposed and be at risk for injury and death due to high heat events, poor air quality, and infectious diseases.

PROPERTY

The greatest impact to property from an agricultural hazard is crop damage and loss. In the latest Fresno County Agricultural Crop and Livestock Report, the total gross value of agricultural commodities in 2021 was over \$8 billion. Loss of livestock and poultry can also be significant. The economic value of total damaged or lost crops could range in the hundreds of millions of dollars.

NATURAL ENVIRONMENT

Agricultural hazards including fires, crops, and livestock disease, noxious weeds, and contamination of animal food and water supply can significantly alter the natural environment. Fresno County is particularly threatened by several insects that can cause severe economic and environmental harm to the agricultural industry. Noxious weeds can have negative effects on the natural environment including loss of wildlife habitat and reduced wildfire numbers, loss of native plant species, increased soil erosion and topsoil loss, and diminished water quality and fish habitat.

CRITICAL FACILITIES

Agricultural hazards would most likely not have an impact on critical facilities. However, mass mortality of animals could stress local rendering plants.

FUTURE DEVELOPMENT

Fresno County recognizes the importance of reducing the conversion of productive agricultural land, therefore the county has enacted policies to sustain agriculture and its activities to preserve and maintain productivity, while also controlling expansion of non-agricultural development onto productive agricultural lands. Details on the policies that Fresno County has adopted to protect agricultural lands are described in more detail within the Fresno County General Plan.

VULNERABILITY TO DAM FAILURE (HIGH)

A dam failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to dam failures is confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the dam itself and associated revenues that accompany those functions.

PEOPLE

Persons located underneath or downstream of a dam are at risk of a dam failure, though the level of risk can be tempered by topography, amount of water in the reservoir and time of day of the breach. Injuries and fatalities can occur from debris, bodily injury and drowning. Once the dam has breached, standing water presents all the same hazards to people as floodwater from other sources. People in the inundated area may need to be evacuated, cared for, provided temporary shelter, and possibly permanently relocated. Specific population impacts are noted in the following section.

PROPERTY

In general, communities located below a dam and along a waterway are potentially exposed to the impacts of a dam failure. Specific inundation maps and risk information are included in the dam-specific emergency action plans. Due to the sensitive nature of this information, it is not included in this plan. Inundation maps that identify anticipated flooded areas (which may not coincide with known floodplains) are produced for all high hazard dams and are contained in the Emergency Action Plan (EAP) required for each dam. However, the information contained in those plans is considered sensitive and is not widely distributed. For reference, high hazard dams threaten lives and property, significant hazard dams threaten property only.

The potential impacts from a dam failure in the County and its municipalities are largely dependent on the specific dam or area in question. Generally, any buildings or other infrastructure located in a dam inundation area is vulnerable to the impacts from rising waters.

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding causing overtopping of the structure. The primary danger associated with dam failure is the high velocity flooding of those properties downstream of the dam.

According to the Fresno County Operational Area Dam Failure Evacuation Plan, of the 23 dams with a potential to impact the planning area four of them pose the greatest threat should a failure occur, shown in **Table 104. Fresno County Population Threatened by Dams**: Big Dry, Fancher Creek, Friant, and Pine Flat. According to the plan, a catastrophic failure of any of these dams could have a significant impact on Fresno County. Some jurisdictions are more at risk to dam failure than others. The City of Clovis and the City of Fresno are the most vulnerable, with three and five high hazard dams respectively. Centerville, Firebaugh, Friant, and Sanger also have a high hazard dam located within their boundaries. The failure of any of these dams would cause downstream flooding and would likely result in loss of life and property. The potential magnitude of a dam failure depends on the time of year and the base flow of the river when the failure occurs. During the winter months, when the river flows are higher, the impact to the area would be much greater and evacuation times much less.

4. Risk Assessment

Table 104. Fresno County Population Threatened by Dams

Dam	Stream	Capacity (Acre-Feet)	Population Threatened
Balch Afterbay	North Fork Kings River	318	20
Balch Diversion	North Fork Kings River	1,295	20
Balsam Meadow	West Fork Balsam Creek	2,040	319
Big Creek No. 4	Big Creek	100	244
Big Creek No. 6	San Joaquin River	993	104
Big Creek No. 7	San Joaquin River	35,000	713
Big Dry 1017	Big Dry Creek/ Dog Creek	30,200	266,502
Courtright	Helms Creek	123,300	20
Crane Valley	North Fork Willow Creek	45,410	142
Fancher Creek	Fancher Creek & Hog Creek	9,600	134,775
Florence Lake	South Fork San Joaquin River	64,406	822
Friant	San Joaquin River	520,500	75,184
Giffen Reservoir	Tributary Holland Creek	900	98
Hume Lake	Ten Mile Creek	1,410	57
Huntington Lake	Big Creek	88,834	1,018
Little Panoche	Little Panoche Creek	5,580	459
Mammoth Pool	San Joaquin River	123,000	817
Pine Flat	Kings River	1,000,000	143,678
Redbank	Redbank Creek	1,100	947
Sequoia Lake	Mill Flat Creek	1,370	27
Shaver Lake	Stevenson Creek	135,283	863
Vermilion Valley	Mono Creek	125,000	822
Wishon	North Fork Kings River	118,000	20

Source: Fresno County Operational Area Dam Failure Evacuation Plan, 2003

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Based on the risk assessment, it is apparent that a major dam failure could have a devastating impact on the planning area. Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect crops and livestock as well as lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies.

NATURAL ENVIRONMENT

Dam failure effects on the environment would be similar to those caused by flooding from other causes. Water could erode stream channels and topsoil and cover the environment with debris. For the most part the environment is resilient and would be able to rebound from whatever damages occurred, though this process could take years.

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CRITICAL FACILITIES

A total dam failure can cause catastrophic impacts to areas downstream of the water body, including critical infrastructure. Any critical asset located under the dam in an inundation area would be susceptible to the impact of a dam failure. Of particular risk would be roads and bridges that could be vulnerable to washouts, further complicating response, and recovery by cutting off impacted areas. Risk to specific facilities is considered sensitive information but is detailed in the Fresno County Operational Area Dam Failure Evacuation Plan.

FUTURE DEVELOPMENT

Areas slated for future development should take into consideration potential impacts from dam failure risk upstream. Policy HS-C.20 states that the County shall consider dam failure inundation maps of all reservoirs in making land use and related decisions. In the case of a dam failure, inundation would likely follow some existing FEMA mapped floodplains, which contains development restrictions for areas in the 1 percent annual chance floodplain, but it could exceed those floodplains and affect areas that are not regulated for flood hazards. Also of note is that development below a low hazard dam could increase its hazard rating.

VULNERABILITY TO DROUGHT (HIGH)

Drought is a common hazard in the state of California. California has experienced significant dry periods. Drought is a gradual process, occurring slowly over a period. A drought is a period of drier-than-normal conditions that results in water-related problems. When rainfall is less than normal for several weeks, months, or years, the flow of streams and rivers declines, water levels in lakes and reservoirs fall, and the depth to water in wells increases. If dry weather persists and water-supply problems develop, the dry period can become a drought.

PEOPLE

The historical and potential impacts of drought on populations include agricultural sector job loss, secondary economic losses to local businesses and public recreational resources, increased cost to local and state government for large-scale water acquisition and delivery, and water rationing and water wells running dry for individuals and families. During 2021, many residents in the Fresno area owed over \$15 million on late water bills. More than 76,000 customers in the central San Joaquin Valley were behind on their bills. Systems serving population with higher rates of poverty and more people of color often have higher number of past-due accounts. For example, 96 percent of households in the majority-Latino town of Mendota are behind on their water bill compared to 6 percent in Clovis, which is predominately non-Latino and white.²

Drought can affect population health and can pose health implications. As drought is often accompanied by prolonged periods of extreme heat, negative health impacts such as dehydration can also occur, where children and elderly are most susceptible. Air quality often declines in times of drought which can affect those with respiratory ailments. Due to the long duration in which drought can form, health implications from drought can be seen both in the short-term and in the long-term such as:

- **Water Quality and Quantity**
 - Drought can reduce the water supply impacting not only households and businesses but especially disproportionately impacted communities. Water quality can be compromised due to increased salinity, increased algal production, less dilution, and reduced oxygen levels in the water system.
- **Food and Nutrition**
 - Drought can create dry conditions and impact the food quality, supply, and distribution to communities which can cause malnutrition.
- **Air Quality**
 - Drought increases the risk for wildfires and dust storms. Particulate matter from these poor air quality events and particulate matter can irritate the lungs and exacerbate chronic heart and lung conditions.
- **Sanitation and Hygiene**
 - Water shortage due to drought can impact available clean water for cleaning, sanitation, and hygiene which can reduce or control disease.
- **Recreational Risks**

² Residents in Fresno CA area owe \$15 million in water debt | Fresno Bee
<https://www.fresnobee.com/fresnoland/article249129100.html>

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- Individuals who engage with water-related recreational activities during drought can be at increased risk for waterborne disease caused by bacteria, protozoa, and other contaminants such as chemicals and heavy metals.
- **Infectious Disease**
 - Drought often creates drier conditions which can increase the risk of disease (i.e., Valley Fever)
- **Chronic Disease**
 - Drought can cause adverse health impacts for individuals with certain chronic health conditions such as asthma and some immune disorders.

The burden of drought impacts on communities varies depending on age, socioeconomic status, access to health care, and gender. ³ Especially water shortage as the cost of water will increase based on the lower supply and higher demand, which can be very difficult for low-income communities for example.

Regarding tree mortality, in particular, Fresno County's tree mortality risk and fallen tree occurrences has resulted in the closure of numerous roads most notably in parks, forest land, and outdoor recreation areas: In 2016, 20 to 30 campgrounds were closed as well as Kings Canyon National Park due to tree mortality risks to public safety. The risk is especially high between May and October, due to a dramatic influx of campers and other outdoor enthusiasts.

PROPERTY

The historical and potential impacts of drought on property include crop loss, injury and death of livestock and pets, and damage to infrastructure, homes and other buildings resulting from the secondary drought impact of land subsidence. As a related drought impact, tree mortality has resulted in potentially vulnerable critical infrastructure property as these trees become more susceptible to falling with time. The following tables show the results of analysis for tree mortality related to property exposure. In both the incorporated and unincorporated parts of the county, there are 6,657 structures, valued at close to \$360 million, with \$112 million in contents located within the Tier I tree mortality hazard area. Tier II tree mortality only effects the unincorporated parts of Fresno County, with 11,799 buildings and \$467 million in exposure.

Table 105. Fresno County Assets in Tier I Tree Mortality Hazard Areas

Jurisdiction	Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Coalinga	Unknown	20	11	\$0	\$0	\$0
Unincorporated	Agricultural	40	3	\$594,727	\$3,180,922	\$3,775,649
	Church	1	1	\$245,547	\$115,092	\$360,639
	Outlot & Common Area	6	7	\$0	\$762	\$762

³ Health Implications of Drought | CDC <https://www.cdc.gov/nceh/drought/implications.htm>

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Jurisdiction	Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
	Primary Use Not Designated	5,766	4,217	\$0	\$0	\$0
	Recreation	4	4	\$248,607	\$94,419	\$343,026
	Single-Family Residence	472	213	\$245,127,811	\$74,719,520	\$319,847,311
	Vacant	348	109	\$822,809	\$34,652,188	\$35,679,397
	Grand Total	6,657	4,560	\$247,039,501	\$112,762,903	\$360,006,804

Table 106. Fresno County Assets in Tier II Tree Mortality Hazard Areas

Jurisdiction	Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Unincorporated	Agricultural	394	232	\$12,244,091	\$20,801,500	\$33,051,391
	Apartments	1	2	\$15,767	\$68,235	\$84,092
	Church	3	6	\$842,791	\$212,837	\$1,055,628
	Commercial	5	3	\$2,172,891	\$698,766	\$2,871,657
	Industrial	3	0	\$0	\$1,193,862	\$1,193,862
	Office/ Professional Space	2	8	\$201,468	\$21,246	\$222,714
	Primary Use Not Designated	223	10,604	\$0	\$0	\$0
	Recreation	6	5	\$296,685	\$463,558	\$760,243
	Single-Family Residence	760	752	\$284,554,609	\$94,077,864	\$378,632,473
	Vacant	629	179	\$1,712,710	\$47,372,288	\$49,289,398
	Total	2,034	11,799	\$302,041,012	\$164,911,258	\$467,162,470

In addition to tree mortality hazards, several examples of agricultural impacts shape drought vulnerability and potential losses. Drought is linked to declines in crop yields, increasing costs, and decreasing crop profitability. Drought can result in regional losses of crops and can stress the statewide water supply. Crops such as rice, alfalfa, almonds, and pistachios are dependent on high depths of water and subsequently higher water intensity needs. Almonds and pistachios account for two of the top three most economically productive crops within Fresno County. According to Fresno County asset managers, recent drought led to a decrease in agricultural productivity in the county, as water scarcity has increased.⁴

In the 2021 crop year, California's farms, ranches and plant nurseries earned \$51.1 billion in cash receipts, representing a 3.6 percent increase over the prior year. However, due to supply chain

⁴ fcgpr_general-plan_prd-county_redline_2024-01-12_1.pdf (fresnocountyca.gov)

https://www.fresnocountyca.gov/files/sharedassets/county/v/1/public-works-and-planning/development-services/planning-and-land-use/general-plan-review-comments/fcgpr_general-plan_prd-county_redline_2024-01-12_1.pdf

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disruptions that have increased the cost of farm inputs, this gain in cash receipts does not necessarily equate to margins – they have been squeezed by higher costs.⁵

NATURAL ENVIRONMENT

The historical and potential impacts of drought on the natural environment are widespread throughout public and private lands within the County, including tree mortality, impacts to all flora and fauna, and destabilization (erosion, subsidence) of land along streams and rivers, and within watersheds.

One of the core issues shaping the long-term impacts of drought in Fresno County and throughout California is water supply and demand. Several factors play into the issue including groundwater basins, surface water run-off, public and agricultural demand, and surface water storage water sheds. In the State 2022 Annual Water Supply and Demand Assessment Summary Report, released November 2022, the Tulare Lake Hydrologic Region, which encompasses Fresno County, reported 78 percent of urban water suppliers reporting no shortages (21 suppliers), 22 percent shortage addressed fully by actions (6 supplies). However, 18 percent of urban water suppliers (6 suppliers) in the hydrologic region did not report their status. Overall, most of the hydraulic regions report no water shortages or are taking actions to address shortages, which is encouraging to reducing drought impacts to the region. In fact, this report was part of the first-year annual water shortage assessment reporting requirements to strive for successful water management planning and effect water shortage contingency planning in ensuring water supply reliability and drought resiliency.⁶

While the State of California struggled with water supply and demand due to a three-year drought (2020-2023), in the past year, drought conditions have alleviated across much of the state due to heavy precipitation from winter storms and atmospheric rivers. In order to continue to mitigate drought impacts, the state has committed more than 8.6 billion dollars in expanding water storage capacity, reducing water demand, improving forecasting, data, and water management, and developing new water supplies.⁷

CRITICAL FACILITIES

Drought impacts to critical facilities include water shortfalls for facility operations and critical functions, and potential structural destabilization and damage resulting from land subsidence. As a related drought impact, tree mortality has resulted in potentially vulnerable critical infrastructure as these trees become more susceptible to falling with time. The unincorporated county is the only area with critical facilities at risk to tree mortality. **Table 107. Critical Facilities within the Tree Mortality Tier I Summary** below summarizes the types of facilities at-risk while **Table 108. Critical Facilities within the Tree Mortality Tier I in the Unincorporated County** provides more details. In addition to the schools and fire stations in Tier I, there is one public works facility and two buildings of the Sheriff's Office located in the Tier II hazard areas shown in **Table 109. Critical Facilities within the Tree Mortality Tier II Summary**.

⁵ California Agriculture Statistics Review 2021-2022 https://www.cdfa.ca.gov/Statistics/PDFs/2022_Ag_Stats_Review.pdf

⁶ 2022 ANNUAL WATER SUPPLY AND DEMAND ASSESSMENT SUMMARY REPORT (ca.gov) https://water.ca.gov/-/media/DWR-Website/Web-Pages/Programs/Water-Use-And-Efficiency/Urban-Water-Use-Efficiency/Annual-Water-Supply-and-Demand-Assessment/FINAL-DWR-2022-AWSDA-Report-to-SWB_11-22-22.pdf

⁷ California Continues Progress to Boost Water Supplies and Build Resilience Amid Extreme Weather | California Governor <https://www.gov.ca.gov/2023/10/16/california-continues-progress-to-boost-water-supplies-and-build-resilience-amid-extreme-weather/>

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Table 107. Critical Facilities within the Tree Mortality Tier I Summary

Jurisdiction	Facility Type	Counts
Unincorporated	Fire	8
	School	7
	Total	15

Table 108. Critical Facilities within the Tree Mortality Tier I in the Unincorporated County

Jurisdiction	Facility Type	Name
Unincorporated	Fire Station	Bald Mountain Volunteer Fire Department
	Fire Station	Big Creek Volunteer Fire Department
	Fire Station	Fresno County Fire Protection District - Shaver Lake
	Fire Station	Hume Lake Volunteer Fire and Rescue Company
	Fire Station	Huntington Lake Volunteer Fire Department
	Fire Station	Huntington Lake Volunteer Fire Department Station 2
	Fire Station	Pine Ridge Volunteer Fire Department
	Fire Station	Shaver Lake Volunteer Fire Department
	School	Big Creek Elementary
	School	Hammer Mountain School
	School	Hume Lake Charter
	School	Pine Ridge Elementary
	School	Pole Corral Elementary School

Table 109. Critical Facilities within the Tree Mortality Tier II Summary

Jurisdiction	Facility Type	Counts
Unincorporated	School	19
	Fire Station	13
	Department of Public Works	1
	Sheriff	2
	Total	35

FUTURE DEVELOPMENT

Because future development encompasses all forms of property, buildings, infrastructure, critical facilities and all related populations and their functions, drought impacts to future development align with the historical and potential impacts to populations, property, natural environment, and critical facilities discussed (above). Additionally, the Fresno County general plan outlines policies that encourage overall drought mitigation, adaptation, and resiliency to reduce risk to the community. Some policies include EJ-A.13 which states that landscaping for new industrial development shall use drought tolerant species with low biogenic emissions.

VULNERABILITY TO EARTHQUAKE (MEDIUM)

An earthquake occurs when two blocks of the earth suddenly slip past one another creating a vibration through the release of energy in the earth's crust. The vibrations that are generated are called "seismic waves". The surface where they slip is called the fault or fault plane. Earthquakes can result in ground shaking, soil liquefaction, landslides, fissures, avalanches, fires, and tsunamis. Additionally, earthquakes can cause buildings to collapse and cause heavy items to fall, resulting in injuries and property damage. Earthquakes can occur anywhere and at any time.

PEOPLE AND PROPERTY

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. The California Geological Survey and U.S. Geological Survey have done considerable work using GIS to identify populations in high seismic hazard zones in every California County.

Ground shaking is the primary earthquake hazard. Many factors affect the survivability of structures and systems from earthquake-caused ground motions. These factors include proximity to the fault, direction of rupture, epicentral location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. Ground motions become structurally damaging when average peak accelerations reach 10 to 15 percent of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity Scale is about VII (18-34 percent peak ground acceleration), which is considered to be very strong (general alarm; walls crack; plaster falls).

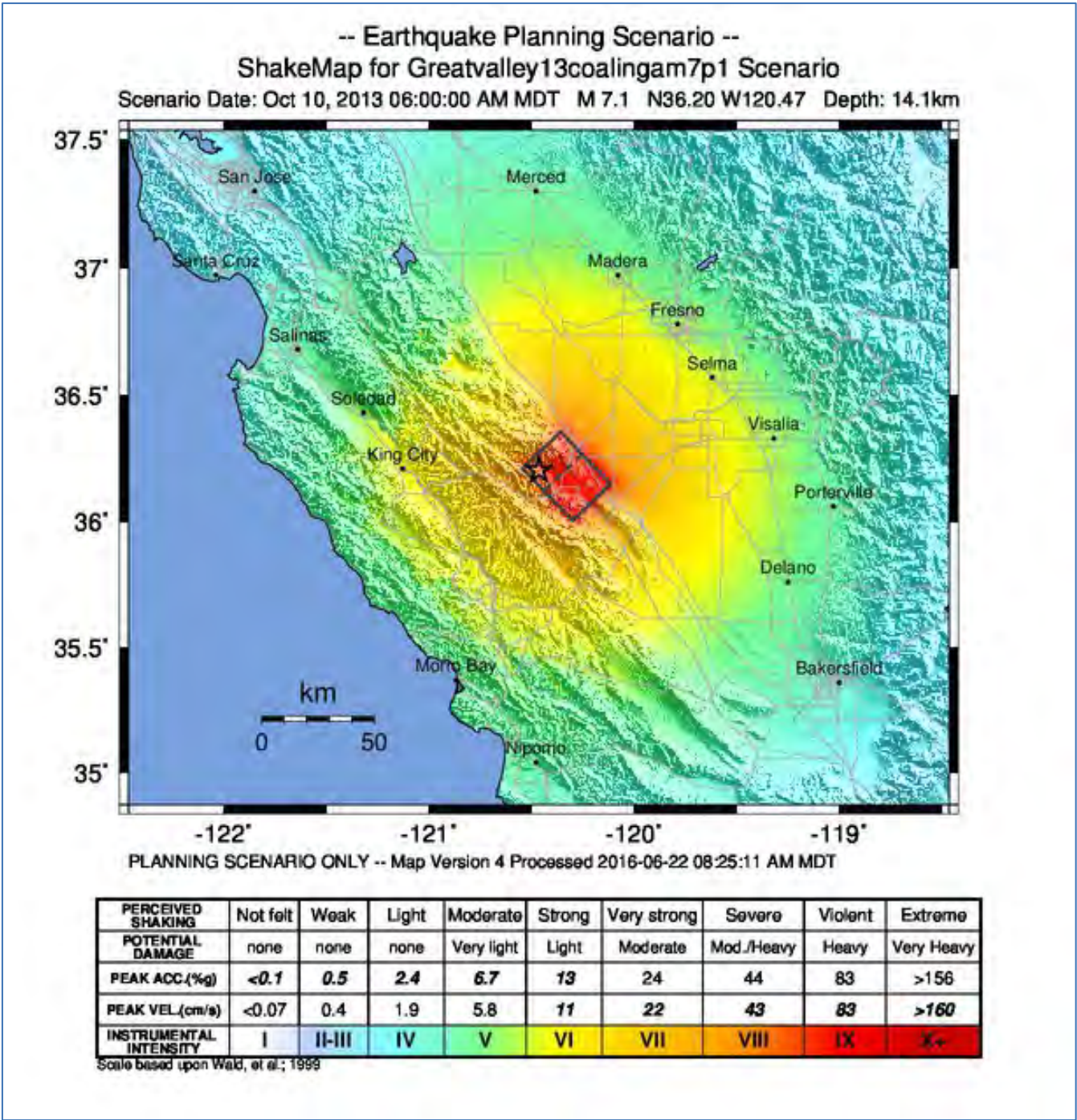
Fault rupture itself contributes very little to damage unless the structure or system element crosses the active fault. In general, newer construction is more earthquake resistant than older construction because of improved building codes and their enforcement. Manufactured housing is very susceptible to damage because rarely are their foundation systems braced for earthquake motions. Locally generated earthquake motions, even from very moderate events, tend to be more damaging to smaller buildings, especially those constructed of unreinforced masonry, as was seen in the Oroville, Coalinga, Santa Cruz, and Paso Robles earthquakes.

Common impacts from earthquakes include damage to infrastructure and buildings (e.g., crumbling of unreinforced masonry, failure of architectural facades, rupturing of underground utilities, and road closures). Earthquakes also frequently trigger secondary hazards, such as dam failures, landslides and rock falls, explosions, and fires that can become disasters themselves.

HAZUS

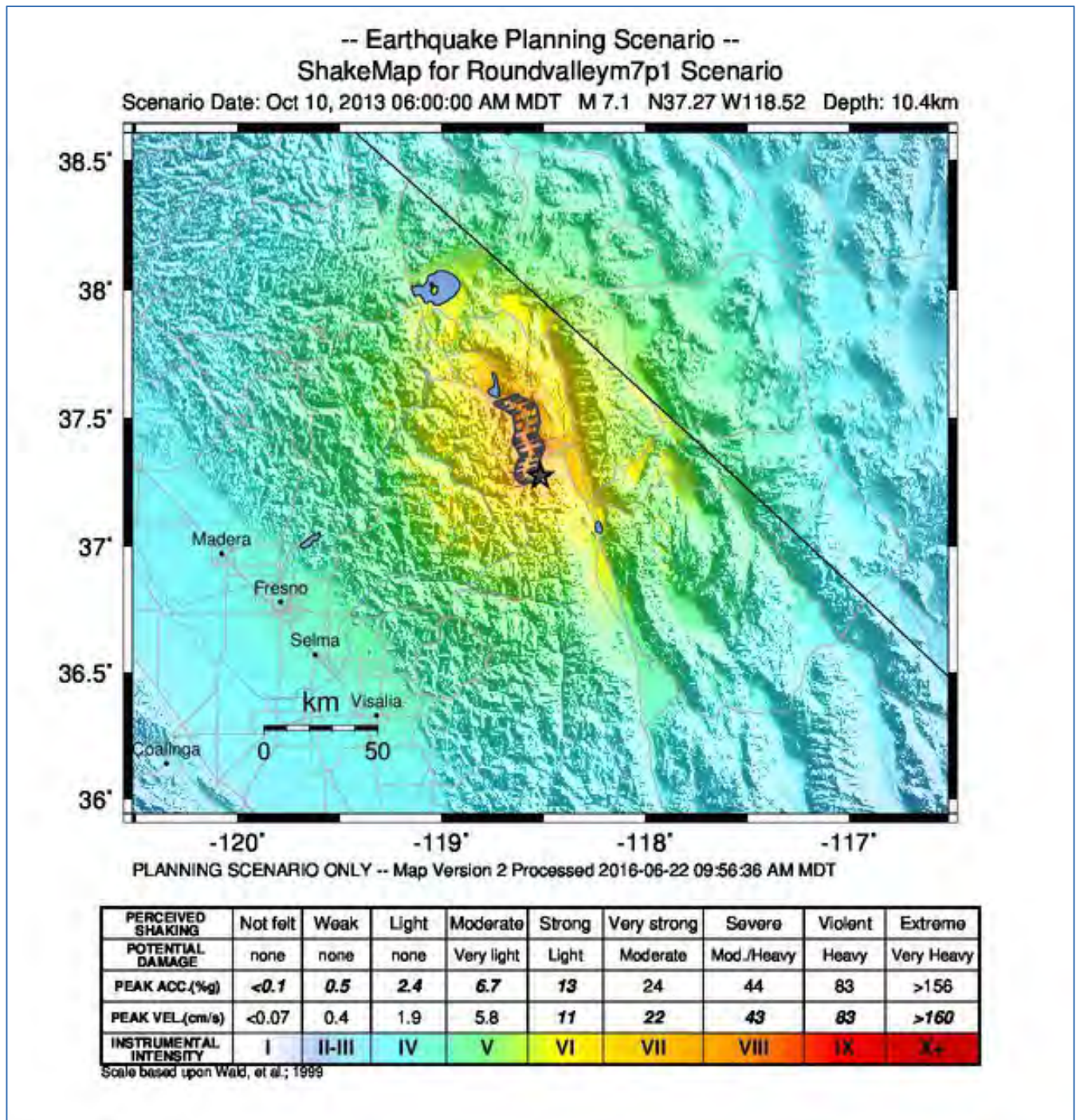
Earthquake losses will vary across the Fresno County planning area depending on the source and magnitude of the event. Three earthquake scenarios were used for the planning area. The three earthquake scenarios include The Great Valley M7.1, Round Valley M7.1, and White Mountain M7.4. The earthquake shake maps for each scenario are described in the maps below.

Figure 66. Shake Map for Great Valley Coalinga M7.1 Scenario



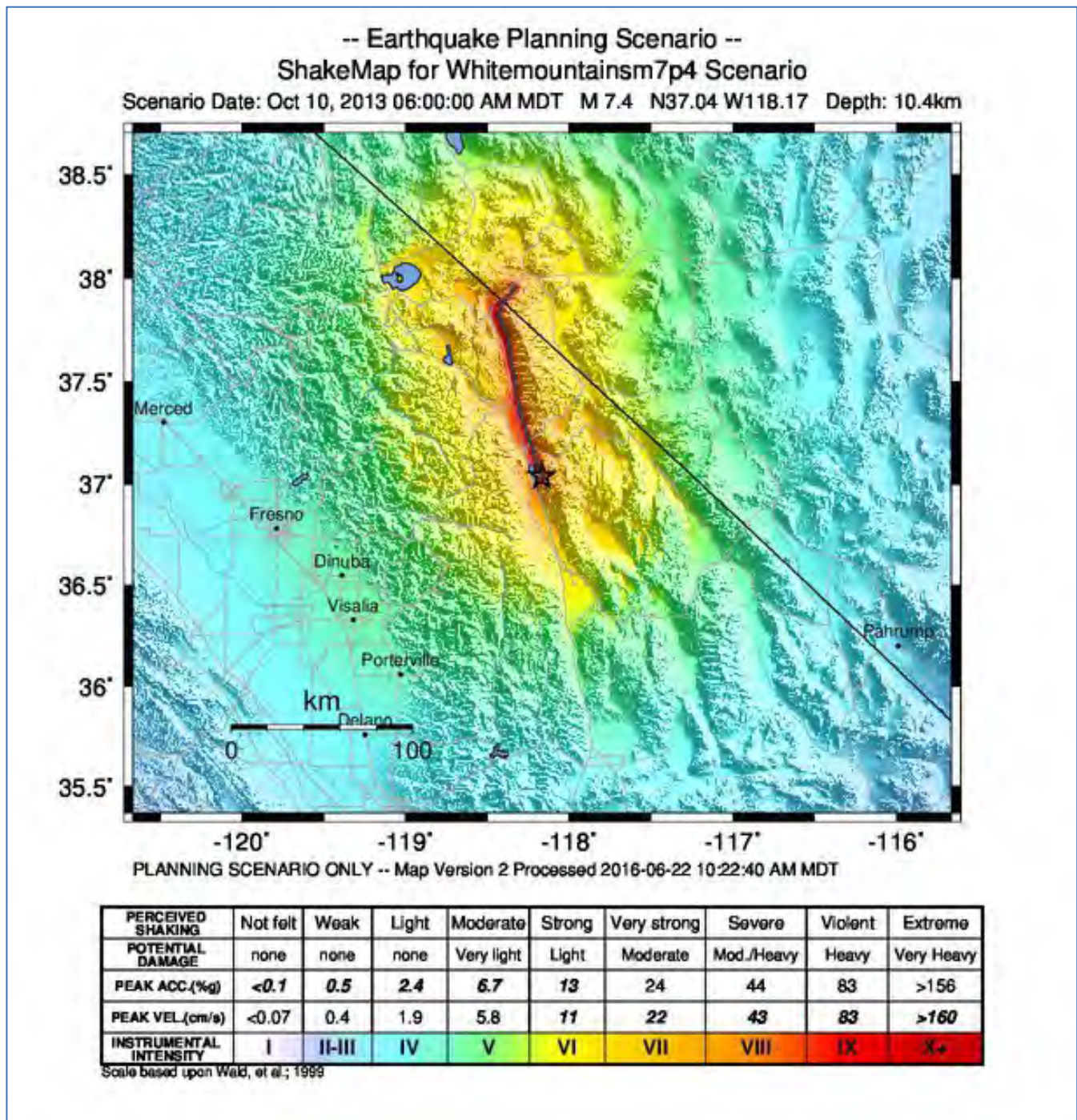
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Figure 67. Shake Map for Round Valley M7.1 Scenario



4. Risk Assessment

Figure 68. Shake Map for White Mountain M7.4 Scenario



4. Risk Assessment

The geographical size of the planning area is 6,013,58 square miles and contains 225 census tracts. There are over 319,000 households in the region which has a population of 1,008,654 people. There are an estimated 299 thousand buildings in the region with a total building replacement value (excluding contents) of \$160,304,000. Approximately 89 percent of the buildings (and 61 percent of the building value) are associated with residential housing. The replacement value of the transportation and utility lifeline systems are estimated to be \$12,169,000 and \$27,843,000.

Building Inventory

HAZUS estimates that there are 299,000 buildings in the region that have an aggregate replacement value of \$160,304,000. Regarding building construction types found in the region, wood frame construction makes up 86 percent of the building inventory. The remaining percentage is distributed between the other general building types.

Transportation and Utility Lifeline Inventory

There are seven transportation systems that include highways, railways, light rail, bus, ports, ferry, and airports, detailed in the tables below. There are six utility systems that include potable water, wastewater, natural gas, crude & refined oil, electric power and communications. The lifeline inventory data are provided in the table below. The total value of the lifeline inventory is over \$40,012,000. This inventory includes over 813.13 miles of highways, 897 bridges, 21.321.72 miles of pipes.

Table 110. Transportation System Lifeline Inventory

System	Component	Number of Locations & Segments	Replacement value (millions of dollars)
Highway	Bridges	897	2645.6197
	Segments	362	6637.6252
	Tunnels	0	0
	Subtotal		9283.2449
Railways	Bridges	96	546.2400
	Facilities	9	23.9670
	Segments	126	2128.1232
	Tunnels	0	0
	Subtotal		2698.3302
Light Rail	Bridges	0	0
	Facilities	0	0
	Segments	0	0
	Tunnels	0	0
	Subtotal		0
Bus	Facilities	1	2.1666
	Subtotal		2.1666
Ferry	Facilities	0	0
	Subtotal		0
Port	Facilities	0	0
	Subtotal		0
Airport	Facilities	8	118.3667

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System	Component	Number of Locations & Segments	Replacement value (millions of dollars)
	Runways	11	67.2396
		Subtotal	185.6063
		Total	12,169.3

Source: HAZUS

Table 111. Transportation System Lifeline Inventory

System	Component	Number of Locations & Segments	Replacement value (million of dollars)
Portable Water	Distribution Lines	N/A	424.2406
	Facilities	0	0
	Pipelines	0	0
		Subtotal	424.2406
Waste Water	Distribution Lines	N/A	254.5444
	Facilities	4	687.8072
	Pipelines	0	0
		Subtotal	942.3516
Natural Gas	Distribution Lines	N/A	169.6962
	Facilities	1	18.2016
	Pipelines	62	1321.0466
		Subtotal	1508.9444
Oil Systems	Facilities	1	0.1180
	Pipelines	0	0
		Subtotal	0.1180
Electrical Power	Facilities	60	24962.9942
		Subtotal	24962.9942
Communication	Facilities	42	4.9560
		Subtotal	4.9560
		Total	27,843.60

Source: HAZUS

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Great Valley (Coalinga) M7.1

The social impact from earthquakes can be catastrophic and wide ranging. HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodations in temporary public shelters. The model estimates 1 household to be displaced due to the earthquake. Of these zero people out of 1,008,654 will seek temporary shelter in public shelters. **Table 112. Casualty Estimates for the Great Valley (Coalinga) M7.1** describes the casualty estimates from the earthquake scenario based on different time periods and type of properties, spaces, or activities.

Table 112. Casualty Estimates for the Great Valley (Coalinga) M7.1

		Level 1	Level 2	Level 3	Level 4
2AM	Commercial	0.03	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.03	0.00	0.00	0.00
	Other-Residential	1.23	0.08	0.00	0.00
	Single Family	0.71	0.01	0.00	0.00
	Total	2	0	0	0
2PM	Commercial	1.85	0.12	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.64	0.04	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.23	0.02	0.00	0.00
	Other-Residential	0.38	0.03	0.00	0.00
	Single Family	0.20	0.00	0.00	0.00
	Total	3	0	0	0
5PM	Commercial	1.31	0.09	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.10	0.01	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.15	0.01	0.00	0.00
	Other-Residential	0.44	0.03	0.00	0.00
	Single Family	0.25	0.00	0.00	0.00
	Total	2	0	0	0

Source: HAZUS

The total economic loss estimated for the earthquake is \$233,340,000 which includes building and lifeline related losses based on the region's availability inventory. HAZUS estimates that about 3,007 buildings will be at least moderately damaged. This is over one percent of the buildings in the region. There are an estimated 99 buildings that will be damaged beyond repair. The tables below summarize

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the expected damage by general building type and estimated damage to utility and transportation systems.

Table 113. Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	2777.97	0.97	367.00	3.45	206.12	8.27	57.09	13.74	12.81	12.81
Commercial	19748.99	6.91	844.85	7.94	352.38	14.14	85.06	20.48	22.72	22.73
Education	568.78	0.20	21.95	0.21	8.50	0.34	2.22	0.53	0.56	0.56
Government	267.98	0.09	13.98	0.12	6.74	0.27	2.28	0.55	0.73	0.73
Industrial	4877.02	1.71	277.51	2.61	145.90	5.86	38.19	9.19	9.38	9.38
Religion	38195.11	13.36	1899.92	17.86	693.98	27.85	150.38	36.20	33.61	33.62
Residential	1418.90	0.50	59.83	0.56	21.70	0.87	5.12	1.23	1.45	1.45
Total	218123.08	76.27	7151.69	67.24	1056.45	42.40	75.05	18.07	18.71	18.72
Subtotal	285,978		10,636		2,492		415		100	

Source: HAZUS

Table 114. Expected Building Damage by Building Type (All Design Levels)

	None		Slight		Moderate		Extensive		Complete	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	247212.84	86.44	8473.68	79.67	1284.86	51.56	90.02	21.67	24.20	24.20
Steel	6868.73	2.40	419.18	3.94	251.32	10.09	74.07	17.83	19.47	19.47
Concrete	6646.89	2.32	308.27	2.90	114.0	4.58	33.36	8.14	9.76	9.76
Precast	5891.61	2.06	330.66	3.11	198.50	7.97	49.36	11.88	10.18	10.19
RM	10114.34	3.54	321.17	3.02	185.56	7.45	51.24	12.34	8.50	8.51
URM	2107.52	0.74	167.38	1.57	76.35	3.06	21.02	5.06	9.60	9.60
MH	7135.90	2.50	615.68	5.79	381.18	15.30	95.86	23.08	18.26	18.27
Total	285,978		10,636		2,492		415		100	

Source: HAZUS

RM: Reinforced Masonry

URM: Unreinforced Masonry

MH: Manufactured Housing

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Table 115. Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations and Segments	With at least Moderate Damage	With Complete Damage	With Functionality >50%	
					After Day 1	After Day 7
Highway	Segments	362	0	0	362	362
	Bridges	897	3	0	894	897
	Tunnels	0	0	0	0	0
Railways	Segments	126	0	0	126	126
	Bridges	96	0	0	96	96
	Tunnels	0	0	0	0	0
	Facilities	9	0	0	9	9
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	8	1	0	8	8
	Runways	11	0	0	11	11

Source: HAZUS

Table 116. Expected Utility System Facility Damage

System	Number of Location				
	Total Number	With at Least Moderate Damage	With Complete Damage	With Functionality >50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	4	0	0	4	4
Natural Gas	1	0	0	1	1
Oil Systems	1	0	0	1	1
Electrical Power	60	21	0	44	52
Communication	42	1	0	41	42

Source: HAZUS

4. Risk Assessment

Table 117. Expected utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	13,181	1436	359
Waste Water	7,908	721	180
Natural Gas	233	0	0
Oil	0	0	0

Source: HAZUS

Table 118. Expected Potable Water and Electric Power System Performance

	Total Number of households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	319,296	4,764	2,905	675	0	0
Electric Power		5,267	3,647	1,678	190	7

Source: HAZUS

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Round Valley M7.1

The social impact from earthquakes can be catastrophic and wide ranging. HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodation in temporary public shelters. The model estimates 1 household to be displaced due to the earthquake. Of these zero people out of 1,008,654 will seek temporary shelter in public shelters. **Table 119. Casualty Estimates** describes the casualty estimates from the earthquake scenario based on different time periods and type of properties, spaces, or activities.

Table 119. Casualty Estimates

		Level 1	Level 2	Level 3	Level 4
2AM	Commercial	0.03	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.03	0.00	0.00	0.00
	Other-Residential	1.23	0.08	0.00	0.00
	Single Family	0.71	0.01	0.00	0.00
	Total	2	0	0	0
2PM	Commercial	1.85	0.12	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.64	0.04	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.23	0.02	0.00	0.00
	Other-Residential	0.38	0.03	0.00	0.00
	Single Family	0.20	0.00	0.00	0.00
	Total	3	0	0	0
5PM	Commercial	1.31	0.09	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.10	0.01	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.15	0.01	0.00	0.00
	Other-Residential	0.44	0.03	0.00	0.00
	Single Family	0.25	0.00	0.00	0.00
	Total	2	0	0	0

Source: HAZUS

The total economic loss estimated for the earthquake is \$233,340,000 which includes building and lifeline related losses based on the region's available inventory. HAZUS estimates that about 127 buildings will be at least moderately damaged. This is over zero percent of the buildings in the region. There are an estimate zero buildings that will be damaged beyond repair. The tables below summaries the expected damage by general building type.

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Table 120. Expected Building Damage by Occupancy

Occupancy	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	3410.74	1.14	8.18	0.91	1.96	1.60	0.12	2.28	0.00	4.98
Commercial	20934.25	7.01	97.93	10.85	20.88	17.05	0.94	18.10	0.00	25.03
Education	599.79	0.20	1.88	0.21	0.33	0.27	0.01	0.17	0.00	0.23
Government	289.48	0.10	1.26	0.14	0.25	0.20	0.01	0.17	0.00	0.23
Industrial	5311.20	1.78	28.93	3.21	7.46	6.10	0.40	7.78	0.00	4.61
Religion	40611.40	13.60	275.56	30.54	82.41	67.31	3.62	69.84	0.01	57.63
Single Family	1498.27	0.50	7.24	0.80	1.43	1.17	0.06	1.19	0.00	7.39
Total	225935.90	75.67	481.35	53.35	7.72	6.30	0.02	0.46	0.00	0.00

Source: HAZUS

Table 121. Expected Building Damage by Building Type (All Design Levels)

Occupancy	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	256532.40	85.91	546.50	60.57	6.70	5.47	0.00	0.01	0.00	0.00
Steel	7585.10	2.54	37.45	4.15	9.82	8.02	0.40	7.72	0.00	2.27
Concrete	7073.90	2.37	33.72	3.74	5.02	4.10	0.10	1.97	0.00	0.11
Precast	6436.30	2.16	32.67	3.62	10.72	8.76	0.62	11.99	0.00	6.04
RM	10637.09	3.56	33.38	3.70	10.09	8.24	0.25	4.90	0.00	0.00
URM	2349.10	0.79	25.92	2.87	6.33	5.17	0.51	9.83	0.00	49.25
MH	7977.14	2.67	192.69	21.36	73.75	60.24	3.29	63.57	0.00	42.33
Total	298,591		902		122		5		0	

Source: HAZUS

RM: Reinforced Masonry

URM: Unreinforced Masonry

MH: Manufactured Housing

Table 122. Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations and Segments	With at least Moderate Damage	With Complete Damage	With Functionality >50%	
					After Day 1	After Day 7
Highway	Segments	362	0	0	362	362
	Bridges	897	0	0	897	897
	Tunnels	0	0	0	0	0
Railways	Segments	126	0	0	126	126

4. Risk Assessment

System	Component	Number of Locations				
		Locations and Segments	With at least Moderate Damage	With Complete Damage	With Functionality >50%	
					After Day 1	After Day 7
	Bridges	96	0	0	96	96
	Tunnels	0	0	0	0	0
	Facilities	9	0	0	9	9
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	8	0	0	8	8
	Runways	11	0	0	11	11

Source: HAZUS

Table 123. Expected Utility System Facility Damage

System	Number of Location				
	Total Number	With at Least Moderate Damage	With Complete Damage	With Functionality >50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0
Waste Water	4	0	0	4	4
Natural Gas	1	0	0	1	1
Oil Systems	1	0	0	1	1
Electrical Power	60	0	0	60	60
Communication	42	0	0	42	42

Source: HAZUS

Table 124. Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	13,181	17	4
Waste Water	7,908	9	2
Natural Gas	233	0	0
Oil	0	0	0

Source: HAZUS

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Table 125. Expected Potable Water and Electric Power System Performance

	Total Number of households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	319,296	0	0	0	0	0
Electric Power		0	0	0	0	0

Source: HAZUS

The total building-related losses were \$26,360,000 for the earthquake scenario and 16 percent of the estimated losses were related to the business interruption of the region. By far, the largest loss were sustained by the residential occupancies, which made up over 39 percent of the total loss. **Table 126. Building-Related Economic Loss Estimates** provides a summary of the losses associated with the building damage. The following tables describe other estimated losses.

Table 126. Building-Related Economic Loss Estimates

Category	Area	Single Family	Other Residential	Commercial	Industrial	Others	Total
Income Losses	Wage	0.00	0.0326	0.9021	0.0409	0.0946	1.0702
	Capital-Related	0.00	0.0138	0.8267	0.0243	0.0292	0.8940
	Rental	0.0454	0.1675	0.6026	0.0316	0.0294	0.8765
	Relocation	0.0540	0.2641	0.6660	0.1777	0.2453	1.4071
Subtotal		0.0994	0.4780	2.9974	0.2745	0.3985	4.2478
Capital Stock Losses	Structural	0.8561	0.6113	1.4114	0.5372	0.5331	3.9491
	Non-Structural	4.6481	2.5130	4.0524	1.2348	1.8442	14.3025
	Content	0.8333	0.3050	1.1546	0.6171	0.5534	3.4634
	Inventory	0.00	0.00	0.2172	0.1058	0.0757	0.3987
Subtotal		6.3375	3.493	6.8456	2.4949	3.0064	22.1137
Total		6.44	3.91	9.84	2.77	3.40	26.36

Source: HAZUS

Table 127. Transportation System Economic Losses

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Highway	Bridges	6637.6252	0.00	0.00
	Segments	2645.6197	0.0006	0.00
	Tunnels	0.00	0.00	0.00
	Subtotal	9283.2449	0.0006	
Railways	Segments	2128.1232	0.00	0.00
	Bridges	546.2400	0.00	0.00

4. Risk Assessment

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
	Tunnels	0.00	0.00	0.00
	Facilities	23.9670	0.0831	0.35
	Subtotal	2698.3302	0.0831	
Light Rail	Segments	0.00	0.00	0.00
	Bridges	0.00	0.00	0.00
	Tunnels	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00
	Subtotal	0.00	0.00	
Bus	Facilities	2.1666	0.0076	
	Subtotal	2.166	0.0076	
Ferry	Facilities	0.00	0.00	0.00
	Subtotal	0.00	0.00	
Port	Facilities	0.00	0.00	0.00
	Subtotal	0.00	0.00	
Airport	Facilities	118.3667	0.5499	0.46
	Runways	67.2396	0.00	0.00
	Subtotal	185.6063	0.5499	
	Total	12,169.35	0.64	

Source: HAZUS

Table 128. Utility System Economic Losses

System	Component	Inventory Value	Economic Loss	Loss Ratio (%)
Portable Water	Pipelines	0.00	0.00	0.00
	Facilities	0.00	0.00	0.00
	Distribution	424.2406	0.0778	0.02
	Subtotal	424.2406	0.0778	
Waste Water	Pipelines	0.00	0.00	0.00
	Facilities	18.2016	0.0004	0.00
	Distribution Lines	169.6962	0.0134	0.01
	Subtotal	1508.9444	0.0138	
Oil Systems	Pipelines	0.00	0.00	0.00
	Facilities	0.1180	0.00	0.00
	Subtotal	0.1180	0.00	
Electrical Power	Facilities	24962.9942	206.0104	0.83
	Subtotal	24962.9942	206.0104	
Communication	Facilities	4.9560	0.0039	0.08
	Subtotal	4.9560	0.0039	
	Total	27,843.60	206.34	

Source: HAZUS

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White Mountain M7.4

The social impact from earthquakes can be catastrophic and wide ranging. HAZUS estimates the number of households that are expected to be displaced from their homes due to the earthquake and the number of displaced people that will require accommodation in temporary public shelters. The model estimates 1 household to be displaced due to the earthquake. Of these zero people out of 1,008,654 will seek temporary shelter in public shelters. **Table 129. Transportation System Lifeline Inventory** describes the casualty estimates from the earthquake scenario based on different time periods and type of properties, spaces, or activities.

Table 129. Transportation System Lifeline Inventory

		Level 1	Level 2	Level 3	Level 4
2AM	Commercial	0.02	0.00	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.00	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.03	0.00	0.00	0.00
	Other-Residential	1.10	0.07	0.00	0.00
	Single Family	0.55	0.00	0.00	0.00
	Total	2	0	0	0
2PM	Commercial	1.60	0.11	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.52	0.03	0.00	0.00
	Hotels	0.00	0.00	0.00	0.00
	Industrial	0.19	0.01	0.00	0.00
	Other-Residential	0.34	0.02	0.00	0.00
	Single Family	0.16	0.00	0.00	0.00
	Total	3	0	0	0
5PM	Commercial	1.15	0.08	0.00	0.00
	Commuting	0.00	0.00	0.00	0.00
	Educational	0.08	0.00	0.00	0.00
	Hotels	0.00	0.00	0.00	0.000
	Industrial	0.12	0.01	0.00	0.00
	Other-Residential	0.40	0.03	0.00	0.00
	Single Family	0.20	0.00	0.00	0.00
	Total	2	0	0	0

Source: HAZUS

HAZUS estimates that about 114 buildings will be at least moderately damaged. This is over zero percent of the buildings in the region. There are an estimated zero buildings that will be damaged beyond repair. **Table 130. Expected Building Damage by Occupancy** summarizes the expected damage by general building type. The following tables describe other estimated losses.

4. Risk Assessment

Table 130. Expected Building Damage by Occupancy

Occupancy	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	3409.19	1.14	9.41	1.27	2.26	2.06	0.14	3.04	0.00	14.49
Commercial	20955.42	7.01	81.08	10.90	16.80	15.32	0.70	15.57	0.00	33.17
Education	600.19	0.20	1.54	0.21	0.26	0.24	0.01	0.14	0.00	0.21
Government	289.69	0.10	1.09	0.15	0.21	0.19	0.01	0.18	0.00	0.69
Industrial	5317.22	1.78	24.33	3.27	6.14	5.60	0.31	6.99	0.00	7.44
Other Residential	40641.45	13.60	251.27	33.79	77.05	70.28	3.23	71.96	0.00	21.73
Religion	1498.15	0.50	7.27	0.98	1.50	1.37	0.08	1.69	0.00	22.28
Single Family	226051.95	75.66	367.62	49.44	5.41	4.93	0.02	0.44	0.00	0.00
Total	298,763		744		110		4		0	

Source: HAZUS

Table 131. Expected Building Damage by Occupancy

Occupancy	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	3409.19	1.14	9.41	1.27	2.26	2.06	0.14	3.04	0.00	14.49
Commercial	20955.42	7.01	81.08	10.90	16.80	15.32	0.70	15.57	0.00	33.17
Education	600.19	0.20	1.54	0.21	0.26	0.24	0.01	0.13	0.00	0.21
Government	289.69	0.10	1.09	0.15	0.21	0.19	0.01	0.18	0.00	0.69
Industrial	5317.22	1.78	24.33	3.27	6.14	5.60	0.31	6.99	0.00	7.44
Other Residential	40641.45	13.60	251.27	33.79	77.05	70.28	3.23	71.96	0.00	21.73
Religion	1498.15	0.50	7.27	0.98	1.50	1.37	0.08	1.69	0.00	22.28
Single Family	226051.95	75.66	367.62	49.44	5.41	4.93	0.02	0.44	0.00	0.00
Total	298,763		744		110		4		0	

Source: HAZUS

Table 132. Expected Building Damage by Building Type (All Design Levels)

Occupancy	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Wood	256660.13	85.91	420.81	56.59	4.66	4.25	0.00	0.00	0.00	0.00
Steel	7590.95	2.54	32.95	4.43	8.53	7.78	0.34	7.56	0.00	15.50
Concrete	7079.95	2.37	28.64	3.85	4.16	3.80	0.08	1.83	0.00	0.00
Precast	6443.66	2.16	27.37	3.68	8.79	8.02	0.48	10.79	0.00	14.27
RM	10644.32	3.56	28.04	3.77	8.25	7.53	0.19	4.34	0.00	0.00
URM	2353.79	0.79	22.31	3.00	5.35	4.88	0.41	9.18	0.01	70.22

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Occupancy	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
MH	7990.55	2.67	183.47	24.67	69.89	63.75	2.98	66.30	0.00	0.00
Total	298,763		744		110		4		0	

Source: HAZUS

RM: Reinforced Masonry

URM: Unreinforced Masonry

MH: Manufactured Housing

Table 133. Expected Damage to the Transportation Systems

System	Component	Number of Locations				
		Locations and Segments	With at least Moderate Damage	With Complete Damage	With Functionality >50%	
					After Day 1	After Day 7
Highway	Segments	362	0	0	362	362
	Bridges	897	0	0	897	897
	Tunnels	0	0	0	0	0
Railways	Segments	126	0	0	126	126
	Bridges	96	0	0	96	96
	Tunnels	0	0	0	0	0
	Facilities	9	0	0	9	9
Light Rail	Segments	0	0	0	0	0
	Bridges	0	0	0	0	0
	Tunnels	0	0	0	0	0
	Facilities	0	0	0	0	0
Bus	Facilities	1	0	0	1	1
Ferry	Facilities	0	0	0	0	0
Port	Facilities	0	0	0	0	0
Airport	Facilities	8	0	0	8	8
	Runways	11	0	0	11	11

Source: HAZUS

Table 134. Expected Utility System Facility Damage

System	Number of Location				
	Total Number	With at Least Moderate Damage	With Complete Damage	With Functionality >50 %	
				After Day 1	After Day 7
Potable Water	0	0	0	0	0

4. Risk Assessment

System	Number of Location				
	Total Number	With at Least Moderate Damage	With Complete Damage	With Functionality >50 %	
				After Day 1	After Day 7
Waste Water	4	0	0	4	4
Natural Gas	1	0	0	1	1
Oil Systems	1	0	0	1	1
Electrical Power	60	0	0	60	60
Communication	42	0	0	42	42

Source: HAZUS

Table 135. Expected Utility System Pipeline Damage (Site Specific)

System	Total Pipelines Length (miles)	Number of Leaks	Number of Breaks
Potable Water	13,181	47	12
Waste Water	7,908	24	6
Natural Gas	233	0	0
Oil	0	0	0

Source: HAZUS

Table 136. Expected Potable Water and Electric Power System Performance

	Total Number of households	Number of Households without Service				
		At Day 1	At Day 3	At Day 7	At Day 30	At Day 90
Potable Water	319,296	0	0	0	0	0
Electric Power		0	0	0	0	0

Source: HAZUS

NATURAL ENVIRONMENT

An earthquake could cause cascading effects, including dam failure or rockslide that would impact the natural environment in different ways, depending on the scope of the cascading hazard. Other types of ground deformation could result as well.

CRITICAL FACILITIES

An earthquake could have major impacts on critical infrastructure. HAZUS estimates impacts to critical facilities including hospitals, schools, Emergency Operations Centers (EOCs), police stations and fire stations. The following tables display the expected damage to essential facilities for the three

4. Risk Assessment

earthquake scenarios (Great Valley Coalinga M7.1, Round Valley M7.1, White Mountain M7.4) that was generated by HAZUS.

Table 137. Expected Damage to Essential Facilities for Great Valley Coalinga M7.1

Classification	Total	Number of Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on Day 1
Hospitals	18	0	0	16
Schools	394	10	0	382
EOCs	8	0	0	7
Police Stations	26	0	0	23
Fire Stations	77	0	0	72

Source: HAZUS-MH

Table 138. Expected Damage to Essential Facilities for Round Valley M7.1

Classification	Total	Number of Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on Day 1
Hospitals	18	0	0	18
Schools	394	0	0	394
EOCs	8	0	0	8
Police Stations	26	0	0	26
Fire Stations	77	0	0	77

Source: HAZUS-MH

Table 139. Expected Damage to Essential Facilities for White Mountain M7.4

Classification	Total	Number of Facilities		
		At Least Moderate Damage > 50%	Complete Damage > 50%	With Functionality > 50% on Day 1
Hospitals	18	0	0	18
Schools	394	0	0	394
EOCs	8	0	0	26
Police Stations	26	0	0	26
Fire Stations	77	0	0	77

Source: HAZUS-MH

4. Risk Assessment

In addition to the exposure analysis generated through HAZUS, information provided by the California Geological Survey, and USGS was utilized to generate estimates of critical facilities within the 55% g or greater ground shaking potential area.

Table 140. Critical Facilities in Earthquake Hazard Areas shows the critical facilities affected in the earthquake hazard areas.

Table 140. Critical Facilities in Earthquake Hazard Areas

Jurisdiction	Facility Type	Count
Coalinga	Airport	1
	Colleges & Universities	2
	Communications	1
	Department of Public Works	1
	Fire Station	3
	Health Care	1
	Police	3
	School	10
	Total	22
Firebaugh		
	Airport	1
	CalARP	2
	Fire Station	1
	Police	1
	School	9
	Urgent Care	1
	Total	15
Huron	CalARP	7
	Fire Station	1
	Police	1
	School	3
	Total	12
Mendota	Airport	1
	CalARP	1
	Fire Station	1
	School	7
	Total	10
San Joaquin	CalARP	1
	School	2
	Sheriff	1
	Total	4
Unincorporated	Airport	5

4. Risk Assessment

Jurisdiction	Facility Type	Count
	CalARP	35
	Department of Agriculture	1
	Department of Public Works	2
	Fire Station	5
	Nursing Home	1
	School	17
	Total	66
	Grand Total	129

Source: California Geological Survey, USGS

FUTURE DEVELOPMENT

Future development in the county is not anticipated to significantly affect vulnerability to earthquakes but will result in a slight increase in exposure of the population and building stock due to population increases over the next several decades. Additionally, the County has adopted policies to curb damage from earthquake hazard areas. For example, the Alquist Priolo Earthquake Fault Act states that the County shall not permit any structure for human occupancy to be placed within designated Earthquake Fault Zones.

VULNERABILITY TO FLOOD/LEVEE FAILURE (HIGH)

Floods are characterized by the rising and overflowing of excess water from a water source such as a stream, river, lake, canal, or coastal body onto an area of normally dry floodplain. A floodplain is a lowland area downstream and adjacent to water bodies that are subject to flood events. Flooding is a naturally occurring event that becomes hazardous when populations and property are affected. A flood occurs when the existing channel of a stream, river, canyon, or other watercourse cannot contain excess runoff from rainfall or snowmelt, resulting in overflow onto adjacent lands. Man-made levees can fail in a number of ways. The most frequent (and dangerous) form of levee failure is a breach. A levee breach is when part of the levee actually breaks away, leaving a large opening for water to flood the land protected by the levee. A breach can be a sudden or gradual failure that is caused either by surface erosion or by a subsurface failure of the levee.

PEOPLE

The number of people living in the 100-year and 500-year floodplains was determined by multiplying the percentage area of coverage for the floodplains in each census tract by the total population of that tract. Census tracts do not always adhere to local boundaries; if a census tract was completely within a city boundary or unincorporated Fresno County it was labeled as such in the following tables. If a tract intersected more than one jurisdiction, all jurisdictions within the tract were labeled in the following tables. Based on this analysis, there are 44,905 residents living in the 100-year flood zones throughout Fresno County. **Table 141. Population Living in 1% Annual Chance Flood Hazard Zones** below details population estimates by census tract, followed by a similar table for the 500-year floodplain.

Table 141. Population Living in 1% Annual Chance Flood Hazard Zones

Jurisdiction(s)	Population
Clovis	640
Clovis; Fresno; Unincorporated Fresno Co.	1,736
Clovis; Unincorporated Fresno Co.	3,171
Coalinga; Unincorporated Fresno Co.	2,148
Firebaugh; Unincorporated Fresno Co.	2,860
Fowler; Kingsburg; Selma; Unincorporated Fresno Co.	75
Fowler; Selma; Unincorporated Fresno Co.	59
Fowler; Unincorporated Fresno Co.	115
Fresno	3,446
Fresno; Kerman; Unincorporated Fresno Co.	1,222
Fresno; Unincorporated Fresno Co.	10,984
Huron; Unincorporated Fresno Co.	1,930
Kerman; Unincorporated Fresno Co.	272
Kingsburg; Selma; Unincorporated Fresno Co.	15
Kingsburg; Unincorporated Fresno Co.	10
Mendota; Unincorporated Fresno Co.	5,498
Orange Cove; Unincorporated Fresno Co.	2,397

4. Risk Assessment

Parlier; Reedley; Unincorporated Fresno Co.	102
Parlier; Unincorporated Fresno Co.	42
Reedley; Unincorporated Fresno Co.	1,813
San Joaquin; Unincorporated Fresno Co.	1,709
Sanger	11
Sanger; Unincorporated Fresno Co.	1,686
Selma; Unincorporated Fresno Co.	234
Unincorporated Fresno Co.	2,731
Total	44,905

Source: Fresno County Assessor's Office; FEMA, US Census Bureau

The same analysis determined that there are 195,454 residents living in the 500-year flood zones throughout Fresno County. The results of this analysis are shown in **Table 142. Population Living in 0.2% Annual Chance Flood Hazard Zones.**

Table 142. Population Living in 0.2% Annual Chance Flood Hazard Zones

Jurisdiction(s)	Population
Clovis	11,704
Clovis; Fresno; Unincorporated Fresno Co.	17,015
Clovis; Unincorporated Fresno Co.	2,216
Coalinga; Unincorporated Fresno Co.	3,835
Firebaugh; Unincorporated Fresno Co.	2,292
Fowler; Kingsburg; Selma; Unincorporated Fresno Co.	0
Fowler; Selma; Unincorporated Fresno Co.	0
Fowler; Unincorporated Fresno Co.	7
Fresno	104,996
Fresno; Kerman; Unincorporated Fresno Co.	0
Fresno; Unincorporated Fresno Co.	48,361
Huron; Unincorporated Fresno Co.	43
Kerman; Unincorporated Fresno Co.	0
Kingsburg; Selma; Unincorporated Fresno Co.	0
Kingsburg; Unincorporated Fresno Co.	0
Mendota; Unincorporated Fresno Co.	2,504
Orange Cove; Unincorporated Fresno Co.	200
Parlier; Reedley; Unincorporated Fresno Co.	45
Parlier; Unincorporated Fresno Co.	0
Reedley; Unincorporated Fresno Co.	851
San Joaquin; Unincorporated Fresno Co.	0
Sanger	7

4. Risk Assessment

Sanger; Unincorporated Fresno Co.	1,003
Selma; Unincorporated Fresno Co.	0
Unincorporated Fresno Co.	375
Total	195,454

Source: Fresno County Assessor's Office; FEMA, US Census Bureau

Population estimates were conducted using the USACE Comprehensive Study and the CA DWR for the 200 year floodplain. However, there is not an updated study for the analysis and therefore has been omitted in the 2024 plan update.

HAZUS

The geographical size of the region is approximately 184 square miles and contains 14,708 census blocks. The region contains over 319,000 households and has a total population of more than one million people. There are an estimated 299,621 buildings in the region with a total building replacement value (excluding contents) of \$160,289,000,000. Approximately 89.25 percent of the buildings (and 61.47 percent of the building value) are associated with residential housing.

Based on the 100-Year Flood Event Scenario generated by HAZUS, it is estimated that 927 people will seek shelter and 9,513 will be displaced. Displacements may occur due to evacuations from the flood area and damage to homes. Due to the damage, individuals may seek public shelters. The model estimates that 3,171 households may be displaced due to the flood event.

PROPERTY

Flooding is a natural occurrence in the Central Valley because it is a natural drainage basin for thousands of watershed acres of Sierra Nevada and Coast Range foothills and mountains. Historically, the Fresno County planning area has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. But, occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage.

Flooding has occurred in the past: within the 100-year floodplain and in other localized areas. Recent digital flood insurance rate maps (DFIRMs) dated January 2016 placed additional areas within the 100-year or greater floodplain. This is primarily due to the inability of the old and inadequate levees to be certified in accordance with current FEMA standards. As such, these levees no longer provide protection from the 100-year flood. It should be noted, however, that all levees, whether certified or not, provide some level of protection to the planning area and remain a critical factor in floodplain management for the communities.

The continued need to rely on these flood control structures is an ongoing concern. The history of the area, beginning with hydraulic gold mining techniques and through the continuing conversion of agricultural lands to commercial and residential uses, makes it impossible to reverse the planning area's dependence on structural flood control protection. Levee maintenance is a continuous effort due to erosion and scour brought on by the channelization itself.

Additional improvements to strengthen the levees and make them less susceptible to seepage-induced failures are a priority of local and state agencies. Once these improvements are made, certification may be possible. Nevertheless, while these improvements may mitigate the impacts of flooding due to levee failure, the levees will remain subject to overtopping by flood events larger than their design capacity.

The likelihood of flooding increases with the heavy rains that occur annually between November and May. In addition to damage to area infrastructure, other problems associated with flooding include erosion, sedimentation, degradation of water quality, loss of environmental resources, and certain health hazards.

HAZUS

A flood vulnerability assessment was performed for Fresno County using GIS. The county’s parcel layer and associated assessor’s building improvement valuation data were provided by the county and were used as the basis for the inventory. Fresno County’s effective DFIRM was used as the hazard layer. DFIRM is FEMA’s flood risk data that depicts the 1% annual chance (100-year) and the 0.2% annual chance (500-year) flood events. Fresno County’s effective FEMA DFIRM, dated January 20, 2016, was determined to be the best available floodplain data. **Table 143. Fresno County Flood Zones** summarize the flood zones included on these maps.

Table 143. Fresno County Flood Zones

Zone Designation	Percent Annual Chance of Flood	Description
Zone V	1%	Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. Because hydraulic analyses have not been performed, no base flood elevations (BFEs) or flood depths are shown.
Zones VE and V1-30	1%	Areas along coasts subject to inundation by the 1% annual chance of flooding with additional hazards associated with storm-induced waves. BFEs derived from detailed hydraulic analyses are shown within these zones. (Zone VE is used on new and revised maps in place of Zones V1-30.)
Zone A	1%	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas, no depths or BFEs are shown within these areas.

4. Risk Assessment

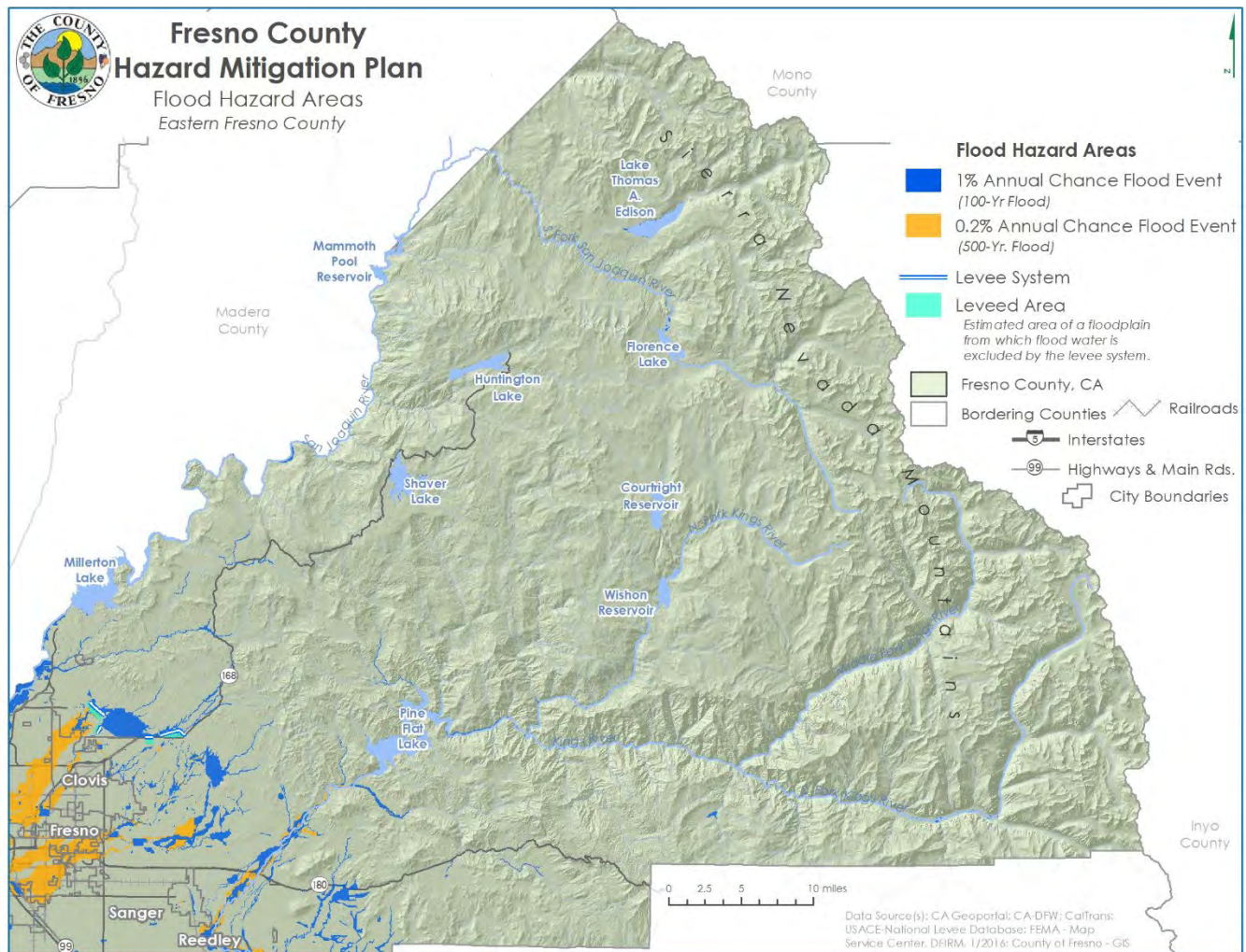
Zone Designation	Percent Annual Chance of Flood	Description
Zone AE	1%	Areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. In most instances, BFEs derived from detailed analyses are shown at selected intervals within these zones.
Zone AH	1%	Areas with a 1% annual chance of flooding where shallow flooding (usually areas of ponding) can occur with average depths between 1 – 3 feet.
Zone AO	1%	Areas with a 1% annual chance of flooding, where shallow flooding average depths are between 1 – 3 feet.
Zone X (shaded)	0.2%	Represents areas between the limits of the 1% annual chance of flooding and 0.2% chance of flooding.
Zone X (unshaded)	Undetermined	Areas outside of the 1% annual chance floodplain and 0.2% annual chance floodplain; areas of 1% annual chance sheet flow flooding where average depths are less than one (1) foot; areas of 1% annual chance stream flooding where the contributing drainage area is less than one (1) square mile, or areas protected from the 1% annual chance flood by levees. No BFE or depths are shown within this zone.

Source: FEMA

GIS was used to intersect the parcel boundaries with a master address point layer to obtain number of buildings per parcel. The parcel layer was then converted into a centroid, or point, representing the center of each parcel polygon.

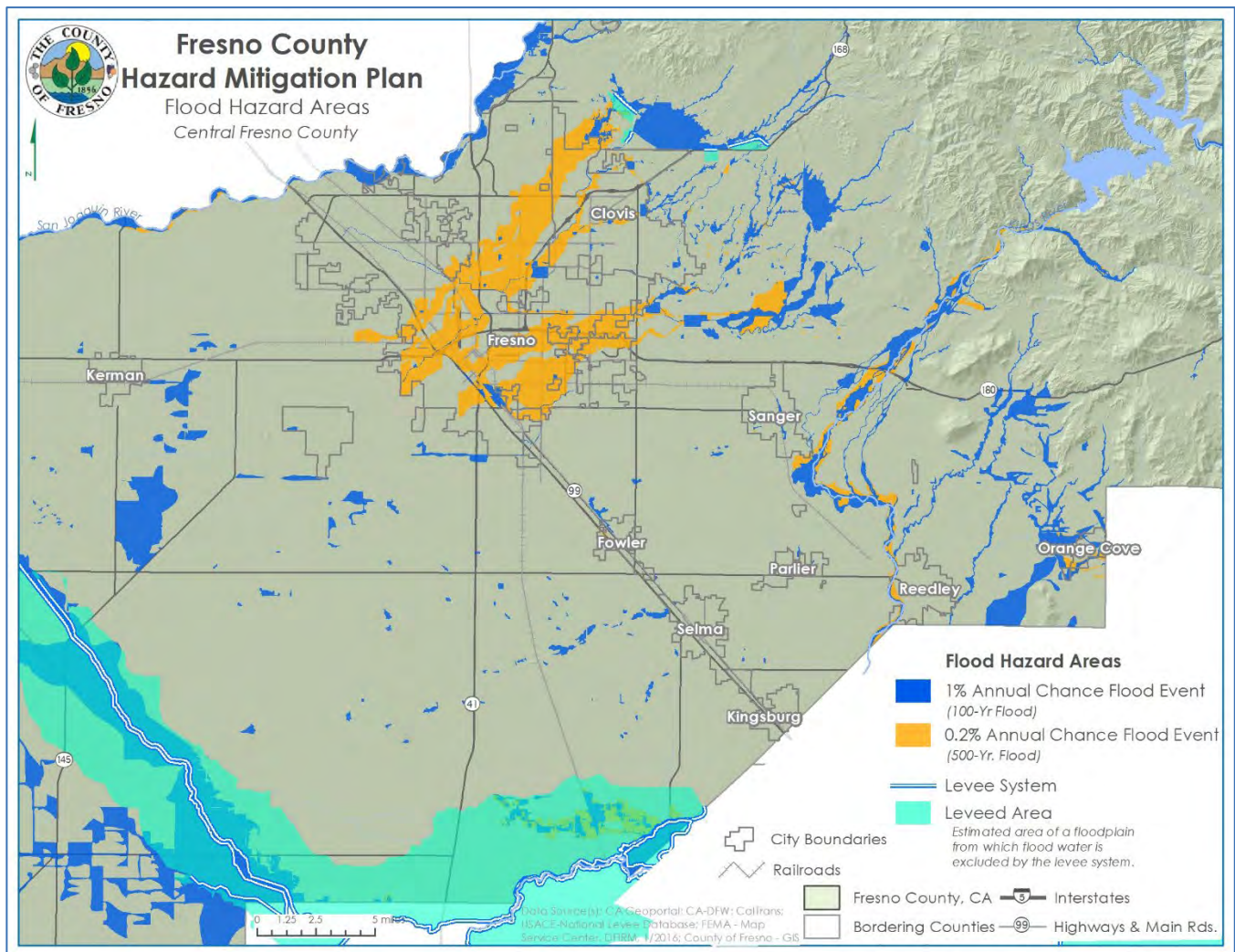
Only parcels with improvement values greater than zero and address points were used in the analysis, this method assumes that improved parcels have a structure of some type. The DFIRM flood zones were overlaid in GIS on the address points and parcel centroid data to identify structures that would likely be inundated during a 1 percent annual chance and 0.2 percent annual chance flood event. These overlays can be seen graphically in the regional maps in the following figures and in more detail in the jurisdictional annexes.

Figure 69. Fresno County Flood Hazard Areas – Eastern Fresno County



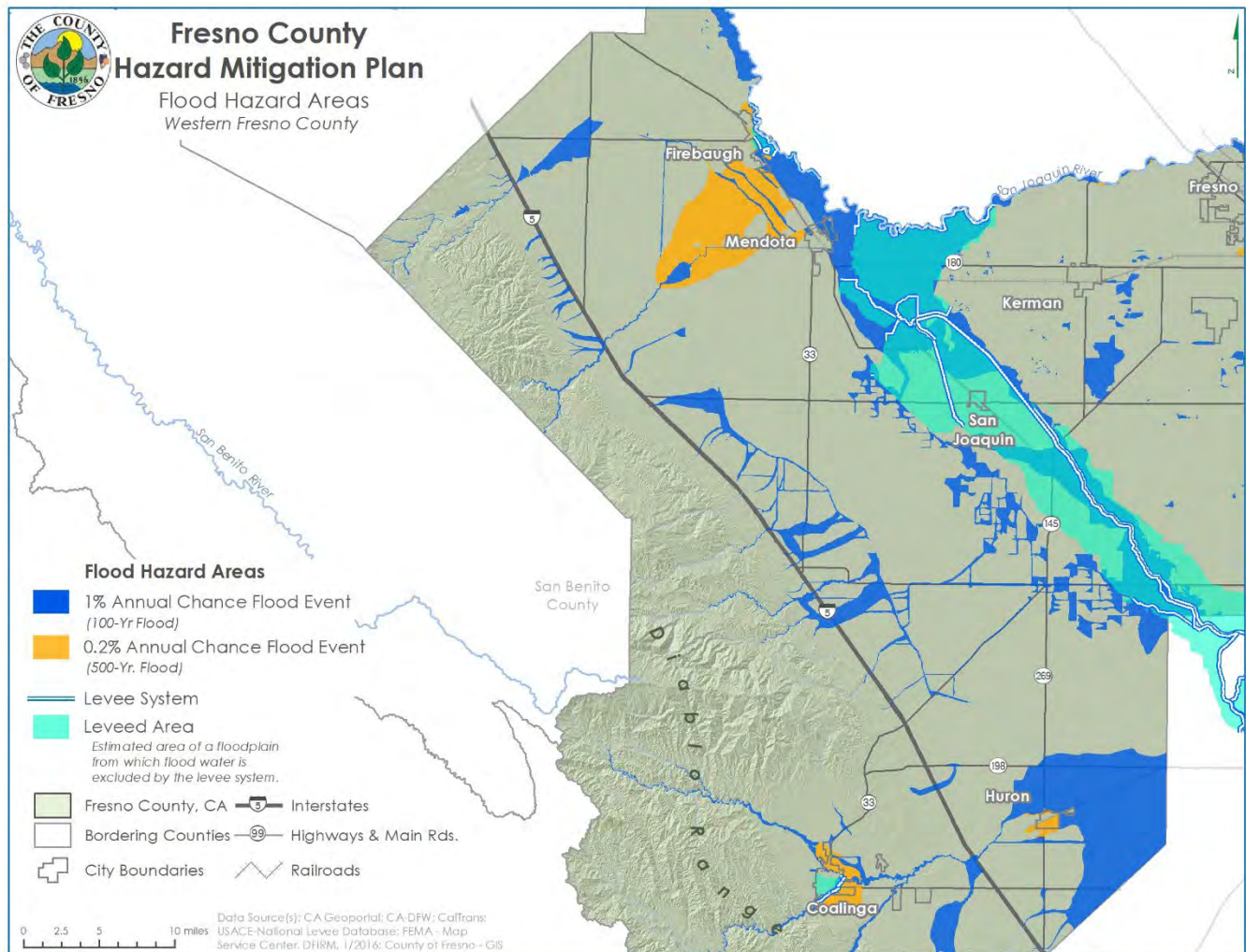
Source: CA-DFW, CalTrans, USACE-National Levee Database, FEMA – Map Service Center, DFIRM 1/2016

Figure 70. Fresno County Flood Hazard Areas – Central Fresno County



Source: CA-DFW, CalTrans, USACE-National Levee Database, FEMA – Map Service Center, DFIRM 1/2016

Figure 71. Fresno County Flood Hazard Areas - Western Fresno County



Source: CA-DFW, CalTrans, USACE-National Levee Database, FEMA – Map Service Center, DFIRM 1/2016

4. Risk Assessment

Results of the overlay analysis area are provided in the following tables. The jurisdictional annexes provide more detailed information based on property type. Property type refers to the land use of the parcel. Where possible, parcel and structure counts were separated in the analysis. Detailed tables show counts of parcels by jurisdiction and land use type (agricultural, commercial, industrial, residential, open space, etc.). The flood loss analyses do not account for business disruption, emergency services, environmental damages, or displacement costs, thus actual losses could exceed the estimates shown.

The geographical size of the region is approximately 184 square miles and contains 14,708 census blocks. The region contains over 319,000 households and has a total population of 1,007,944 people. HAZUS estimates that there are 299,621 buildings in the region with a total building replacement value (excluding contents) of \$160,289,000,000. Approximately 89.25 percent of the buildings (and 61.47 percent of the total exposure value) are associated with residential housing. The tables below represent the relative distribution of the value to the general occupancies by Study Region and Scenario respectively.

Table 144. Building Exposure by Occupancy Type for the Study Region 1% Floodplain

Occupancy	Exposure (\$1000)	Percent of Total
Residential	98,523,386	61.5%
Commercial	32,127,603	20.0%
Industrial	11,799,356	7.4%
Agricultural	4,086,209	2.5%
Religion	2,853,221	1.8%
Government	868,453	0.5%
Education	10,030,538	6.3%
Total	160,288,766	100%

Source: HAZUS

HAZUS estimates that about 911 buildings will be at least moderately damaged (defined as damage level 11 or above). This is over 59 percent of the total number of buildings in the scenario. There are an estimated 46 buildings that will be completely destroyed. **Table 145. Expected Building Damage by Occupancy for the Study Region 1% Floodplain** summarizes the expected damage by general occupancy for the buildings in the region.

Table 145. Expected Building Damage by Occupancy for the Study Region 1% Floodplain

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	7	39	11	61	0	0	0	0	0	0	0	0
Commercial	7	58	3	25	2	17	0	0	0	0	0	0
Education	3	100	0	0	0	0	0	0	0	0	0	0
Government	0	0	0	0	0	0	0	0	0	0	0	0
Industrial	0	0	1	100	0	0	0	0	0	0	0	0
Religion	7	44	9	56	0	0	0	0	0	0	0	0

4. Risk Assessment

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Residential	258	23	468	41	174	15	130	11	67	6	46	4
Total	282		492		176		130		67		46	

Source: HAZUS

Table 146. Expected Building Damage by Building Type (All Design Levels)

	1-10		11-20		21-30		31-40		41-50		>50	
Occupancy	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Concrete	3	50	3	50	0	0	0	0	0	0	0	0
Manufactured Housing	5	25	2	10	1	5	0	0	0	0	12	60
Masonry	4	57	3	43	0	0	0	0	0	0	0	0
Steel	3	43	4	57	0	0	0	0	0	0	0	0
Wood	255	23	467	42	173	15	130	12	66	6	34	3

Source: HAZUS

Table 147. Building Exposure in the 100-Year Floodplain

Jurisdiction	Parcel Count	Building Count	Improved Value	Land Value	Total Value
Clovis	1,028	147	\$2,243,518,271	\$395,015,237	\$2,638,652,708
Coalinga	201	215	\$2,599,806	\$1,358,556	\$3,958,362
Firebaugh	592	656	\$13,454,662	\$5,635,994	\$19,090,656
Fowler	74	64	\$0	\$0	\$0
Fresno	1,520	455	\$460,869,587	\$153,917,812	\$618,041,399
Huron	38	8	\$0	\$0	\$0
Kerman	2	0	\$0	\$0	\$0
Kingsburg	0	0	\$0	\$0	\$0
Mendota	171	98	\$833,583	\$511,649	\$1,345,232
Orange Cove	379	318	\$0	\$0	\$0
Parlier	82	52	\$52,101	\$692,304	\$744,405
Reedley	62	16	\$0	\$9,066	\$9,066
San Joaquin	0	0	\$0	\$0	\$0
Sanger	296	206	\$2,485,504	\$1,045,731	\$3,531,235
Selma	27	18	\$0	\$0	\$0
Unincorporated	9,167	3,178	\$468,803,571	\$385,320,333	\$885,563,114
Total	13,639	5,431	\$3,192,617,085	\$943,506,682	\$4,170,936,177

Source: Fresno County Assessor's Office; National Flood Hazard Layer Effective date 01/20/2016, FEMA

4. Risk Assessment

Table 148. Building Exposure in the 500-Year Floodplain

Jurisdiction	Parcel Count	Building Count	Improved Value	Land Value	Total Value
Clovis	2,814	7,149	\$9,200,833,909	\$2,002,816,583	\$11,206,145,592
Coalinga	217	868	\$37,362,500	\$10,261,060	\$47,623,560
Firebaugh	173	818	\$489,560	\$1,740,991	\$2,230,551
Fowler	-	6	-	-	-
Fresno	10,685	49,144	\$17,978,613,870	\$3,890,079,524	\$21,908,534,084
Huron	-	747	-	-	-
Kerman	-	-	-	-	-
Kingsburg	-	-	-	-	-
Mendota	7	105	\$1,457,645	\$335,832	\$1,793,477
Orange Cove	-	78	-	-	-
Parlier	-	0	-	-	-
Reedley	157	177	\$39,218,838	\$13,541,001	\$52,759,839
San Joaquin	-	0	-	-	-
Sanger	35	59	\$4,916,474	\$1,637,528	\$6,554,002
Selma	-	0	-	-	-
Unincorporated	464	5,828	\$101,640,999	\$93,426,960	\$195,068,859
Total	14,552	64,979	\$27,364,533,795	\$6,013,839,479	\$33,420,809,964

Source: Fresno County Assessor's Office; National Flood Hazard Layer Effective date 01/20/2016, FEMA

Looking at the flood risk for the entire Fresno County planning area, in general, Clovis, Firebaugh, Coalinga, Fresno, and Reedley are predominantly inundated by the 500-year flood. Orange Cove, San Joaquin, and Sanger are predominantly inundated by the 100-year flood. Fowler, Huron, Mendota, Parlier, and Selma are just barely affected by the floodplain. Kerman and Kingsburg are not in floodplains. This analysis does not take localized flooding into account.

According to this information, the Fresno County planning area has 13,639 parcels valued at roughly \$4.17 billion in the 100-year floodplain. An additional 14,552 parcels valued at roughly \$33.42 billion fall within the 500-year floodplain. As a result, total structural exposure exceeds \$37 billion. The end of this section provides more discussion on vulnerability in leveed areas.

The tables below provide further analysis that shows the count and improved value of parcels that fall in a floodplain by property type for the 100- and 500-year annual chance flood zones. It should be noted that the model may have included structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, it is important to remember that the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Table 149. Building Exposure in the 100-Year Floodplain by Property Type

Property Type	Parcel Count	Improved Value	Land Value	Total Value
Agricultural	878	\$358,153,138	\$318,496,610	\$683,541,058

4. Risk Assessment

Property Type	Parcel Count	Improved Value	Land Value	Total Value
Apartments	374	\$2,071,722,176	\$246,745,111	\$2,318,467,287
Church	1	\$173,970	\$45,877	\$219,847
Commercial	66	\$339,833,649	\$180,132,311	\$520,360,260
Condominium	9	\$2,946,834	\$1,001,664	\$3,948,498
Government	3	\$3,327	\$572,628	\$575,955
Group Housing/Lodging	2	\$1,005,835	\$1,865,208	\$2,871,043
Industrial	92	\$276,238,213	\$109,597,919	\$413,352,932
Mobile/ Manufactured Home	2	\$2,880,436	\$3,951,834	\$6,832,270
Office/ Professional Space	1	\$300,900	\$81,600	\$382,500
Primary Use Not Designated	340	\$0	\$0	\$0
Recreation	25	\$330,626	\$3,724,131	\$4,054,757
School	2	\$2,134,198	\$169,598	\$2,303,796
Single Family Residence	694	\$134,072,705	\$59,474,922	\$193,557,627
Unknown	10,971	\$0	\$0	\$0
Utilities	4	\$394,535	\$1,784,659	\$2,179,194
Vacant	175	\$2,426,543	\$15,862,610	\$18,107,083
Total	\$13,639	\$3,192,617,085	\$943,506,682	\$4,170,936,177

Source: Fresno County Assessor's Office; National Flood Hazard Layer Effective date 01/20/2016, FEMA

*Includes Zones A, AE, AH, and AO

**Includes Shaded Zone X (500-year) and all 100-year flood zones

Table 150. Building Exposure in the 500-Year Floodplain by Property Type

Type	Parcel Count	Improved Value	Land Value	Total Value
Agricultural	130	\$35,660,282	\$65,664,460	\$101,325,642
Apartments	4,260	\$20,216,231,280	\$4,078,176,352	\$24,294,407,632
Church	37	\$30,688,088	\$4,036,415	\$34,941,503
Commercial	1,066	\$4,482,800,800	\$999,249,972	\$5,515,263,522
Communications	1	\$0	\$3,458	\$3,458
Condominium	14	\$34,466,814	\$6,779,664	\$41,246,478
Group Housing/Lodging	27	\$79,244,013	\$18,354,847	\$99,707,160
Hospital	16	\$341,363,536	\$17,708,710	\$359,072,246
Industrial	191	\$164,740,952	\$42,739,517	\$296,343,750

4. Risk Assessment

Type	Parcel Count	Improved Value	Land Value	Total Value
Mobile/ Manufactured Home	53	\$33,019,701	\$75,522,199	\$108,541,900
Office/ Professional Space	371	\$804,948,104	\$244,371,695	\$1,052,660,999
Outlot & Common Area	1	\$9	\$14	\$23
Primary Use Not Designated	516	\$0	\$0	\$0
Recreation	3	\$3,997,372	\$979,715	\$4,977,087
School	12	\$14,390,928	\$3,649,028	\$18,078,556
Single Family Residence	7,389	\$1,119,808,599	\$401,867,956	\$1,521,692,855
Vacant	461	\$3,173,317	\$54,735,477	\$58,054,894
Total	14,552	\$27,364,533,795	\$6,013,839,479	\$33,420,709,964

Source: Fresno County Assessor's Office; National Flood Hazard Layer Effective date 01/20/2016, FEMA

*Includes Zones A, AE, AH, and AO

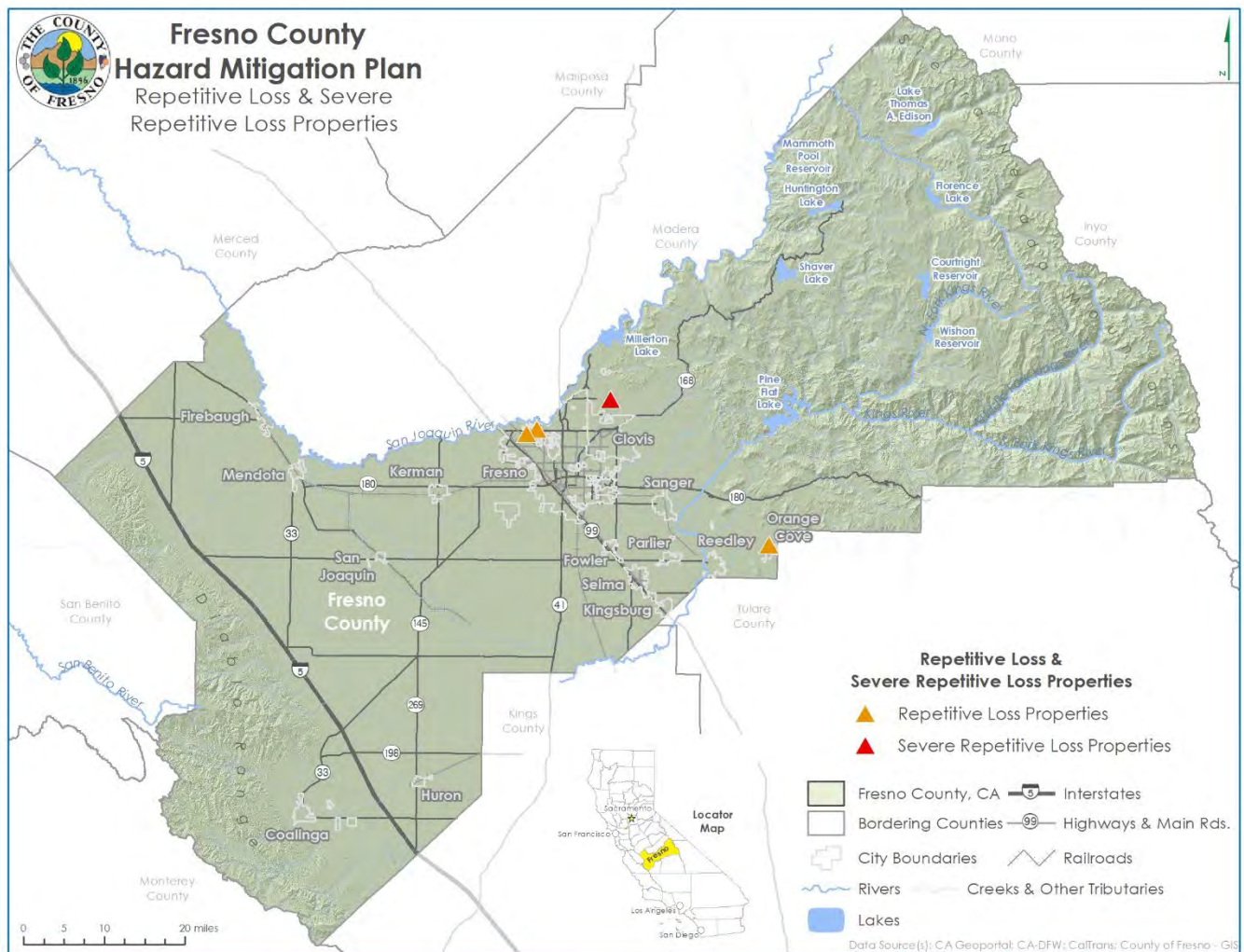
**Includes Shaded Zone X (500-year) and all 100-year flood zones

Insurance Coverage, Claims Paid, and Repetitive Losses

Unincorporated Fresno County joined the National Flood Insurance Program (NFIP) on December 12, 1982, and the Community Rating System (CRS) on October 1, 1991. According to Fresno County, the current Community Rating System (CRS) score of seven, which is lower than the 2007 rating (8).

Within Fresno County, there are 247 policies in force. There are four repetitive loss properties within Fresno County, three of which are located in the City of Fresno and City of Clovis, and one located in Unincorporated Fresno County (Orange Cove). Three of the four are repetitive loss properties and one is a severe repetitive loss property. There are 163 claims within incorporated Fresno County and 84 claims within unincorporated. According to FEMA, accessed information on March 19, 2024, there are no Severe Repetitive Loss properties located in the unincorporated Fresno County. **Figure 72. Fresno County Repetitive Loss and Severe Repetitive Loss Properties** displays where the Severe Repetitive Loss properties are located within the County.

Figure 72. Fresno County Repetitive Loss and Severe Repetitive Loss Properties



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

4. Risk Assessment

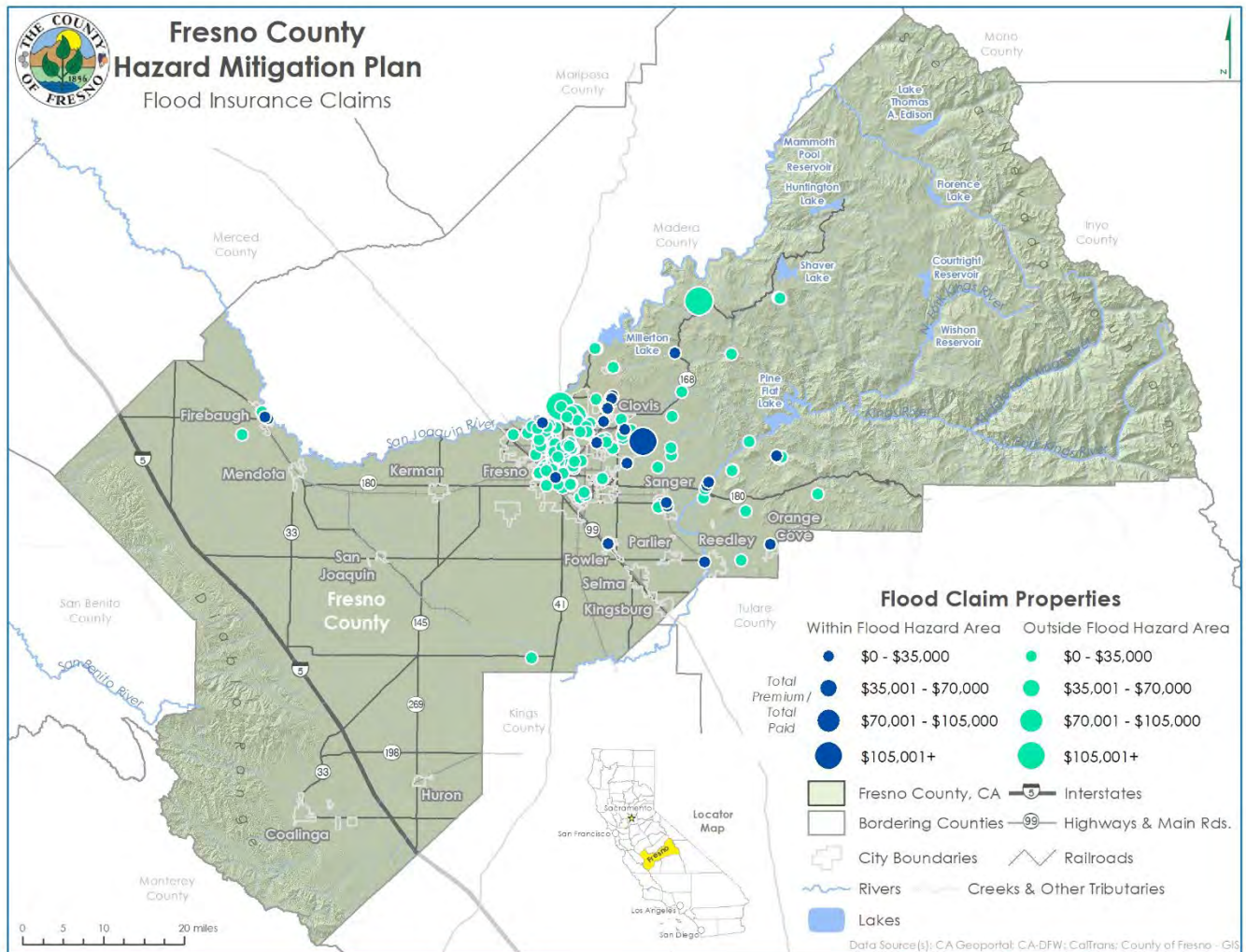
NFIP data indicates that there are 247 active insurance policies in Fresno County. **Table 151. Fresno County NFIP Information** provides more details on NFIP policies and paid losses for each jurisdiction participating in the NFIP. **Figure 73. Fresno County Flood Insurance Claims** shows where flood claims are being submitted across the County.

Table 151. Fresno County NFIP Information

Jurisdiction	Policies	Total Premium/Total Paid	No. of Paid Losses
Clovis	24	\$176,106.79	16
Firebaugh	4	\$0	0
Fowler	3	\$3,197.94	1
Fresno	128	\$711,909.74	77
Sanger	4	\$6,220.92	2
Unincorporated Fresno Co.	84	\$571,029.69	41
Total	247	\$1,468,465.08	137

Source: FEMA National Flood Insurance Program Community Information System

Figure 73. Fresno County Flood Insurance Claims



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

4. Risk Assessment

HISTORIC, CULTURAL, AND NATURAL RESOURCES AT RISK

The Fresno County planning area has significant historic, cultural, and natural resources located throughout the County as previously described. Risk analysis of these resources was not possible due to data limitations. However, natural areas within the floodplain often benefit from periodic flooding as a naturally recurring phenomenon. These natural areas often reduce flood impacts by allowing absorption and infiltration of floodwaters.

OVERALL COMMUNITY IMPACT

Floods and their impacts will vary by location and severity and will likely only affect certain areas of the County at any one time. Based on the risk assessment, it is evident that floods will continue to have potentially devastating economic impacts to certain areas of the County. However, many of the floods in the County are minor, localized flood events that are more of a nuisance than a disaster. Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural damage;
- Disruption of and damage to public infrastructure;
- Health hazards associated with mold and mildew;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) upon the community;
- Negative impact on commercial and residential property values; and
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.

NATURAL ENVIRONMENT

Natural resources are generally resistant to flooding except where natural landscapes and soil compositions have been altered for human development or after periods of previous disasters such as drought and fire. Wetlands, for example, exist because of natural flooding incidents. Areas that are no longer wetlands may suffer from oversaturation of water, as will areas that are particularly impacted by drought. Areas recently suffering from wildfire damage may erode because of flooding, which can permanently alter an ecological system.

CRITICAL FACILITIES

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. An analysis was performed using GIS software to determine critical facilities in Fresno County's floodplain. The DFIRM flood layer previously discussed was used to identify the 100- and 500-year floodplains. For more information on the spatial distribution and location of critical facilities, see the Critical Facility overview. The impact to the community could be great if these critical facilities were damaged or destroyed during a flood event. Similar data is available for the other participating jurisdictions in the jurisdictional annexes.

4. Risk Assessment

As described earlier, critical facilities are located throughout Fresno County. Critical facilities in the floodplain are summarized in **Table 152. Critical Facilities in the 100-Year Floodplain** and **Table 153. Critical Facilities in the 500-year Floodplain**. In total, there are 34 facilities in the 100-year flood zone, 209 facilities in the 500-year flood zone, and 9 critical facilities in the 200-year floodplain. Information regarding critical facilities in the floodplain for each jurisdiction is outlined in the jurisdictional annexes.

Table 152. Critical Facilities in the 100-Year Floodplain

Jurisdiction	Facility Type	Total Facilities	Replacement Cost
Coalinga	Communications Facilities	1	\$118,000
	Schools	1	\$10,203,670
Firebaugh	Schools	4	\$35,277,520
Mendota	Electric Power Facilities	2	\$135,892,580
	Fire Stations	1	\$1,306,580
Orange Cove	Fire Stations	1	\$1,306,580
Reedley	Airport Facilities	1	\$5,300,00
Sanger	Schools	1	\$1,070,310
Unincorporated Fresno County	Electric Power Facilities	4	\$2,238,656,990
	Schools	1	\$5,244,180
Totals		17	\$2,434,376,410

Fresno County Assessor's Office; National Flood Hazard Layer Effective date 01/20/2016, FEMA

Table 153. Critical Facilities in the 500-year Floodplain

Jurisdiction	Facility Type	Total Facilities	Replacement Cost
Clovis	Schools	6	\$156,373,660
Coalinga	Medical Care Facilities	1	\$110,720,100
Firebaugh	Airport Facilities	1	\$5,300,000
	EOCs	1	\$3,438,840
	Schools	1	\$8,873,840
Fresno	Airport Facilities	1	\$13,356,000
	Bus Facilities	1	\$2,166,680
	Communications Facilities	4	\$472,000
	Electric Power Facilities	1	\$40,533,900
	EOCs	1	\$7,997,200
	Fire Stations	6	\$10,752,960
	Medical Care Facilities	4	\$803,905,150
	Police Stations	5	\$46,895,200
	Railway Facilities	1	\$2,663,000
	Schools	66	\$2,618,520,760
Huron	Schools	1	\$9,830,260

4. Risk Assessment

Reedley	Wastewater Treatment Facilities	1	\$171,951,800
Unincorporated Fresno County	Electric Power Facilities	1	\$11,036,810
	Fire Stations	2	\$3,098,740
	Schools	1	\$11,183,000
Totals		106	\$4,039,069,900

Source: Fresno County Assessor's Office; National Flood Hazard Layer Effective date 01/20/2016, FEMA

HAZUS

For essential facilities, there are 18 hospitals in the region with a total bed capacity of 3,621 beds. There are 394 schools, 77 fire stations, 26 police stations, and 8 emergency operation centers. **Table 154. Critical Facilities in the 100-Year Floodplain** describes the severity of damage to essential facilities for the flood scenario.

Table 154. Critical Facilities in the 100-Year Floodplain

Classification	Total	At Least Moderate	At Least Substantial	Loss of Use
Emergency Operations Centers	8	0	0	0
Fire Station	77	0	0	0
Hospitals	18	0	0	0
Police Stations	26	0	0	0
Schools	394	0	0	0

Source: HAZUS

this report displays all zeros or is blank, two possibilities can explain this.

(1) None of your facilities were flooded. This can be checked by mapping the inventory data on the depth grid.

(2) The analysis was not run. This can be tested by checking the run box on the Analysis Menu and seeing if a message box asks you to replace the existing results.

The building losses are broken into two categories: direct building losses and business interruption losses. The direct building losses are the estimated costs to repair or replace the damage caused to the building and its contents. The business interruption losses are the losses associated with inability to operate a businesses because for those people displaced from their homes because of the flood. The total building-related losses were \$412,620,00 million dollars. 39 percent of the estimated losses were related to the business interruption of the region. The residential occupancies made up about 39 percent of the total loss. **Table 155. Building-Related Economic Loss Estimates (in \$ millions)** provides a summary of the losses associated with the building damage.

Table 155. Building-Related Economic Loss Estimates (in \$ millions)

Category	Area	Residential	Commercial	Industrial	Others	Total
Building Loss	Building	133	14.62	6.64	16.71	170.97
	Content	72	43.49	16.57	82.50	214.75
	Inventory	0	5.92	3.14	17.84	26.90
	Subtotal	205.20	64.03	26.35	117.05	412.62
Business Interruptions	Income	0.56	33.24	0.55	32.51	66.85
	Relocation	40.85	7.82	0.66	17.12	66.44
	Rental Income	15.92	5.71	0.15	1.07	22.85
	Wage	1.33	35.60	0.94	70.77	108.64
Subtotal		58.67	82.36	2.30	121.47	164.79
Total		263.86	146.39	28.64	238.52	677.41

Source: HAZUS

FUTURE DEVELOPMENT

Flooding and floodplain management are significant issues for Fresno County. The potential or likelihood of a flood event in the city increases with the annual onset of heavy rains in April combined with snowmelt runoff from May through June. Much of the historical growth in the problems connected with flooding and stormwater runoff include erosion, sedimentation, degradation of water quality, losses of environmental resources, and certain health hazards. Future annexations of unincorporated areas could significantly add to the number of flood-prone structures in Fresno County.

For NFIP participating communities, floodplain management practices implemented through local floodplain management ordinances should mitigate the flood risk to new development in floodplains. The development trend in the Fresno County planning area is steady, significant growth. Much of this growth is occurring in the urban areas, which causes a significant increase in peak flow and stormwater runoff. Census projections from the California Department of Finance expect the County's population to grow to 1,201,792 by 2020. This is an increase of 271,342 people from the 2010 census estimate of 930,450. Such growth will consume previously undeveloped acres, and the impacts may overwhelm existing drainage and flood control facilities.

The potential for flooding may increase as stormwater is channelized due to land development. Such changes can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on buildout land use to ensure that all new development remains safe from future flooding. While local floodplain management, stormwater management, and water quality regulations and policies address these changes on a site-by-site basis, their cumulative effects can have a negative impact on the floodplain.

Local floodplain management ordinances require that new construction be built with the lowest floor elevated a minimum of one foot above the base flood (100-year) elevation. New development that adheres to the elevation requirements in addition to other requirements for maintaining elevation certificates and implementing stormwater program elements and erosion or sediment controls for all new development in the floodplain should help protect development from 100-year floods. The amount of growth in the County and nearby communities can also strain the limits of the entire water management system, which includes water supply in addition to water control. When flood control

4. Risk Assessment

structures are overwhelmed, the result is not only severe flooding. Significant losses to the water supply system may also occur. The following policies are a few policies preventing loss from flood damage.

- Policy PF-E.9 100-year Flood Protection requires new development to provide protection from the 100-year flood as a minimum.
- Policy PF-E.20 requires that the County's new development of facilities near rivers, creeks, reservoirs, or substantial aquifer recharge areas to mitigate any potential impacts of release of pollutants in flood waters, flowing rivers, streams, creeks, or reservoir waters.
- Policy HS-C.2 requires the County prohibit new development in existing undeveloped areas (i.e., areas devoted to agriculture or open space that are not designated for development) protected by a State flood control project without appropriately considering significant known flooding risks and taking reasonable and feasible action to mitigate the potential property damage to the new development resulting from a flood.

VULNERABILITY TO LEVEE FAILURE

A levee failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions.

VULNERABILITY TO HUMAN HEALTH: EPIDEMIC/PANDEMIC (HIGH)

Based on historical occurrences, the risk to the Fresno County planning area is occasional, but the vulnerability is high due to the recent COVID-19 pandemic and the devastating impacts the pandemic had across the globe. The majority of the impacts from epidemics and pandemics will likely be on public health. It is critical that future planning and preparedness activities for pandemic and epidemics account for the existing disparities in Fresno County and potential barriers communities may face to mitigate adverse health outcomes and other impacts such as unemployment and the subsequent impacts (i.e., food and housing insecurity). Such efforts will assist in reducing the health disparities often seen in pandemic and epidemics as well as improving health outcomes and the livelihoods of disproportionately impacted communities.

PEOPLE

All residents and visitors of the County could be susceptible to exposure from an infectious disease and subsequent impacts from a pandemic or epidemic. However, based on existing inequities, some populations and communities will continue to bear the burden of those impacts, similar to previous occurrences. Disproportionately impacted communities include but are not limited to:

- Rural communities
- Black, Indigenous, People of Color (BIPOC) Communities
- LGBTQ+ communities
- Incarcerated/detained populations
- Individuals with disabilities
- Individuals with chronic health conditions
- Individuals with no health insurance or lack of access to healthcare services
- Low socioeconomic status
- People experiencing homelessness
- Individuals with limited English proficiency

Disease spread and mortality is affected by a variety of factors, including virulence, ease of spread, aggressiveness of the virus and its symptoms, resistance to known antibiotics and environmental factors. While every pathogen is different, diseases normally have the highest mortality rate among the very young, the elderly or those with compromised immune systems. Additionally, as seen during the COVID-19 pandemic, those populations with increased exposure to the virus, especially those living and working in congregate settings such as hospitals and health care facilities are at greater risk. During the 1918 H1N1 influenza pandemic an estimated 50 million people died, which is a crude mortality rate of 2.7 percent. The crude mortality rate calculates if someone is infected how likely are they to die. During the COVID-19 pandemic, the number of deaths peaked during the 2021 winter season, with a 7-day average of over 3,000 deaths. Since the start of the pandemic in early 2020, there have been over 1,000,000 deaths in the United States as of February 2024⁸. It is likely that if a new epidemic or pandemic were to occur, few people, if any, would have immunity to a new virus.

⁸ CDC COVID Data Tracker: Maps by Geographic Area https://covid.cdc.gov/covid-data-tracker/#maps_deaths-total

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PROPERTY

For the most part, property itself wouldn't be physically destroyed or damaged by a human disease epidemic or pandemic. However, as concerns about contamination increase, property may be quarantined or destroyed as a precaution against spreading illness. As seen during the COVID-19 pandemic, businesses can be damaged through disrupting supply chains and the distribution of goods which can slow or force businesses to close. Industry and commerce are also likely to suffer losses which occurred during the COVID-19 pandemic.

Good ventilation and indoor air quality are critical in reducing airborne exposure to viruses and other disease vectors. Buildings and their ventilation and air conditioning (HVAC) systems can pose a higher risk for disease spread through lack of adequate ventilation and air filtration. Adjustments can be made to improve indoor air filtration. During the COVID-19 pandemic, public health recommendations included adding portable high efficiency particulate air (HEPA) cleaners to reduce the number of airborne infectious particles, especially in congregate settings.⁹

NATURAL ENVIRONMENT

A widespread pandemic would not likely have an impact on the natural environment unless the disease was transmissible between humans and animals. However, during the beginning of the COVID-19 pandemic when the whole world recommended to quarantine into their homes to prevent and reduce the spread of the virus, many social, economic, industrial, and urbanization activities suddenly shut off. This nonpharmaceutical intervention to reduce the spread of the virus and ultimately reduce infection rates, hospitalizations, and deaths, allowed nature in certain areas of the world to become less polluted.¹⁰ While these activities have returned since the lockdown days of the pandemic, such catastrophic events as the COVID-19 pandemic can have a domino effect to all aspects of life including the natural environment.

CRITICAL FACILITIES

The COVID-19 pandemic rapidly escalated demands on the health care system, medical infrastructure, and health care workforce. Unlike a one-time disaster event, the COVID-19 pandemic disease spread had many surges repeatedly stressing hospitals, EMS, and healthcare settings causing ripple effects throughout the community. In order for the healthcare system to cope with surge of patients seeking medical care and attention, many hospitals cancelled non-emergency (but still needed) procedures and were not prioritizing people with non-COVID needs which increased all-cause and COVID-19 specific mortality in the subsequent weeks after the start of the pandemic. Additionally, hospitals were already operating close to capacity and the pandemic pushed the entire healthcare system to the brink. Educational settings faced many challenges in barriers in continuing to provide education to students which caused disruptions to learning and critical learning milestones for K-12 students. Many schools, for the first time, explore virtual schooling options, which posed challenges. Rural communities with limited access to the internet struggled to connect and participate in virtual classrooms. These hardships create a difficult environment for the school, teachers, students, and parents to navigate.

⁹ Efficacy of Portable Air Cleaners and Masking for Reducing Indoor Exposure to Simulated Exhaled SARS-CoV-2 Aerosols — United States, 2021 | MMWR (cdc.gov) <https://www.cdc.gov/mmwr/volumes/70/wr/mm7027e1.htm>

¹⁰ Coronavirus lockdown helped the environment to bounce back - PMC (nih.gov) <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7323667/>

FUTURE DEVELOPMENT

Future development is not like to be impacted by a pandemic, however pandemics offer an opportunity to implement lessons learned to prevent or reduce harm from future pandemics. As the COVID-19 virus is an airborne disease it is important to have clean air to reduce transmission. Improving indoor air quality won't singlehandedly stopped transmission but will likely reduce the spread of COVID-19 and other viruses such as the flu, RSV, and other allergens and pollutants. Interventions such as air purifiers can improve indoor air quality especially in older buildings and small spaces. ¹¹

¹¹ Indoor air quality improvement in COVID-19 pandemic: Review - PMC (nih.gov)
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8049211/>

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VULNERABILITY TO HUMAN HEALTH: WEST NILE VIRUS (LOW)

While the likelihood of the occurrence of West Nile virus in the Fresno County planning area is likely, the County's vulnerability is low, based on the percentage of total population that actually comes down with the disease. Since the discovery of West Nile virus in California in 2003, Fresno County has had 384 confirmed human cases.

Although the potential for exposure does exist in Fresno County, the vulnerability should be considered in terms of adverse effects due to exposure. The County already has an active vector control program in place for mosquitoes, and protective measures to prevent exposure are relatively simple and cost-effective. Given the nature of protective measures, such as wearing long-sleeved clothing and using bug spray, the responsibility for protection can and should be an individual responsibility. Fresno County's current public education program should give the community the knowledge as well as access to resources to effectively counter the risk and impact from the virus.

PEOPLE

Approximately twenty percent of people exposed to West Nile Virus through a mosquito bite develop symptoms related to the virus; it is not transmissible from one person to another. In the state of California, there have been more than 7,500 cases and over 300 deaths reported since 2003. In Fresno County, there have been 402 cases, 17 of which were fatal. Preventive steps can be taken to reduce exposure to mosquitos carrying the virus; these include insect repellent, covering exposed skin with clothing and avoiding the outdoors during twilight periods of dawn and dusk, or in the evening when the mosquitos are most active.¹²

PROPERTY

Property would not be significantly affected by West Nile Virus.

NATURAL ENVIRONMENT

While birds are the species primarily affected by West Nile Virus, bats, horses, cats, dogs, chipmunks, skunks, squirrels, domestic rabbits and alligators can all be infected with the virus.

CRITICAL FACILITIES

Should a widespread outbreak of West Nile Virus occur, medical facilities could be stressed.

FUTURE DEVELOPMENT

Future development would not be impacted by West Nile Virus.

¹² West Nile Virus (WNV) Fact Sheet (cdc.gov) https://www.cdc.gov/westnile/resources/pdfs/wnvFactsheet_508.pdf

VULNERABILITY TO LANDSLIDE (LOW)

Landslides and mudflows can destroy properties and cause injuries and deaths. A landslide refers to a wide range of ground movement, such as rock falls, deep failure of slopes and shallow debris flow. The figure below illustrates the different types of landslide movement. The primary driving force of landslides is gravity but other contributing factors such as rainfall, earthquakes, volcanic eruptions, groundwater pressure, erosion, destabilization of slopes (because of deforestation, cultivation and construction, snow, and glacial melt) can drive a landslide to occur as well.

PEOPLE

On average, 25 to 50 people are killed by landslides each year in the United States and even more worldwide. In the state of California, more than 100 residents have been killed by debris flows during the past 25 years. Most of the fatalities occurred due to debris flow burying individuals sleeping in lower-floor bedrooms adjacent to hazardous slopes.¹³ Health and safety concerns due to landslides and mudflow include rapidly moving water and debris, broken electrical, water, gas, and sewage lines that can result in injury and illness, and disrupted roadways and railways endangering motorists and impeding on transport and access to healthcare. People are susceptible if they are caught in a landslide or rockfall; falling debris can cause injury or death. There is also a danger to drivers operating vehicles, as rocks and debris can strike vehicles passing through the hazard area or cause dangerous shifts in roadways. Based on previous occurrences, there have been no recorded injuries or deaths from landslides in Fresno County.

PROPERTY

Landslides and mudslides are one of the most destructive hazard processes that can cause tremendous damage to the built environment. This hazard can drastically alter the physical landscape and destroy buildings and homes. Landslide risk is minimal in the highly developed valley area of the County due to the relatively flat topography, and most structures concentrated in the central and eastern portion of the County are not at risk to landslides. However, the Fresno County General Plan identifies State Route 168 in eastern Fresno County and State Route 198 in western Fresno County as areas that could be affected by landslides caused by earthquakes or heavy rains. Current data is limited, and future studies should evaluate the geologic conditions throughout the planning area. Other general impacts to property include road closures. Previous landslides have closed Los Gatos Road west of Coalinga, Huntington Lake Road, State Routes 168 and 180, SR-180, SR-168, SR-63, and Auberry Road.

NATURAL ENVIRONMENT

Landslide susceptibility directly overlaps with most natural resource areas across the County. The likelihood of landslides occurring is determined by precipitation and wildfire occurring sequentially. In the event of a landslide there is potential for loss of lands, habitat, and disruption of waterbodies in areas of debris flow. The susceptibility of natural resource lands in Fresno County to landslides is less than other hazards such as wildfire but the risks around loss of topsoil and habitat conversions create a

¹³ Landslide | Impact (fema.gov) <https://community.fema.gov/ProtectiveActions/s/article/Landslide-Impact>

4. Risk Assessment

high scope of impact. Wildlife and plants face a compounding risk when presented with landslide events. Landslide susceptibility is highest within the Sierra Nevada in the eastern portion of the county.

While susceptibility would be the highest in the eastern part of the County, landslides and rockfalls have minimal impacts to the natural environment; these impacts would be confined to a small area. There is a slight chance that a rockfall or landslide in the drainages above people and property could cause blockage and water backup from temporary landslide dams.

CRITICAL FACILITIES

Landslides and mudslides have the power to disrupt vital utilities and communication lines as well as damage critical infrastructure. Based on nearby previous occurrences there is no reported damage to critical facilities. Pipelines for water, electrical distribution lines, and roadways are vulnerable to landslide impacts which could occur in sloped areas that extend into wildfire zones. With high landslide susceptibility along roadways in the Sierra Nevada as well as several fire stations there is a risk of emergency service disruption and impacts to evacuation.

However, there is not enough available data to determine whether there are any critical facilities located in landslide susceptible areas.

FUTURE DEVELOPMENT

The severity of landslide problems is directly related to the extent of human activity in hazard areas. Human activities such as property development and road construction can also exacerbate the occurrence of landslides. Future development should be done carefully to prevent landslide damage to property or people. Adverse effects can be mitigated by early recognition and avoiding incompatible land uses in these areas or by corrective engineering. Improving mapping and information on landslide hazards and incorporating this information into the development review process could prevent siting of structures and infrastructure in identified hazard areas. For example, Policy HS-D.11 Landslide Hazard Areas, states that in known or potential landslide hazard areas, the County shall prohibit avoidable alteration of land in a manner that could increase the hazard, including concentration of water through drainage, irrigation, or septic systems, undercutting the bases of slopes, removal of vegetative cover, and steepening of slopes.

VULNERABILITY TO SEVERE WEATHER: EXTREME TEMPERATURES (EXTREME COLD/FREEZE AND EXTREME HEAT) (LOW)

Extreme temperatures, both extreme heat and extreme cold, can pose a significant threat to people by causing health related illnesses and hypothermia. Populations without adequate housing will be exposed to these temperature extremes and be at an increased risk of illness. Prolonged extreme temperatures can disrupt vital services and infrastructure. In Fresno County, extreme heat is more likely to occur west of the mountains and extreme cold within the mountainous areas of the county.

PEOPLE

Extreme Cold

Extreme cold pose significant health risks to the residents of Fresno County, particularly to vulnerable groups such as the elderly, young children, and individuals with pre-existing health conditions. The drop in temperatures can lead to an increase in respiratory problems, hypothermia, and frostbite, especially for those without adequate heating or shelter. Homeless individuals are particularly at risk, as they may not have access to warm, indoor spaces during cold spells.

Severe winter weather can disrupt the daily life of residents. Power outages, often caused by heavy snowfall or ice accumulation on power lines, can lead to loss of heating and lighting in homes. This not only makes staying warm a challenge but can also disrupt communication and access to online resources. Transportation can be severely impacted, with icy roads and reduced visibility leading to hazardous driving conditions, public transport delays, and school closures. Businesses might face challenges during extreme cold events, including reduced foot traffic, difficulties in maintaining regular operations, and potential damage to premises and inventory. These disruptions can have a ripple effect on the local economy, affecting both business owners and employees. Additionally, increased heating costs during cold spells can strain household budgets, particularly for low-income families.

Extreme Heat

Exposure to extreme heat is a critical health hazard, leading to illnesses, hospitalizations, and deaths. Conditions like heat exhaustion and heat stroke are direct threats, while extreme temperatures also contribute to cardiovascular diseases, causing heart attacks and strokes. The U.S. Centers for Disease Control and Prevention (CDC) indicates that heat exhaustion contributed to approximately 4.2 deaths per 1 million Californians last year, making extreme heat the deadliest weather hazard in the United States. This risk affects diverse populations disproportionately.

Athletes are particularly vulnerable due to their exposure to high temperatures, physical exertion, and often wearing heat-trapping gear, especially in direct sunlight or areas with poor air quality. Children, reliant on adults for their safety, may lack access to adequate cooling in places like schools or daycares, increasing their risk. Older adults, especially those with cardiovascular issues or other medical conditions, are more susceptible to the effects of extreme heat. This group is also at a disadvantage during power outages that accompany heat events, particularly those reliant on life-sustaining devices or who are socially isolated.

Workers, both outdoor¹⁴ (like those in agriculture, construction, and emergency response) and indoor workers without access to cooling, face heightened risks of heat-related illnesses and injuries. Pregnant women are at an increased risk of complications like preterm birth, low birth weight, fetal death, and

¹⁴ National Integrated Heat Health Information System (NIHHIS) Who is most at risk to extreme heat?

4. Risk Assessment

infant mortality due to extreme heat.¹⁵ About one in four adults in the United States has a disability. Therefore, there is a large population that can experience significant adverse impacts, even death, from extreme heat. They may also face challenges in accessing emergency warnings and accessible cooling shelters.

People experiencing homelessness are at a higher risk for heat-related issues due to a lack of reliable shelter, the risks are exacerbated by high living costs and insufficient affordable housing. In Fresno County, there are 4,216 people that are experiencing homelessness which is a 15.8 percent increase in 2020. Additionally, people with chronic health conditions, such as heart disease, mental illness, poor blood circulation, and obesity, are more susceptible to heat-related illnesses, with certain medications potentially worsening the effects of extreme heat.

Since agriculture is one of the top employment industries in the County, there are many farm workers who are exposed to extreme temperatures such as extreme heat. While there are some protections at the state level, California is one of a few states with laws that mandate employers provide water breaks, shade and rest for outdoor workers once temperatures reach certain levels, farmworkers are vulnerable to the weather conditions and are disproportionately impacted by heat. In fact, The Washington Center for Equitable Growth study estimates hot temperatures have caused at least 360,000 workplace injuries in California from 2001 to 2018, or about 20,000 injuries a year.¹⁶ Since the county has a high farmworker population and there have been previous farmwork deaths during extreme heat events, mitigation actions should work to mitigate future risk to the population.

PROPERTY

The risks of extreme temperatures are often profiled as part of larger hazards, such as severe winter storms or drought. However, as temperature variances may occur outside of larger hazards or outside of the expected seasons but still incur large costs, it is important to examine them as stand-alone hazards. Extreme heat may overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure and presents health concerns to individuals outside in the temperatures. Extreme heat may also be a secondary effect of droughts or may cause temporary drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist.

Extreme heat can cause infrastructure damage to roads. Vulnerable factors can include building materials, insulation, and roofing that may not be adequately designed to withstand prolonged high temperatures. This can lead to increased energy consumption for cooling, potential structural damage, and even health risks for occupants. Moreover, properties lacking sufficient vegetation or green spaces may experience amplified heat effects, contributing to the urban heat island effect and exacerbating local temperature disparities.

Extreme cold impacts structures when pipes or water mains freeze and burst, causing damage. Extreme cold may also lead to higher electricity and natural gas demands to maintain appropriate indoor heating levels combined with damage caused to the delivery infrastructure such as frozen lines and pipes. Cold may impact transportation as well. Exposed populations may be at risk while waiting for public transportation, particularly when combined with wind-chill, and some vehicles may not start

¹⁵ Kuehn, L., and S. McCormick, 2017: Heat Exposure and Maternal Health in the Face of Climate Change. *Int. J. Environ. Res. Public Health*, 14(8), 853, doi:10.3390/ijerph14080853.

¹⁶ The Hidden Cost Of California's Hot Workplaces: 20,000 Job Injuries A Year | LAist <https://laist.com/news/climate-environment/the-hidden-cost-of-californias-hot-workplaces-20-000-job-injuries-a-year>

4. Risk Assessment

which impacts the commute of the workforce and, in worst case scenarios, the movement of emergency services personnel.

Based on previous extreme cold events, aside from millions of dollars in agricultural losses, the County has experienced over 500,000 million dollars in property losses and about 4 million dollars for extreme heat.

NATURAL ENVIRONMENT

Extreme heat may cause temporary drought-like conditions. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist. Extreme cold has the same impacts on exposed wildlife as it does on exposed people. Changing heating and cooling patterns globally can have destructive secondary impacts, intensifying a variety of weather-related disasters that directly impact jurisdictions.

CRITICAL FACILITIES

Extreme temperatures can impact pipe (extreme cold) and road infrastructure (extreme heat), but direct impacts to critical infrastructure is expected to be minimal. Critical infrastructure that relies on public utility systems that could be overloaded may see impacts during extreme temperature events. For extreme multi-day extreme heat or cold events, jurisdictions may need to open cooling or warming shelters to support those populations who are unable to seek relief from the temperature extremities.

FUTURE DEVELOPMENT

Since structures are not usually directly impacted by severe temperature fluctuations, continued development is less impacted by this hazard than others in the plan. However, pre-emptive cautions such as construction of green buildings that require less energy to heat and cool, use of good insulation on pipes and electric wirings, and smart construction of walkways, parking structures, and pedestrian zones that minimize exposures to severe temperatures may help increase the overall durability of the buildings and the community to the variations. Continued development also implies continued population growth, which raises the number of individuals potentially exposed to variations. Public education efforts should continue to help the population understand the risks and vulnerabilities of outdoor activities, property maintenance, and regular exposures during periods of extreme heat and cold.

VULNERABILITY TO SEVERE WEATHER: FOG (MEDIUM)

Fog issues are well documented in the Fresno County planning area. In recent years, there have been several large-scale accidents during periods of heavy fog. However, it should be noted that while fog is present, driver error is usually a significant contributory factor to these accidents. Fog is driven by weather patterns in the Central Valley that will continue to occur annually. According to the California Department of Transportation, nearly three in four fog-related traffic collisions are connected to motorists driving too fast. These collisions resulted in the highest fatality rates. Methods to prevent fog-related traffic collisions include reducing speed, driving with headlights on low beam, and use extra caution, use windshield wipers.¹⁷

PEOPLE

Reduced visibility is the greatest risk to people when heavy fog is prevalent. Particularly when fog is dense, it can be hazardous to drivers, mariners and aviators and contributes to numerous accidents each year. To reduce injury and harm, people should avoid driving when dense fog is prevalent, if possible. If driving is pertinent, emergency services advise driving with lights on low beam, watching for CHP pace vehicles to guide through fog, avoiding stopping on highways, and avoiding crossing traffic lanes.

PROPERTY

Based on historical information, the primary effect of fog has not resulted in significant damage to property, or the losses are typically covered by insurance.

NATURAL ENVIRONMENT

As referred to in the Climate Change Considerations section of the Fog hazard profile, California's winter tule fog has declined dramatically over the past three decades, raising a red flag for the state's multibillion dollar agricultural industry. Crops such as almonds, pistachios, cherries, apricots and peaches go through a necessary winter dormant period brought on and maintained by colder temperatures. Tule fog, a thick ground fog that descends upon the state's Central Valley between late fall and early spring, helps contribute to this winter chill.

CRITICAL FACILITIES

Fog can have devastating effects on transportation corridors in the County. Multi-car pileups have resulted from drivers using excessive speed for the conditions and visibility.

These accidents can cause multiple injuries and deaths and could have serious implications for human health and the environment if a hazardous or nuclear waste shipment were involved. Other disruptions from fog include delayed emergency response vehicles and school closures.

¹⁷ Safe Driving Tips for Foggy Conditions | Caltrans <https://dot.ca.gov/caltrans-near-me/district-3/d3-news/d3-news-release-23-137>

FUTURE DEVELOPMENT

Population and commercial growth in the County will increase the potential for complications with traffic accidents and commerce interruptions associated with dense fog.

VULNERABILITY TO SEVERE WEATHER: HEAVY RAIN/THUNDERSTORM/HAIL/LIGHTNING/WIND (LOW)

Many hazardous weather events are associated with thunderstorms. Under the right conditions, rainfall from thunderstorms causes flash flooding, killing more people each year than hurricanes, tornadoes or lightning. Lightning is responsible for many fires around the world each year, and it can cause fatalities. Hail up to the size of softballs damages cars and windows and kills crops and livestock caught out in the open. Strong (up to more than 120 mph) straight-line winds associated with thunderstorms knock down trees, power lines and mobile homes.¹⁸

PEOPLE

Exposure is the greatest danger to people from severe thunderstorms. People can be hit by lightning, pelted by hail, and caught in rising waters. Serious injury and loss of human life is rarely associated with hailstorms.

While national data shows that lightning causes more injuries and deaths than any other natural hazard except extreme heat, there doesn't seem to be any trend in the data to indicate that one segment of the population is at a disproportionately high risk of being directly affected. Anyone who is outside during a thunderstorm is at risk of being struck by lightning. Aspects of the population who rely on constant, uninterrupted electrical supplies may have a greater, indirect vulnerability to lightning. As a group, the elderly or disabled, especially those with home health care services relying on rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes, residential facilities, or other special needs housing may also be vulnerable if electrical outages are prolonged. If they do not have a back-up power source, rural residents, and agricultural operations reliant on electricity for heating, cooling, and water supplies are also especially vulnerable to power outages. Thunderstorms have the potential energy and strong winds to topple dead trees and injure people.

PROPERTY

Based on historical information, the primary effect of these storms has not resulted in significant injury or damage to people and property, or the losses are typically covered by insurance. It is the secondary hazards caused by weather, such as floods, that have had the greatest impact on the County.

NATURAL ENVIRONMENT

Severe thunderstorms are a natural environmental process. Environmental impacts include the sparking of potentially destructive wildfires by lightning and localized flattening of plants and crops by hail. As a natural process, the impacts of most severe thunderstorms by themselves are part of the overall natural cycle and do not cause long-term consequential damage.

¹⁸ Severe Weather 101: Thunderstorm Basics (noaa.gov) <https://www.nssl.noaa.gov/education/svrwx101/thunderstorms/>

4. Risk Assessment

CRITICAL FACILITIES

Because of the unpredictability of severe thunderstorm strength and path, most critical infrastructure that is above ground is equally exposed to the storm's impacts. Secondary impacts from these storms may include power outages which could significantly impact critical facilities and emergency services.

FUTURE DEVELOPMENT

New critical facilities, such as communication towers should be built to withstand heavy rain, monsoon, and hail damage. Future development projects should consider severe weather hazards at the planning, engineering and architectural design stage with the goal of reducing vulnerability. Stormwater master planning and site review should be considered for all new development. Thus, development trends in the County are not expected to increase overall vulnerability to the hazard, but population growth will increase potential exposure to hazards such as lightning.

VULNERABILITY TO SEVERE WEATHER: WINTER STORM (MEDIUM)

Winter storms can be dangerous from high winds, frigid temperatures, and precipitation (snow, sleet or freezing rain). These conditions can cause dangerous conditions on roads, physical illnesses such as hypothermia, and cause other weather-related injuries. Additionally, such extreme winter storms can disrupt critical facilities and services for a period of time.

PEOPLE

While virtually all aspects of the population are vulnerable to severe winter weather, there are segments of the population that are more vulnerable to the potential indirect impacts of a severe winter storm than others, particularly the loss of electrical power. If they do not have a back-up power source, rural residents reliant on electricity for heating and water supplies are also especially vulnerable to power outages. As a group, the elderly or disabled, especially those with home health care services that rely heavily on an uninterrupted source of electricity. Resident populations in nursing homes, residential facilities, or other special needs housing may also be vulnerable if electrical outages are prolonged. Additionally, those populations experiencing homelessness are at greater risk of winter storms due to the exposure from lack adequate shelter. Supportive services for these populations should be provided during a winter storm event.

Public education efforts may help minimize the risks to future populations by increasing knowledge of appropriate mitigation behaviors, clothing, sheltering capacities, and decision-making regarding snow totals, icy roads, driving conditions, and outdoor activities (all of which are contributors to decreased public safety during severe winter storms.) Previous winter storm events have caused a number of fatalities and injuries.

New establishments or increased populations who are particularly vulnerable to severe winter storms (such as those with health concerns or those who live in communities that may be isolated for extended periods of time due to the hazard) should be encouraged to maintain at least a 72-hour self-sufficiency as recommended by FEMA. Encouraging contingency planning for businesses may help alleviate future economic losses caused by such hazards while simultaneously limiting the population exposed to the hazards during commuting or commerce-driven activities.

PROPERTY

Winter storms can cause significant impacts to property from buildings to homes from snowfall and ice. Extreme temperatures from a winter storm can cause damage to pipes and can lead to leaks and flooding within interior spaces. Depending on the amount of snow and structural quality of roofs, snowfall can cause damage to roofs and in severe cases, collapse. Loose branches can drainpipes and damage guttering and roofs as well. In attention to homes, vehicles can be damaged from winter storms from car crashes and debris if storms are accompanied by strong winds. Previous winter storm events have caused vehicle accidents, and damage from fallen trees on homes, cabins, and outbuildings totaling over couple hundred thousand dollars.

4. Risk Assessment

NATURAL ENVIRONMENT

Natural resources may be damaged by the severe winter weather, including broken trees and death of wildlife. Unseasonable storms may damage or kill plant, crops, and wildlife, which may impact natural food chains until the next growing season. Most of these impacts would be short-term.

CRITICAL FACILITIES

Because of the unpredictability of severe winter storm strength and path, most critical infrastructure that is above ground is equally exposed to the storm's impacts. However, it is important that critical facilities are prepared and braced for disruption from winter storms. For example, winter storms can cause power outages and critical facilities should have backup power sources for such events to continue operations and services. Additionally, roads are especially susceptible to the effects of a winter storm and can be significantly damaged, causing car accidents and road closures.

FUTURE DEVELOPMENT

Future residential or commercial buildings in locations that receive large amounts of snow each year should be built to be able to withstand snow loads from severe winter storms. Jurisdictions within Sierra National Forest like Lakeshore, Big Creek, Cedar Grover and Rock Haven may benefit from taking these precautions. Population growth in these areas and growth in visitors will increase problems with road, business, and school closures, and increase the need for snow removal and emergency services related to severe winter weather events. Development in the County will increase the number of vehicles and persons vulnerable to this hazard.

VULNERABILITY TO SEVERE WEATHER: TORNADOES (MEDIUM)

PEOPLE

Populations are the most vulnerable to tornadoes. The availability of sheltered locations such as basements, buildings constructed using tornado-resistant materials and methods, and public storm shelters, all reduce the exposure of the population. However, there are also segments of the population that are especially exposed to the indirect impacts of tornadoes, particularly the loss of electrical power. These populations include the elderly or disabled, especially those with medical needs and treatments dependent on electricity. Nursing homes, Community Based Residential Facilities, and other special needs housing facilities are also vulnerable if electrical outages are prolonged since backup power generally operates only minimal functions for a short period of time.

Based on previous occurrences, there have been 60 recent tornadoes events in Fresno County ranging from EF0-EF2. According to the NOAA Storm Events Database, there have been zero deaths and six injuries.

PROPERTY

General damages are both direct (what the tornado physically destroys) and indirect, which focuses on additional costs, damages and losses attributed to secondary hazards spawned by the tornado, or due to the damages caused by the tornado. Depending on the size of the tornado and its path, a tornado is capable of damaging and eventually destroying almost anything. Construction practices and building codes can help maximize the resistance of the structures to damage.

Secondary impacts of tornado damage often result from damage to infrastructure. Downed power and communications transmission lines, coupled with disruptions to transportation, create difficulties in reporting and responding to emergencies. These indirect impacts of a tornado put tremendous strain on a community. In the immediate aftermath, the focus is on emergency services. Based on previous occurrences, there have been over 10 million dollars in property damage.

There are over eight million mobile homes in the United States and according to a 2018 study, mobile home residents are at increased risk to tornado impacts, injury, and mortality partly because these structures are inadequate to withstand tornadic winds. The likelihood of a tornado-related fatality in a mobile home is 15 to 20 times greater than in permanent homes. In Fresno County, there are several mobile homes in the jurisdiction and would be an increased risk for tornado impacts.¹⁹ Recently, in March 2024, An EF3 tornado pummeled through Indian Lakes, Ohio, which is heavily occupied by mobile homes. Several deaths and injuries occurred, and a Mass Casualty Incident (MCI) was declared. Nationwide, about 53% of all people killed at home by a tornado between 1996 and 2023 were killed in mobile and manufactured homes according to an AP analysis National Oceanic and Atmospheric and Administration data.²⁰

¹⁹ Severe Storm, Supercell, and Tornado Trends | Climate Central <https://www.climatecentral.org/climate-matters/severe-storm-supercell-and-tornado-trends-2023>

²⁰ Indian Lake tornadoes expose vulnerability of mobile homes (desmoinesregister.com) <https://www.desmoinesregister.com/story/news/state/2024/03/17/indian-lake-tornados-expose-vulnerability-of-mobile-homes/72984880007/>

4. Risk Assessment

NATURAL ENVIRONMENT

Tornadoes can cause massive damage to the natural environment, uprooting trees and other debris. This is part of a natural process, however, and the environment will return to its original state in time.

CRITICAL FACILITIES

Public gathering places including (but not limited to) schools, community centers, shelters, nursing homes and churches, may have increased impacts at certain times of day if struck by a tornado. Tornadoes have the potential to cause major disruptions to critical facilities and services, all critical facilities are at risk as the direction and path of a tornado is not particularly more likely to occur in one area of the city to another. Tornado can cause power outages, disrupt communications, damage schools, and government facilities. Debris from the tornado can block and damage major highways and roads, which can make it difficult for emergency services to reach people in need of medical assistance.

FUTURE DEVELOPMENT

As the County continues to increase in population, the number of people and housing developments exposed to the hazard increases. Proper education on building techniques and the use of sturdy building materials, basements, attached foundations, and other structural techniques may minimize the property vulnerabilities. Public shelters at parks and open spaces may help reduce the impacts of tornadoes on the recreational populations exposed to storms.

4. Risk Assessment

VULNERABILITY TO SOIL HAZARDS: EROSION (LOW)

Erosion is the geological process in which earthen materials are worn away and transported by natural forces such as wind or water.

PEOPLE

Erosion generally only damage structures, with no direct impacts on people.

PROPERTY

While impacts are slow to accumulate, costly damage to residences, facilities, roads, and other infrastructure could occur. Erosion occurs over a long period of time, though weather and other climatic factors can catalyze the magnitude of impact. Properties near construction sites are the most vulnerable to erosion, followed by structures on/near steep slopes, disturbed pits/quarries, and runoff channels.

NATURAL ENVIRONMENT

There are generally no significant impacts to the natural environment associated with erosion.

CRITICAL FACILITIES

Roads, pipelines and facilities can be impacted but significant impacts are not anticipated.

FUTURE DEVELOPMENT

Erosion controls such as silt fences, netting, and vegetative coverage can be utilized to minimize soil erosion around at-risk properties. During construction, erosion risk can be reduced through the use of paved roads and runoff control features, while vegetation removal should be minimized, and drainage ditches constructed only where necessary.

4. Risk Assessment

VULNERABILITY TO SOIL HAZARDS: EXPANSIVE SOILS (LOW)

Expansive soils are those with excessive swelling clay minerals such as montmorillonite. The presence of expansive clay minerals in soils can cause excessive swelling when the soil comes into contact with water and also shrinkage when it undergoes drying.

PEOPLE

No direct impacts on people are anticipated. Should an impact occur, it is anticipated to be localized.

PROPERTY

While impacts are slow to accumulate, costly damages property could occur. The majority of the hazard's significance is drawn from the exposure of existing development to this hazard. Older construction may not be resistant to the swelling soil conditions and, therefore, may experience expensive and potentially extensive damages. This includes heaving sidewalks, structural damage to walls and basements, the need to replace windows and doors, or dangers and damages caused by ruptured pipelines. Newer construction may have included mitigation techniques to avoid most damage from the hazard, but the dangers continue if mitigation actions are not supported by homeowners. For example, the maintenance of grading away from foundations and the use of appropriate landscaping near structures must be continued to prevent an overabundance of water in vulnerable soils near structures. While continued public education efforts may help increase compliance for landscaping and interior finishing mitigation actions, physical reconstruction of foundations is probably not feasible in all but the most heavily impacted of existing development. Therefore, damages may be expected into the future for existing structures.

CRITICAL FACILITIES

Roads, pipelines and facilities can be impacted but significant impacts are not anticipated.

NATURAL ENVIRONMENT

No significant impacts are anticipated.

FUTURE DEVELOPMENT

The recognition of expansive soils typically allows it to be mitigated in future development.

VULNERABILITY TO SOIL HAZARDS: LAND SUBSIDENCE (MEDIUM)

The majority of land subsidence is caused by groundwater pumping, which has been a significant within Fresno County and the greater San Joaquin Valley for decades. In fact, this area has one of the largest land subsidence rates, with more than 1 foot of land subsidence per year.

PEOPLE

Typically, this hazard results in property damage, not risk to human life.

PROPERTY

Subsidence may result in serious structural damage to buildings, roads, irrigation ditches, underground utilities, and pipelines. It can disrupt and alter the flow of surface or underground water. Weight, including surface developments such as roads, reservoirs, and buildings and manmade vibrations from such activities as blasting or heavy truck or train traffic can accelerate natural processes of subsidence, or incur subsidence over manmade voids. Fluctuations in the level of underground water caused by pumping or by injecting fluids into the earth can initiate sinking to fill the empty space previously occupied by water or soluble minerals. Available data prevented further estimation of loss potential.

CRITICAL FACILITIES

Linear infrastructure (roads, buried pipelines) tends to have the most risk of land subsidence. Infrastructure at risk includes levees (which can lower their ability to contain flood flows), the California Aqueduct, and Interstate 5. Other buried infrastructure on the west side of the Valley could be at risk as well. Canals such as the mighty Friant-Kern, delivering water to farms along the valley's eastside, and the California Aqueduct to the westside farms and onto southern California, can shift, stopping water from following the designs of gravity downhill and preventing its efficient delivery.

NATURAL ENVIRONMENT

Typically, there is little impact to the natural environment from this hazard.

FUTURE DEVELOPMENT

The areas with the highest susceptibility to subsidence include the western edge of the Central Valley, where development trends have been slower than the more urbanized areas of the County. As such, vulnerability to this hazard is not anticipated to increase with new development, provided that land use planning and engineering practices are followed. Increased efforts to monitor and manage groundwater pumping, increased accuracy of mapping, and emphasis on appropriate grading and ground compaction during development will help alleviate vulnerability for future development in unknown areas of risk.

VULNERABILITY TO VOLCANOES (LOW)

The Mono Lake-Long Valley area located adjacent to the north and east of the northernmost areas of Fresno County is the only known volcanic hazard to Fresno County (shown in **Figure 74. Fresno County Long Valley Volcanic Region**). Because of the limited area affected and remote potential of an eruption, the significance is rated low. A more likely scenario would involve ash from a regional event which results in two or more inches across much of the mountainous region including Millerton Lake, Pine Flat Lake to the Sierra Nevada Mountains.

PEOPLE

While a remote possibility for Fresno County, volcanoes could have significant impacts on people. These include ash accumulation on the ground and in the air, that can affect the ability to breathe. More significant, though remote, could be the need to evacuate the area entirely, and a temporary or permanent relocation of large segments of the population.

PROPERTY

Volcanoes can cause two major types of impacts to the built environment. One type of impact has to do with the accumulation of ash and eruption debris on infrastructure, which needs to be removed. The other type of impact is direct impacts from lava flows and lahars, which can destroy buildings and infrastructure in their path. Due to the remote possibility of occurrence damage is not anticipated to be significant in the near future.

NATURAL ENVIRONMENT

Volcanoes can have significant impacts on the natural environment. The direct impacts of volcanoes can also destroy the landscape around the eruption – flattening trees, starting fires, moving debris and contaminating water sources. Volcanic eruptions can even affect the global climate. According to research conducted by NASA, after Mount Pinatubo in the Philippines erupted in 1991, strong winds spread the aerosol particles from the plume around the globe. The result was a measurable cooling of the Earth's surface for a period of almost two years.

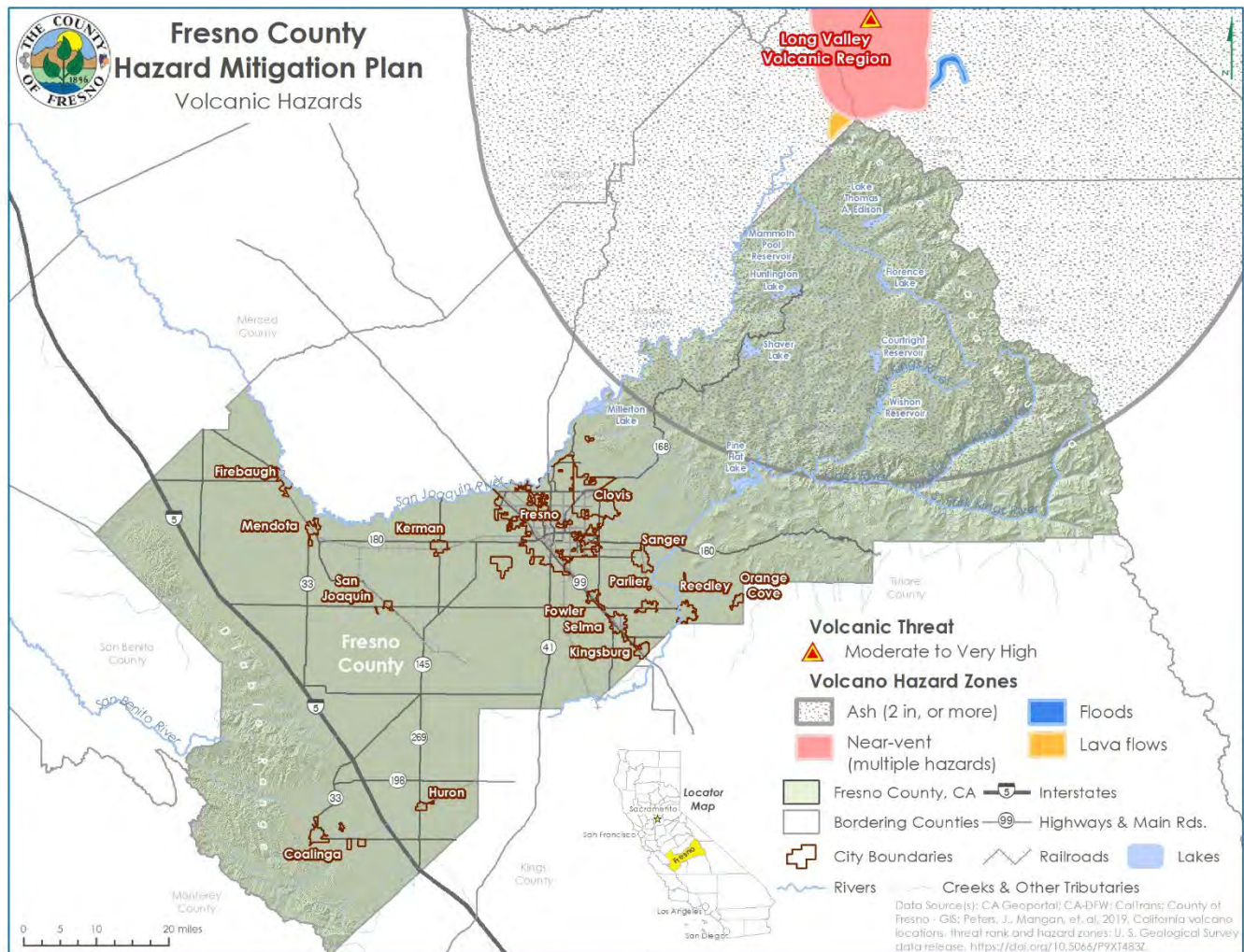
CRITICAL FACILITIES

Due to the low probability of this hazard and Mono Lake Valley Hazard Area stopping short of Fresno County jurisdictional boundaries, there are no critical facilities that are impacted. However, ash from the volcanic eruption could cause damage or disruption to critical services on the eastern side of the County.

FUTURE DEVELOPMENT

The Mono Lake-Long Valley area located adjacent to the north and east of the northernmost areas of Fresno County is the only known volcanic hazard to Fresno County. Development near the Valley is more at risk to volcanic ash than lava flow based on the lahar zone for the volcano. Destructive impacts of a volcanic eruption cannot be easily mitigated by building codes or smart construction.

Figure 74. Fresno County Long Valley Volcanic Region



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; Peters, J., Mangan, et al, 2019, California volcano locations, threat rank and hazard zones: U.S. Geological Survey data release, <https://doi.org/10.5066/P9XT483X>

VULNERABILITY TO WILDFIRE (HIGH)

Fresno County planning area's wildfire risk and vulnerability is of significant concern, with some areas of the planning area being at greater risk than others as described further in this section. High fuel loads in the planning area, along with geographical and topographical features 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 and more urbanized area of central Fresno is not immune from fire. During the fire season, the dry vegetation and hot and sometimes windy weather combined with a denser population result in an increase in the number of ignitions.

Fresno County's wildfire vulnerability is the result of increased development encroaching into forested and annual grassland areas, typically referred to as the wildland-urban interface. As development continues throughout the planning area, especially in the interface, the risk and vulnerability to wildfires will likely increase. Two fire safe councils have been created to address this increased wildfire threat in the wildland-urban interface: Highway 168 and Oak to Timberline fire safe councils.

PEOPLE

Wildfires can be deadly to populations and pose a risk to public health. However, in the planning area, it is more likely that the planning area will be impacted by poor air quality driven by wildfire smoke from near wildfires in the county or state. However, if a wildfire were to impact the planning area, the below section outlined possible impacts to the population.

Public Health

Evacuation

Communities may need to evacuate their homes in order to remove themselves from the direct path of the wildfire. However, some individuals may not have the resources or access to emergency information in order to evacuate. Unfortunately, in some cases, there may not be enough warning time for communities to evacuate even if they have the resources to evacuate before the wildfire burns through. Populations that may have difficulty, may not have the resources, or may experience barriers to evacuation, include but are not limited to:

- Rural communities
- Individuals with disabilities
- Individuals with limited English proficiency
- Individuals with limited or no access to the internet or emergency information
- Individuals with no access to personal transportation
- Older adults

Additionally, individuals and communities may not be aware of shelters to evacuate to or have friends or family to stay with during the evacuation.

4. Risk Assessment

Wildfire Smoke and Poor Air Quality

Particulate matter from wildfire smoke can worsen air quality and cause adverse health effects to population health. Wildfire exposes communities to multiple environmental hazards from combustion due to the fire itself to air pollution from smoke and byproducts of combustion and ash. Approximately 90 percent of total particle mass emitted from wildfires consists of fine particles (i.e., PM_{2.5}). Impacts of poor air quality from wildfire smoke include the following:

- Eye and respiratory tract irritation
- Reduced lung function
- Bronchitis
- Exacerbation of asthma
- Heart failure
- Premature death
- Aggravation of pre-existing respiratory and cardiovascular disease
- Persistent cough, phlegm, wheezing, and difficulty breathing

The Air Quality Index (AQI) measures the severity of air quality and is broken down into 6 categories to communicate the level of health concern for public health, shown in **Table 156. Air Quality Index**.

Table 156. Air Quality Index

Air Quality Index Levels of Health Concern	Numerical Value	Description
Good (Green)	0 to 50	Air quality is considered satisfactory, and air pollution poses little or no risk.
Moderate (Yellow)	51 to 100	Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.
Unhealthy for Sensitive Groups (Orange)	101 to 150	Members of sensitive groups may experience health effects. The general public is not likely to be affected.
Unhealthy (Red)	151 to 200	Everyone may begin to experience health effects; members of sensitive groups may experience more serious health effects.
Very Unhealthy (Light Purple)	201 to 300	Health alert; everyone may experience more serious health effects.
Hazardous (Dark Red)	301 to 500	Health warnings of emergency conditions. The entire population is more likely to be affected.

Source: AQI

The majority of healthy adults and children will recover quickly from wildfire smoke exposure and poor air quality and will not experience long-term health consequences. However, certain at-risk populations may be at greater risk of experiencing severe acute and chronic symptoms which include individuals

4. Risk Assessment

with asthma and other lung disease, children, older adults, individuals experiencing homelessness and outdoor workers. ²¹

Air pollution in and around western parts of Fresno County are already elevated due to cars, trucks, factories, and other activities in the area. Based on the CalEnviroScreen, Western Fresno County has the highest percentile in PM2.5 and ozone.

Wildfire Vulnerability on Population

The historical and potential impacts of wildfire on populations include threat of injury or death, possible agricultural sector job loss, secondary economic losses to businesses located in the wildland-urban interface and within or near wildland resources like parks and national forests, and loss of public access to recreational resources. Fire suppression may also require increased cost to local and state government for water acquisition and delivery, especially during periods of drought when water resources are scarce. With the population moving to the foothills, road and home construction is increasing, therefore, more people will be at risk to wildfires.

The data and mapping demonstrate variations in vulnerability (population, population growth and density) across jurisdictions, and enables the analysis to identify the location of each jurisdiction relative to its risk zone on the wildfire risk map. Other at-risk populations include the location of the County's wildland recreational areas where persons might be located during a wildfire event, such as state and national parks and forests.

Wildfire risk is of greatest concern to populations residing in the moderate, high, and very high wildfire threat zones. GIS was used to estimate populations within the hazard zones, based on the residential parcels with improvements in the wildfire threat zones. Results are shown by census tract in **Table 156. Populations at Risk of Wildfire: Fresno County Planning Area**. Census tracts do not always adhere to local boundaries; if a census tract was completely within a city boundary or unincorporated Fresno County it was labeled as such in the following tables. If a tract intersected more than one jurisdiction, all jurisdictions within the tract were labeled in the following tables.

Table 157. Populations at Risk of Wildfire: Fresno County Planning Area

Jurisdiction(s)	Wildfire Hazard Severity Zones		
	Moderate	High	Very High
Clovis; Fresno; Unincorporated Fresno County	167	0	0
Clovis; Unincorporated Fresno County	2,494	2,070	827
Coalinga; unincorporated Fresno County	1,411	4,064	1,935
Huron; Unincorporated Fresno County	168	267	0
Mendota; Unincorporated Fresno County	316	762	67

²¹ WILDFIRE SMOKE: A GUIDE FOR PUBLIC HEALTH OFFICIALS (airnow.gov)
<https://www.airnow.gov/sites/default/files/2021-05/wildfire-smoke-guide-revised-2019-chapters-1-3.pdf>

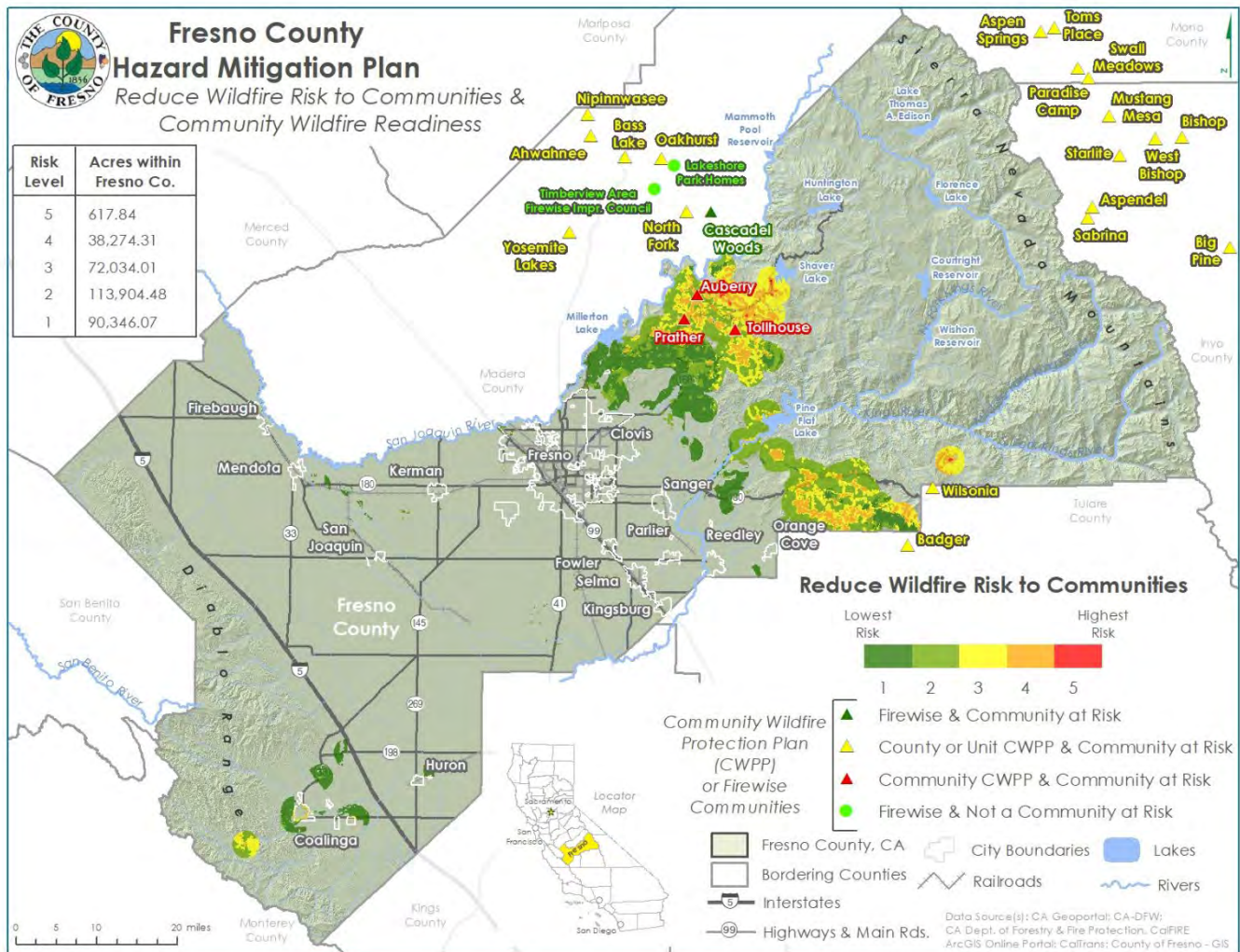
4. Risk Assessment

Reedley; Unincorporated Fresno County	135	68	0
Unincorporated Fresno County	687	4,125	2,947
Totals	5,378	11,356	5,775

Sources: California Department of Forestry and Fire Protection and Fresno County data

In another assessment of community vulnerability, the 2010 FRAP assessment utilized the Priority Landscape unit of analysis and defined it as the convergence of areas with high wildfire threat and human infrastructure assets. The analytical framework follows the same pattern of aligning threats with key assets to define the priority landscape. In this case, the threat is specific to the nature of fire that can cause significant losses to human infrastructure, personal property and pose a risk to public safety. These risk areas are shown in **Figure 75. Fresno County Wildland Urban Interface (WUI) Zones.**

Figure 75. Fresno County Wildland Urban Interface (WUI) Zones



Source: CA Geoportal; CA-DFW; CA Department of Forestry and Fire Protection, CalFIRE ArcGIS Online Portal; CalTrans; County of Fresno - GIS

PROPERTY

The historical and potential impacts of wildfire on property include crop loss, injury and death of livestock and pets, and damage to infrastructure, homes and other buildings located throughout the wildfire risk area, with greatest potential impact on property, buildings and infrastructure located within high and very high hazard zones including the urban-wildland interface, and buildings and infrastructure located within forested lands, including (but not limited to) national forests and parks. With the population moving to the foothills, road and home construction is increasing, therefore, more properties and structures are likely at risk and will continue to be at risk if wildfire mitigation actions are not initiated.

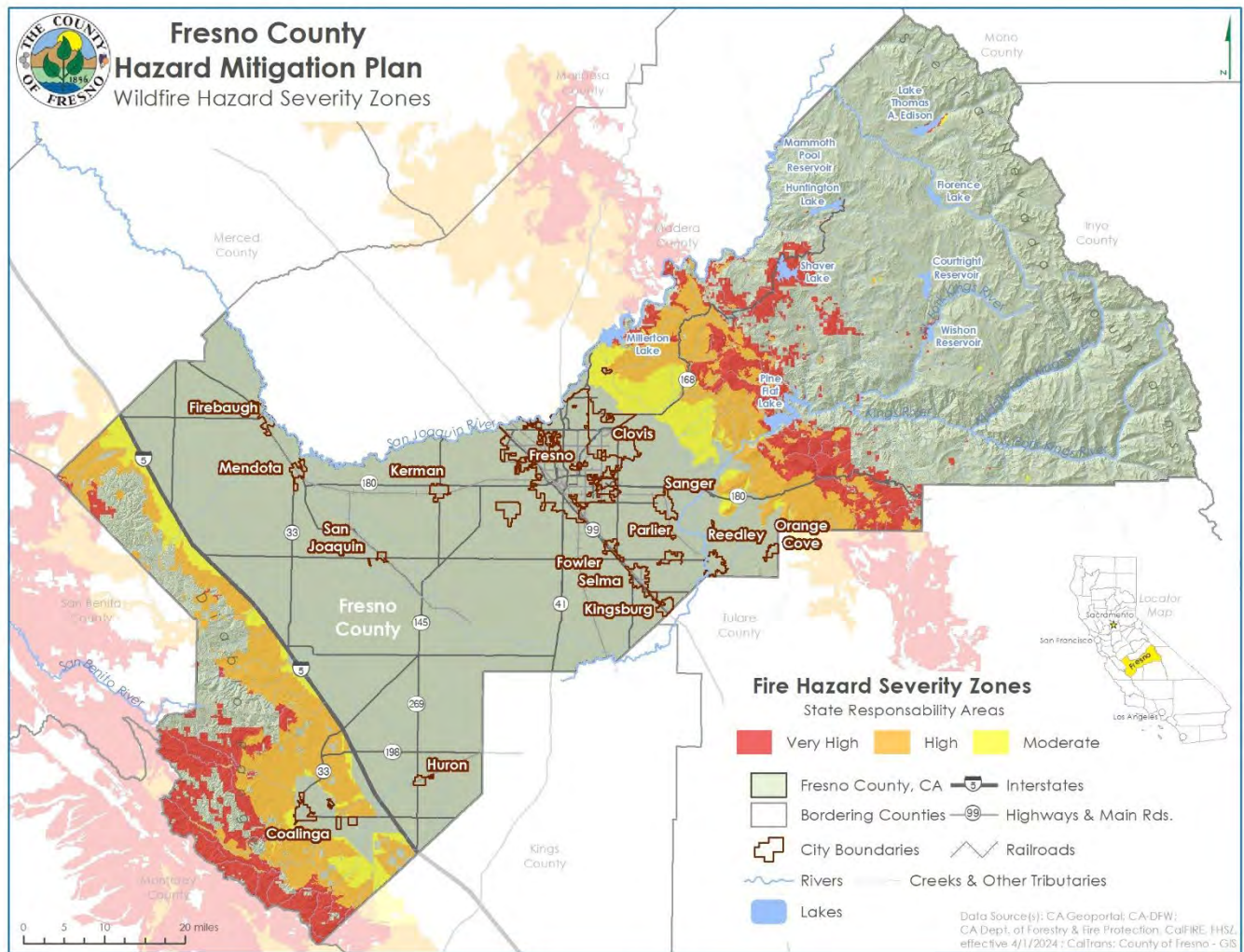
METHODOLOGY

Using CAL FIRE's Fire Hazard Severity Zones (FHSZ), an assessment of wildfire risk in the Fresno County planning area. GIS was used to create a centroid, or point, representing the center of each parcel polygon, which was overlaid on the wildfire layer. For the purposes of this analysis, the wildfire hazard zone that intersected the centroid was assigned as the hazard zone for the entire parcel. For purposes of this analysis, it was assumed that every parcel with an improved value greater than zero was developed in some way. Only improved parcels and the value of their improvements were analyzed. The wildfire data was acquired from the CAL FIRE Fire and Resource Assessment Program; the layer used was the Fire Hazard Severity Zones, Very High zones in LRA.

The results are summarized in the tables and maps that follow. The Community Wildfire Threat used in this analysis was derived from a new and unique spatial dataset, Fire Hazard Severity Zones (FHSZ). This dataset was explicitly built for adopting new ignition-resistant building code standards and adopted by the California Building Commission in 2007. It is constructed to describe the nature and probability of fire exposure to structures, including those lands that are highly urbanized, but in close proximity to open wildlands (WUI). Details of the FHSZ mapping project are available on the FRAP website.

As the following **Figure 76. Fresno County Wildfire Hazard Severity Zones** illustrates that there is a significant fire hazard in the eastern and far western portions of the County. The majority of the structures in the WUI are in the Sierra foothills region.

Figure 76. Fresno County Wildfire Hazard Severity Zones



Source: CA Geoportal; CA-DFW; CA Department of Forestry and Fire Protection, CalFIRE, ArcGIS Online Portal; CalTrans; County of Fresno - GIS

4. Risk Assessment

Once the number of parcels and their values were determined, contents values were estimated (based on HAZUS inventory data) to determine total values at risk by hazard zone. Overlaying the fire hazard severity zone map with the County parcel layer, it is evident that the Fresno County planning area has significant assets at risk to wildfire. Further information on the parcels, buildings, and values at risk to wildfire are provided in **Table 158. Parcels, Buildings, and Values at Risk from Wildfire by Severity** and **Table 159. Parcels, Buildings, and Values at Risk from Wildfire by Property Type**.

Table 158. Parcels, Buildings, and Values at Risk from Wildfire by Severity

Fire Severity Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Very High	10,500	7,010	\$274,775,201	\$143,167,719	\$418,147,320
High	9,416	8,481	\$129,022,493	\$164,156,078	\$293,277,381
Moderate	2,947	1,717	\$49,694,149	\$35,718,516	\$85,412,665
Total	22,863	17,208	\$453,491,843	\$343,042,313	\$796,837,366

Table 159. Parcels, Buildings, and Values at Risk from Wildfire by Property Type

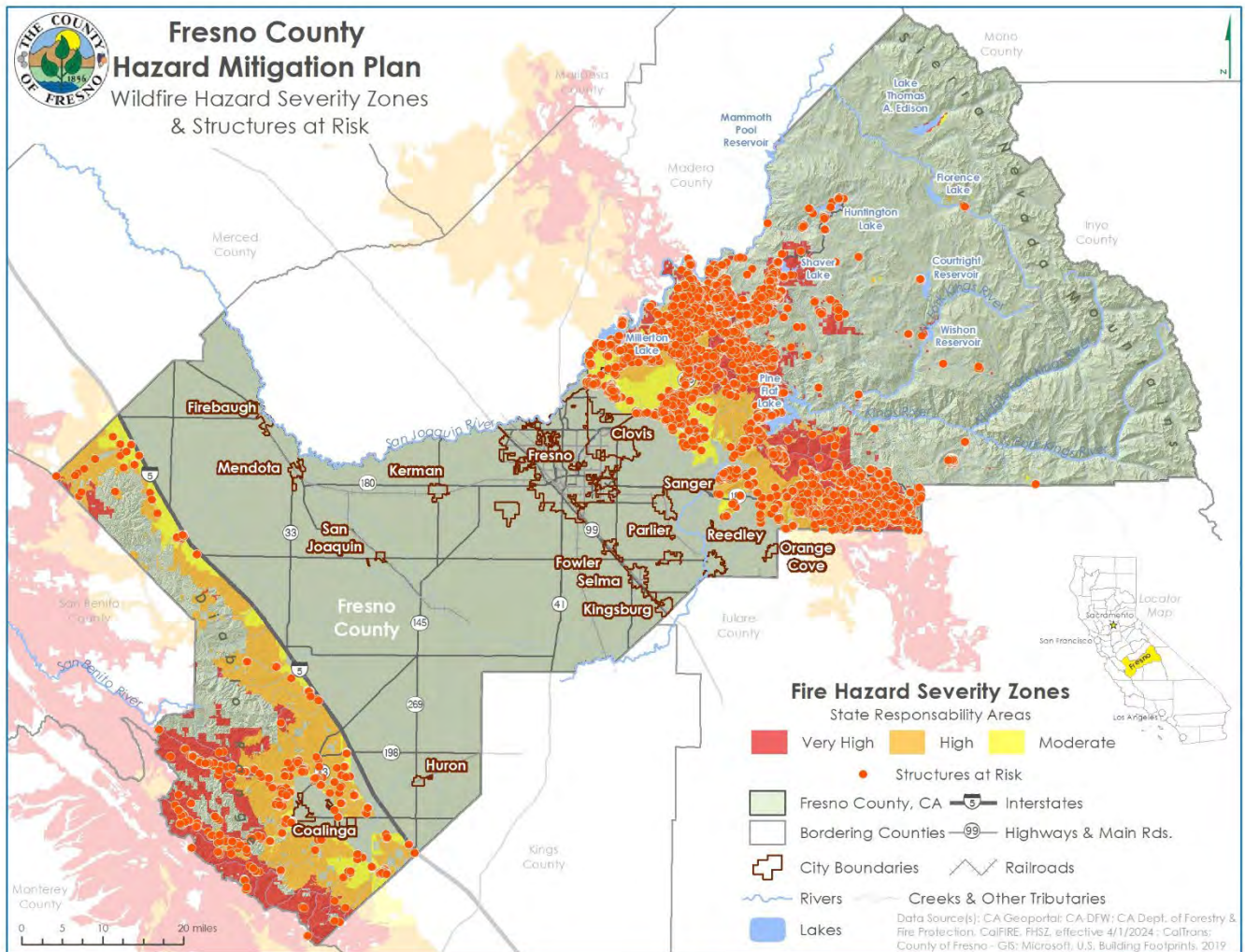
Fire Severity Type	Property Type	Parcels	Building Count	Improved Value (\$)	Land Value (\$)	Total Assessor Value (\$)
Moderate	Agricultural	160	14	\$17,741,004	\$17,391,307	\$35,132,311
	Apartments	0	0	\$0	\$0	\$0
	Church	0	0	\$0	\$0	\$0
	Commercial	0	0	\$0	\$0	\$0
	Industrial	0	0	\$0	\$0	\$0
	Office/ Professional Space	0	0	\$0	\$0	\$0
	Outlot & Common Area	0	0	\$0	\$0	\$0
	Primary Use Not Designated	35	4	\$0	\$0	\$0
	Recreation	0	0	\$0	\$0	\$0
	Single-Family Residence	95	160	\$31,619,174	\$14,726,259	\$46,345,433
	Vacant	220	4	\$333,971	\$3,600,950	\$3,934,921
	Unknown	2,437	1,535	\$0	\$0	\$0
	Total	2,947	1,717	\$49,694,149	\$35,718,516	\$85,412,665
High	Agricultural	305	146	\$29,695,292	\$22,652,828	\$52,391,620
	Apartments	1	2	\$15,767	\$68,325	\$84,092
	Church	2	5	\$597,244	\$97,745	\$694,989
	Commercial	6	6	\$6,088,420	\$1,052,563	\$7,144,393
	Industrial	30	32	\$47,971,460	\$104,774,399	\$152,797,759

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Fire Severity Type	Property Type	Parcels	Building Count	Improved Value (\$)	Land Value (\$)	Total Assessor Value (\$)
	Office/ Professional Space	2	4	\$201,468	\$21,246	\$222,714
	Outlot & Common Area	0	0	\$0	\$0	\$0
	Primary Use Not Designated	90	36	\$0	\$0	\$0
	Recreation	1	1	\$12,734	\$15,664	\$28,398
	Single-Family Residence	395	674	\$43,729,477	\$23,564,953	\$67,294,430
	Vacant	993	65	\$710,631	\$11,908,355	\$12,618,986
	Unknown	7,591	7,510	\$0	\$0	\$0
	Total	9,416	8,481	\$129,022,493	\$164,156,078	\$293,277,381
Very High	Agricultural	486	235	\$8,353,374	\$17,806,161	\$26,159,535
	Apartments	0	0	\$0	\$0	\$0
	Church	1	1	\$245,547	\$115,092	\$360,639
	Commercial	1	1	\$25,506	\$11,295	\$36,801
	Industrial	3	0	\$)	\$30,501	\$30,501
	Office/ Professional Space	0	0	\$0	\$0	\$0
	Outlot & Common Area	8	8	\$0	\$1,012	\$1,012
	Primary Use Not Designated	201	68	\$0	\$0	\$0
	Recreation	5	4	\$283,951	\$447,894	\$731,845
	Single-Family Residence	577	311	\$264,346,339	\$82,162,231	\$346,508,570
	Vacant	547	132	\$1,520,484	\$42,593,533	\$44,318,417
	Unknown	8,671	6,250	\$0	\$0	\$0
	Total	10,500	7,010	\$274,775,201	\$143,167,719	\$418,147,320

Sources: Fresno County Assessor's Office; California Department of Forestry and Fire Protection

Figure 77. Fresno County Wildfire Hazard Severity Zones & Structure at Risk



Source: CA Geoportal; CA-DFW; CA Department of Forestry & Fire Protection, CalFIRE, FHSZ, effective 4/1/2024; CalTrans; County of Fresno --GIS; Microsoft, U.S. Building Footprints, 2019

NATURAL ENVIRONMENT: WILDFIRE POTENTIAL IMPACT TO ECOSYSTEMS

Natural resources are important to include in benefit-cost analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting watersheds will help maintain the quantity and quality of water, timber production and promote carbon sequestration.

Given the previous discussion on wildfire frequency and severity, research conducted as part of the 2010 FRAP Assessment brings to light the factors that shape the potential impact of wildfire events, namely the vulnerability characteristics of ecosystems, populations, buildings and infrastructure that lie within wildfire risk areas within the planning area and beyond.

With regard to ecosystems, **Figure 78. Defining Wildfire Priority Landscapes** shows the analytical framework for identifying the Priority Landscape to assess the risk and feed the mitigation strategy for dealing with preventing damage to ecosystems as a result of wildfire.

Figure 78. Defining Wildfire Priority Landscapes



Source: U.S. Forest Service

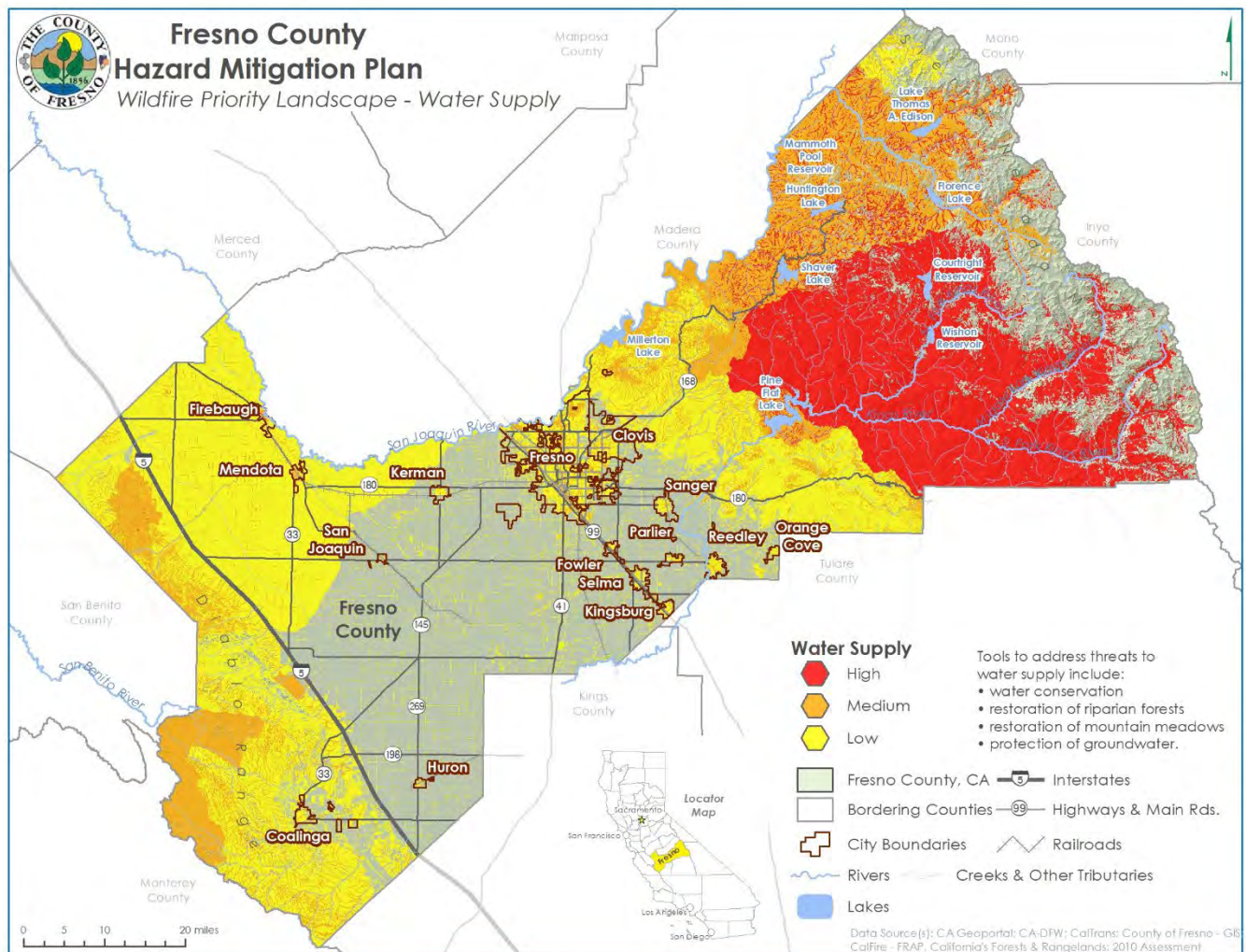
In analyzing the threats, the Assessment defined a particular small area as a Stand-Level threat and is derived from FRAP's fire threat data compiled in 2004. It is based on fuel conditions, observed fire frequency and expected fire weather conditions.

The Landscape-Level wildfire threat attempts to capture the threat of damage to ecosystems at the landscape scale. This is derived by calculating the percentage of each vegetation type in each unique tree seed zone that is "unhealthy", based on being in a condition class that indicates significant deviation from historical fire regimes—specifically the proportion of a given ecosystem that is in either condition class two or three. This approach recognizes that stand-level threats have elevated importance if cumulatively they have potential to damage broader landscape-level ecosystems. A detailed discussion of the metrics can be found on the FRAP website²².

Overall, results of the Assessment indicate that Priority Landscape identifies priority areas within ecosystems that have high levels of threat from future fires, and should be viewed as a basic assessment of need for strategies and adoption of tools to protect these key areas in the future. It is constructed by combining stand- and landscape-level threats to create a composite threat map, and classifying the final product into low, medium, and high priority landscapes. The following maps depict the Assessment findings, showing Fresno County Wildfire Priority Landscapes based on threats to water supply and water quality. Trends in landscape characteristics indicate high threats to water quality and supply in the eastern portion of the County, in the Sierra Nevada region.

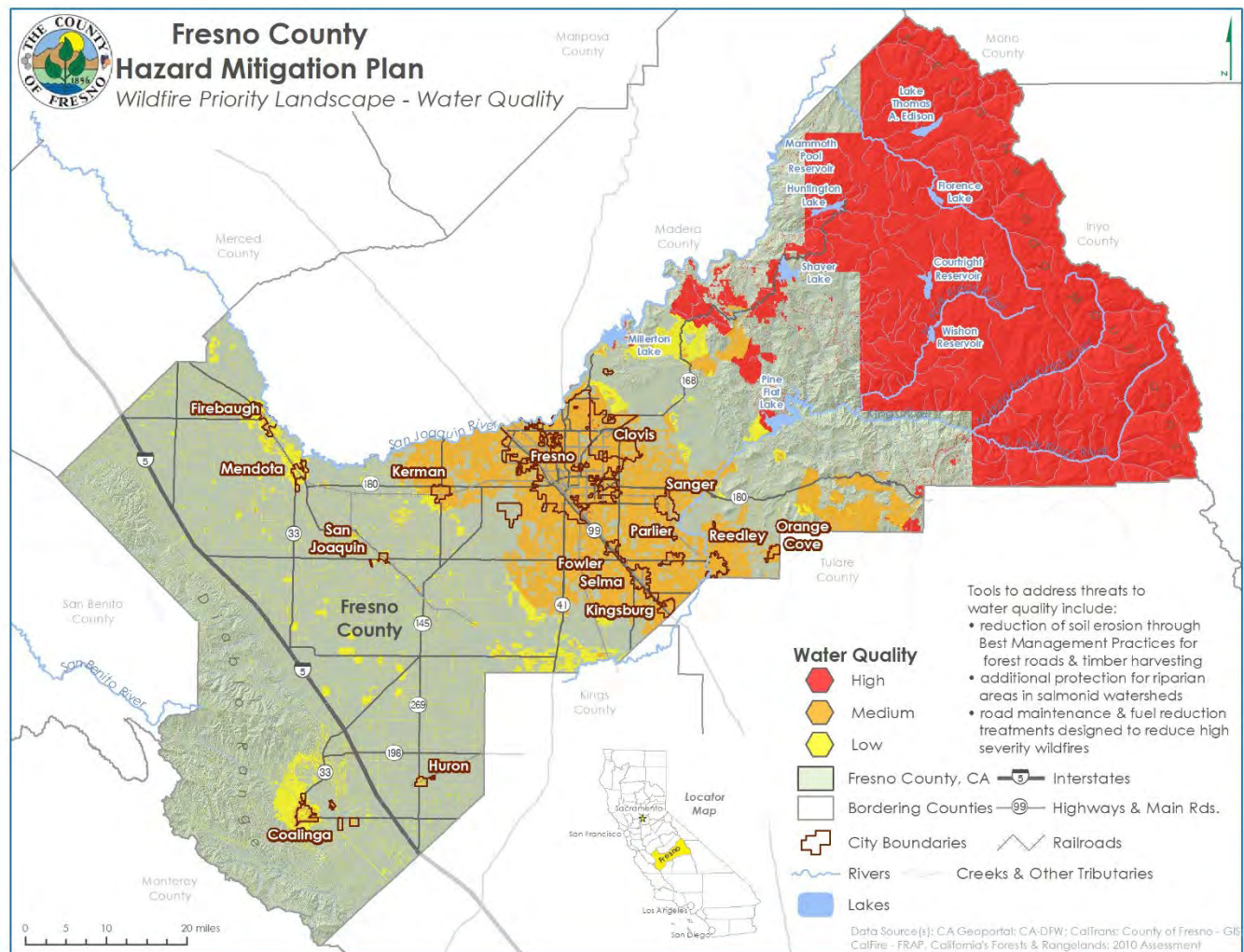
²² https://frap.fire.ca.gov/assessment2003/Chapter3_Quality/wildfire.html

Figure 79. Fresno County Wildfire Priority Landscape - Water Supply



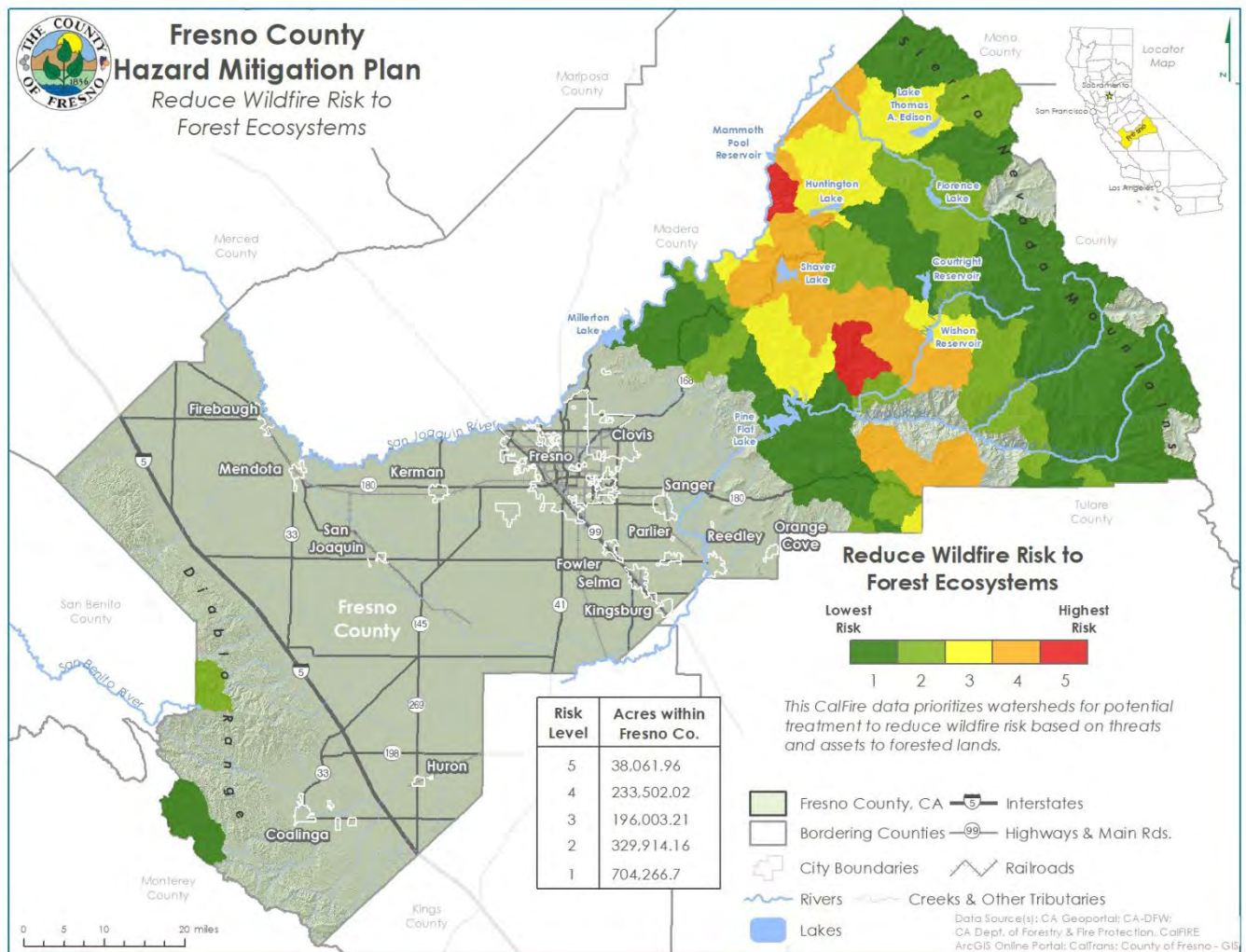
Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS, CalFIRE – FRAP, California's Forests & Rangelands: 2010 Assessment

Figure 80. Fresno County Wildfire Priority Landscape - Water Quality



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS CalFire – FRAP, California's Forests and Rangelands: 2010 Assessment

Figure 81. Fresno County Reduce Wildfire Risk to Forest Ecosystems



Source: CA Geoportal; CA-DFW; CA Department of Forestry and Fire Protection, Cal FIRE ArcGIS Online Portal; CalTrans; County of Fresno - GIS

4. Risk Assessment

The Fresno County planning area has substantial cultural and natural resources located throughout the County as previously described. Wildfires also cause watershed and ecosystem losses. These losses include impacts to water supplies and water quality as well as air quality. Another loss is to the aesthetic value of the area. Major fires that result in visible damage detract from that value. Other natural resources at risk from wildfire include wildland recreation areas, wildlife and habitat areas, rangeland, and timber resources. The loss to these natural resources would be significant.

The historical and potential impacts of wildfire on the natural environment are widespread throughout public and private lands within the County, exacerbated by drought and tree mortality, with impacts to all flora and fauna, and the destabilization (erosion, subsidence) of land dependent on healthy plants and trees for stability.

The data and mapping capture the full range of vulnerable species, habitat types, biotic regions, parks and forests, and other environmental features within Fresno County. Also provided is each jurisdiction’s location within these natural areas, and the location of both jurisdictions and natural areas/species relative to the wildfire risk zones on the wildfire risk map. It should be noted that those species and natural zones most greatly affected by drought appear to be most vulnerable to wildfire. The history of drought and (pine) tree mortality locations in the County highly correlates with the Very High hazard zone on the Wildfire Severity Map.²³

CRITICAL FACILITIES

Wildfire impacts to critical facilities include structural damage or destruction, risk to persons located within facilities, and interruption of facility operations and critical functions. Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. An analysis was performed using GIS software to determine where critical facilities are located within the wildfire threat zones. **Table 160. Critical Facilities at Risk to Wildfire by Hazard Class: Fresno County Planning Area** lists the critical facilities in the different wildfire hazard zones for the entire Fresno County planning area.

Table 160. Critical Facilities at Risk to Wildfire by Hazard Class: Fresno County Planning Area

Jurisdiction	Fire Severity	Facility Type	Counts
Unincorporated	Very High	Communications Facilities	16
		Fire Stations	6
		Electric Power Facilities	4
		Schools	2
	High	Communications Facilities	2
		Fire Stations	7
		Electric Power Facilities	3
		Schools	9
	Moderate	Communications Facilities	3

Sources: Fresno County GIS, California Department of Forestry and Fire Protection

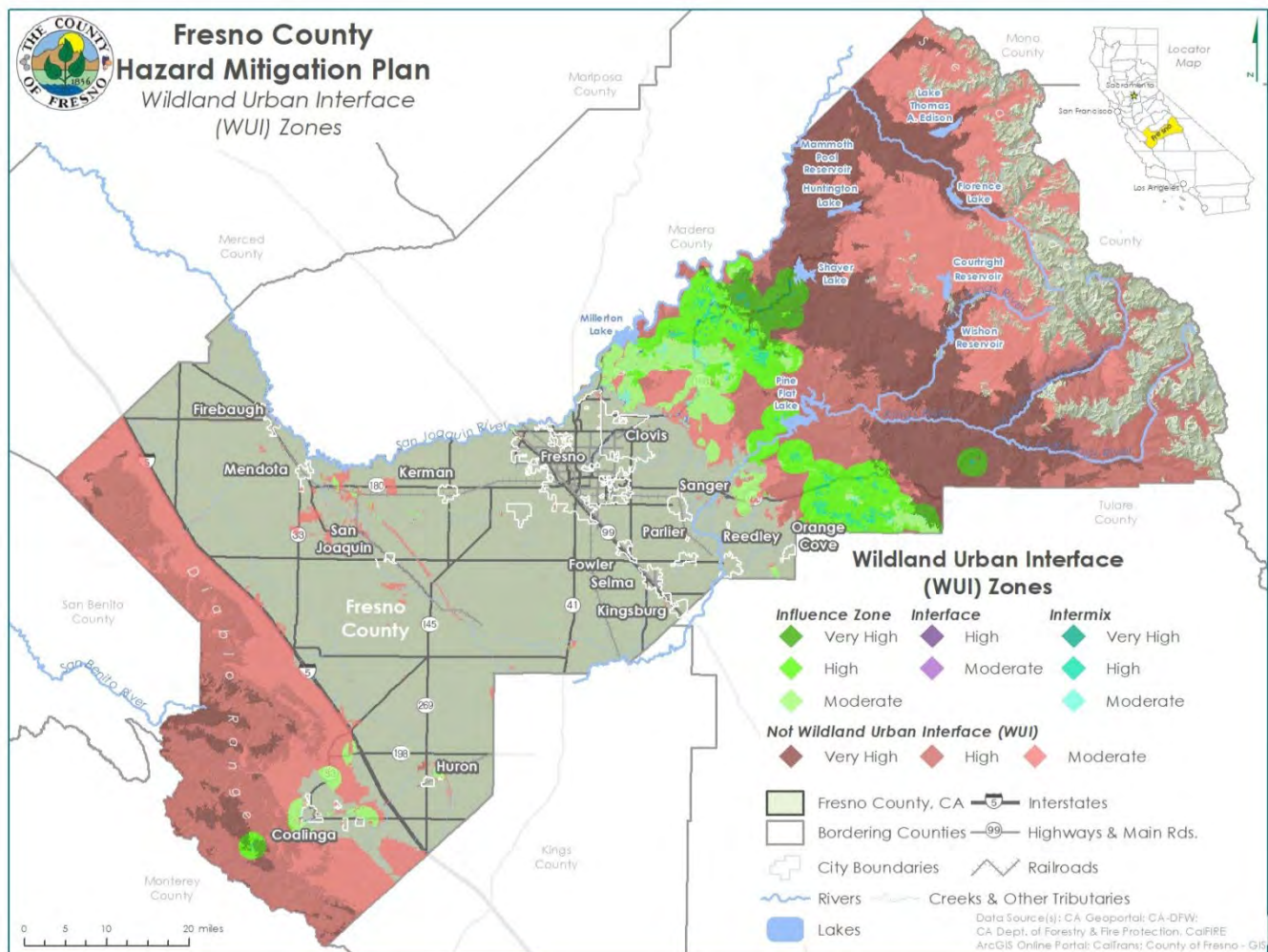
²³ https://frap.fire.ca.gov/projects/projects_drought

4. Risk Assessment

FUTURE DEVELOPMENT

Given that large, destructive fires continue to plague California communities (and Fresno County), recent research points out that such impacts are related to growth/land-use development and federal, state and local policy makers continue to expand the demarcations of the Wildland Urban Interface (WUI). Because future development encompasses all forms of property, buildings, infrastructure, critical facilities and all related populations and their functions, drought impacts to future development align with the historical and potential impacts to populations, property, natural environment, and critical facilities discussed (above). Population growth and development in Fresno County is on the rise. Additional growth and development within the WUI interface will continue to increase the risk and vulnerability of the planning area to damaging wildfires. However, the County has adopted policies to try and reduce damage to structures and people including, HS-A.G which states that new development should have adequate fire protection, including proximity to adequate emergency services, adequate provision for fire flow and emergency vehicle access and fire hardened communication, including high speed internet service.

Figure 82. Fresno County Wildland Urban Interface (WUI) Zones



Source : CA Geoportal ; CA-DFW ; CA Department of Forestry and Fire Protection, CalFIRE, ArcGIS Online Portal ; CalTrans ; County of Fresno - GIS

4. Risk Assessment

In general, continuing past trends, much development in Fresno County is projected on land currently used for agriculture.

Overall Community Impact

The overall impact to the community from a severe wildfire includes:

- Injury and loss of life;
- Commercial and residential structural damage;
- Decreased water quality in area watersheds;
- Increase in post-fire hazards such as flooding, sedimentation, and mudslides;
- Damage to natural resource habitats and other resources, such as timber and rangeland;
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for emergency responders and/or area residents;
- Economic losses (jobs, sales, tax revenue) associated with loss of commercial structures;
- Negative impact on commercial and residential property values;
- Loss of churches, which could severely impact the social fabric of the community;
- Loss of schools, which could severely impact the entire school system and disrupt families and teachers, as temporary facilities and relocations would likely be needed; and
- Impact on the overall mental health of the community.

HUMAN-CAUSED HAZARDS

This risk assessment differs from the risk assessment for natural hazards in that it does not include an assessment of potential losses from human-caused hazards. Such an assessment is very difficult, primarily because of how unpredictable and complex such events are. Human-caused hazard events are often measured in terms such as human lives and economic disruption as well as the value of the facilities actually impacted. The value of impacted facilities is often negligible as compared to public health and human impacts as well as the and the economic impact of affected local, regional, national, and world markets. The unpredictability of human-caused hazard events creates a level of complexity in modeling potential losses which is often covered in other planning mechanisms and is well beyond the scope of this DMA planning effort.

The risk assessment process for human-caused hazards identifies the areas most susceptible to potential hazard events by evaluating which populations and facilities are most vulnerable to human-caused hazards. It is presented in two sections: Hazard Identification and Profiles: Human Caused-Hazards and Asset Inventory and Vulnerability Assessment.

HAZARD IDENTIFICATION AND PROFILES: HUMAN-CAUSED

Natural hazards, while essentially uncontrollable events, do follow the fundamental laws of earth science and physics. Therefore, the types, frequencies, and locations of many natural hazards can be identified and often predicted with a certain level of confidence. For example, within floodplains, it can be stated that in any given year there is a 1 percent chance of a flood event at a given discharge and flood depth that will be equaled or exceeded. These predictions are based on historical flood records combined with hydrologic and hydraulic modeling. In many cases, warning systems are in place to notify the public of a pending natural event. The same is not usually true for human-caused hazards.

With human-caused hazards, the recurrence interval cannot be predicted and human behaviors, such as incompetence, carelessness or malice cannot be forecast with any level of accuracy. While some warning systems have been established to notify at risk populations of impending threats from human-caused hazards, these types of hazards usually do not follow a predictable pattern. The potential exists for most types of human-caused hazards to occur anywhere at any time. Due to their unpredictability, human-caused hazards can pose great danger to public health and safety. Education, warning, and response capability are particularly important in preparing for human-caused incidents.

Human-caused hazards are hazards that directly result from human activity. These hazards can be accidental or intentional. FEMA guidance generally separates human-caused hazards into two broad categories: technological hazards (accidental) and terrorism hazards (intentional). The HMPC chose to only address technological hazards associated with a hazardous materials release in this plan.

HAZARDOUS MATERIALS INCIDENTS (LOW/MEDIUM/HIGH)

Hazardous Material Incidents usually result from accidents or system failures. These hazards are largely unforeseen and therefore are difficult to predict with any level of accuracy. Hazards of concern in Fresno County include fixed facility incidents and transportation incidents (these are discussed further below); in other words, facilities and operations that produce, transport, store, and/or use hazardous materials.

Hazardous materials are substances that are flammable or combustible, explosive, toxic, noxious, corrosive, reactive, an oxidizer, an irritant, carcinogenic, or radioactive. These materials can harm people through skin contact, inhalation, ingestion, or pharmaceutical action. Hazardous materials have the potential to be released into the environment during use, processing, storage, and transport or when improperly disposed. The release of a hazardous material can pose a risk to life safety, public health, and property and can result in the evacuation of a few people, a portion of a facility, or an entire area. Other concerns include impacts to air quality, water quality, and other short- and long-term impacts to the natural environment. As a result of these risks, the use, storage, transport, and disposal of hazardous materials is highly regulated at the federal, state, and local levels.

Hazardous materials are everywhere, and spills or releases occur in this nation on a daily basis. According to FEMA, the impact to life and property from any given release depends on a number of factors:

- Application Mode describes the human act(s) or unintended event(s) necessary to cause the hazard to occur.
- Duration is the length of time the hazard is present on the target.
- The dynamic/static characteristic of a hazard describes its tendency, or that of its effects, to either expand, contract, or remain confined in time, magnitude, and space.
- Mitigating conditions are characteristics of the target and its physical environment that can reduce the effects of a hazard.
- Exacerbating conditions are characteristics that can enhance or magnify the effects of a hazard

Additional factors contribute to the impact of hazardous materials releases from a fixed facility or transportation incident: Cal A

- Solid, liquid, and/or gaseous hazardous materials can be released from fixed or mobile containers either accidentally or on purpose
- The resulting release can last for hours or for days.
- The substances released may be corrosive or otherwise damaging over time, and they may cause an explosion and/or fire.
- Contamination may be carried out of the incident area by people, vehicles, water, and/or wind.
- Weather conditions will directly affect how the hazard develops.
- The micrometeorological effects of buildings and terrain can alter travel and duration of agents.
- Shielding in the form of sheltering in place can protect people and property from harmful effects.
- Noncompliance with fire and building codes as well as failure to maintain existing fire protection and containment features can substantially increase the damage from a hazardous materials release.

FIXED FACILITY INCIDENTS

Industrial accidents occur due to inadequate human oversight, or the failure of systems used to move or store materials, such as pipes and storage tanks. Numerous facilities in the Fresno County region have been identified as sites that store hazardous materials as part of their daily operations. The threat that these sites pose to the region depends on the type of material present and the proximity of these facilities to populations and whether or not these materials are transported.

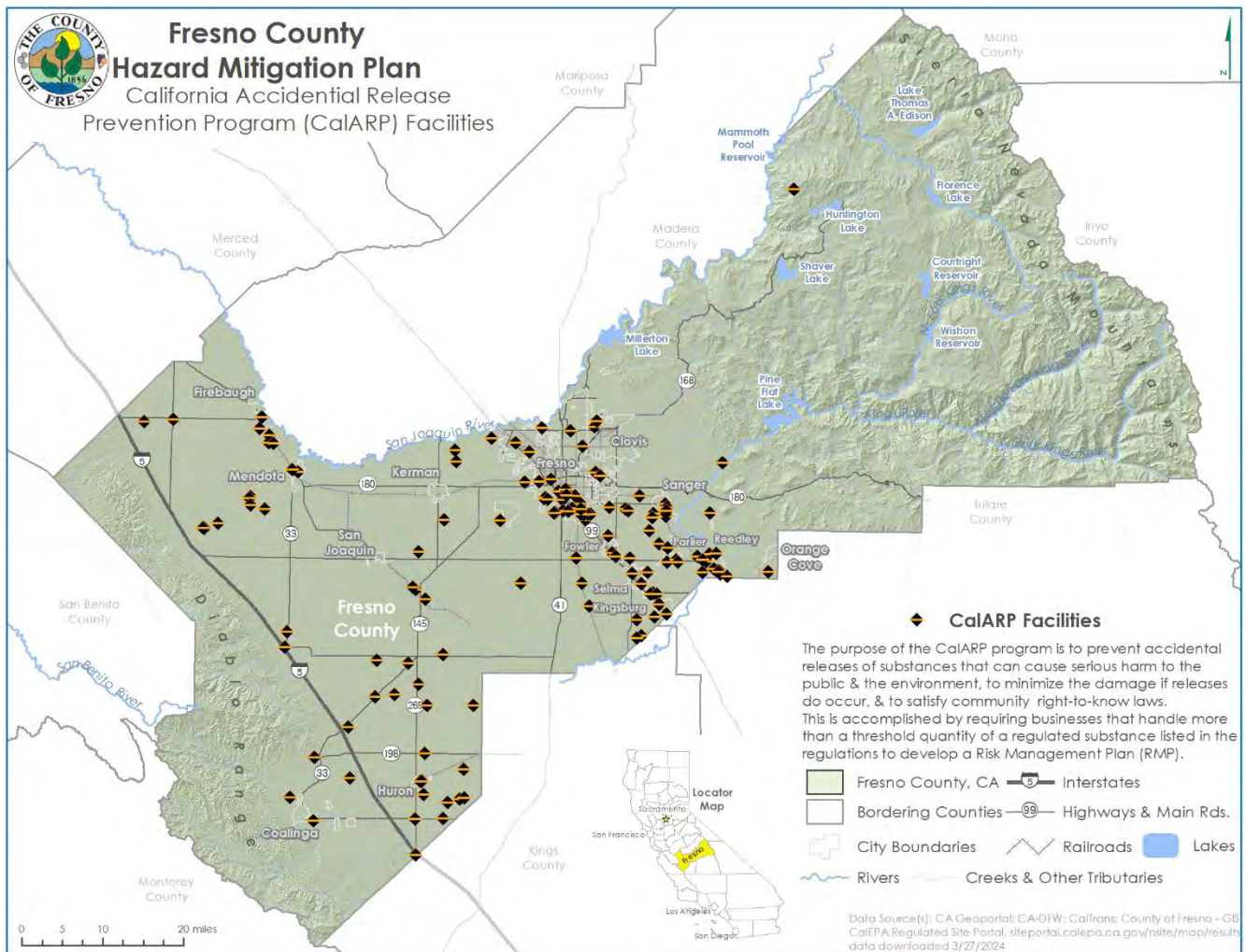
In order to identify those facilities with the greatest potential for a hazardous materials release that could adversely impact communities within the Fresno County planning area, the HMPC took an initial inventory of potential sites by utilizing data from the California Accidental Release Prevention Program (CalARP). The program was implemented on January 1, 1997, and replaced the California Risk Management and Prevention Program (RMPP). The purpose of the CalARP program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right- to-know laws. This is accomplished by requiring businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop a Risk Management Plan (RMP). An RMP is a detailed engineering analysis of the potential accident factors present at a business and the mitigation measures that can be implemented to reduce this accident potential. The RMP contains:

- Safety information
- A hazard review
- Operating procedures
- Training requirements
- Maintenance requirements
- Compliance audits
- Incident investigation procedures

The CalARP program is implemented at the local government level by Unified Program Agencies (UPAs). Of benefit to the HMPC's efforts to address hazardous materials incidents is the fact that the CalARP program is designed so that UPA's work directly with regulated facilities.

Figure 83. Fresno County California Accidental Release Prevention Program (CalARP) Facilities (below) identifies all CalARP regulated facilities within the planning area, as well as the location and density of such facilities in relation to jurisdictions (at risk population centers), and critical infrastructure such as railways and major transportation routes. The mapped sites below represent those most critical (CalARP) sites as determined by the HMPC for the purposes of the plan update.

Figure 83. Fresno County California Accidental Release Prevention Program (CalARP) Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS CalEPA Regulated Site Portal, siteportal.calpa.ca.gov/nsite/map/results data downloaded 3/27/2024

4. Risk Assessment

- In addition to the Cal ARP sites mapped (above), the following sites are identified in the Fresno County 2040 General Plan, Environmental Impact Report or from other federal sources:
- As of June 2020, there are 45 active Leaking Underground Storage Tanks (LUST) sites.
- According to the U.S. Environmental Protection Agency (EPA) there are 7 National Priorities List and Superfund Alternative Approach Sites in Fresno County.²⁴
- There are 1,678 small quantity hazardous waste generators and 150 large quantity hazardous waste generators in Fresno County.
- There are several hazardous waste disposal locations in Fresno County for Household Hazardous Waste Disposal (HHW)²⁵
- Agriculture operations in proximity to urbanized areas, particularly near residential uses, present some risks associated with agricultural chemicals (pesticides and fertilizers). As more residential development is built close to existing agricultural uses, risks associated with agricultural chemicals may increase

Table 161. Hazmat Facilities by Jurisdiction identifies the number of hazardous materials facilities within each jurisdiction and in unincorporated Fresno County. It is useful as a cross-reference to illustrate how the risk varies by jurisdiction.

Table 161. Hazmat Facilities by Jurisdiction

Jurisdiction	Counts
Clovis	2
Coalinga	1
Firebaugh	1
Fowler	2
Fresno	28
Huron	3
Kingsburg	5
Mendota	2
Orange Cove	2
Reedley	8
Sanger	6
Selma	2
Unincorporated	107
Total	169

Source: CalARP

²⁴ Search for Superfund Sites Where You Live | US EPA <https://www.epa.gov/superfund/search-superfund-sites-where-you-live>

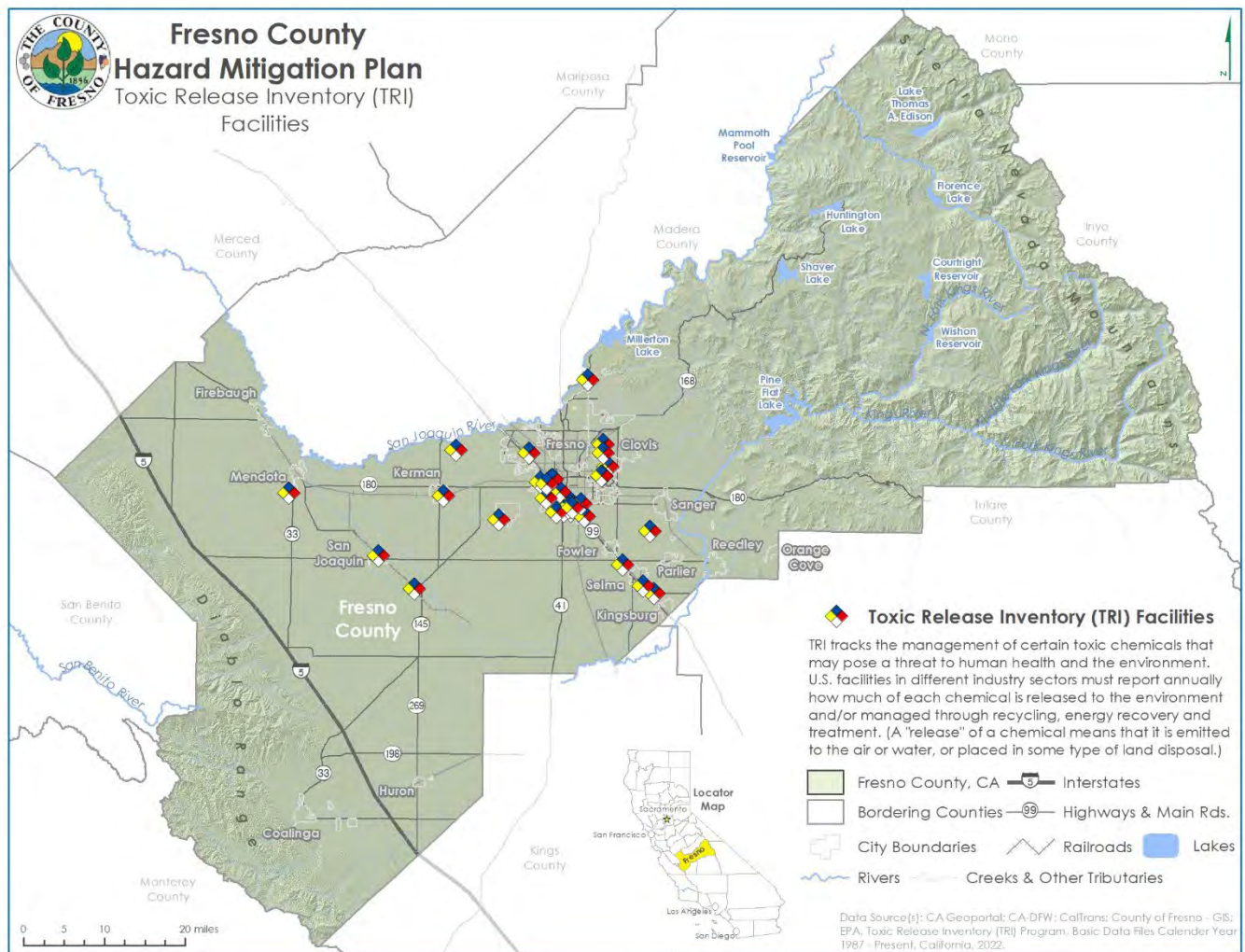
²⁵ Landfill Operations - County of Fresno ([fresnocountyca.gov](https://www.fresnocountyca.gov)) <https://www.fresnocountyca.gov/Departments/Public-Works-and-Planning/divisions-of-public-works-and-planning/resources-and-parks-division/landfill-operations>

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The Toxics Release Inventory (TRI) Program tracks the industrial management of toxic chemicals that may cause harm to human health and the environment. TRI data are reported by certain industrial and federal facilities. TRI tracks the management of certain toxic chemicals that may pose a threat to human health and the environment. U.S. facilities in different industry sectors must report annually how much of each chemical is released to the environment and/or managed through recycling, energy recovery and treatment. (A "release" of a chemical means that it is emitted to the air or water or placed in some type of land disposal.). The information submitted by facilities is compiled in the Toxics Release Inventory. TRI helps support informed decision-making by companies, government agencies, non-governmental organizations, and the public.

In Fresno County, there are 33 TRI sites across Clovis, Fresno, Kerman, Kingsburg, San Joaquin, Selma, and Unincorporated Fresno County, shown in Figure 84. Fresno County Toxic Release Inventory (TRI) Facilities. There are two facilities in Clovis, 18 in Fresno, one in Kerman, one in Kingsburg, one in San Joaquin, one in Selma, and nine unincorporated.

Figure 84. Fresno County Toxic Release Inventory (TRI) Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; EPA, Toxic Release Inventory (TRI) Program, Basic Data Files Calendar Year 1987 – Present, California, 2022

TRANSPORTATION INCIDENTS (E.G., RAIL, HIGHWAY)

Transportation incidents can occur during the transportation of hazardous materials to and from storage facilities. The most likely routes for the transportation of hazardous materials are major roadways and railroads. Two major north-south roadways are located in Fresno County. Highway 99 runs through the central part of the County and provides a north-south corridor through several counties. Most of the County’s industrial and residential activity is positioned along Highway 99. In western Fresno County, Interstate 5 traverses the County at the base of the Coast Range foothills. State Routes 33, 41, 43, 63, 145, 168, 180, 198, and 269 provide local service to urban and rural areas in the County. A network of County roads connects the various communities to these major arteries. Major rail lines include Union Pacific, Burlington Northern and Santa Fe Company, Port Railroads, Inc., and San Joaquin Valley Railroad. The major transportation corridors and rail lines are illustrated in **Figure 85. Fresno County Transportation System** and **Figure 86. Fresno County Rail Network**.

The United States Department of Transportation (USDOT) has established nine hazardous materials classifications: explosive, compressed gases, flammable/combustible liquids, flammable solids, oxidizers, poisons, corrosive, radioactive, and miscellaneous, shown in **Table 162. DOT Hazardous Materials Classifications**.

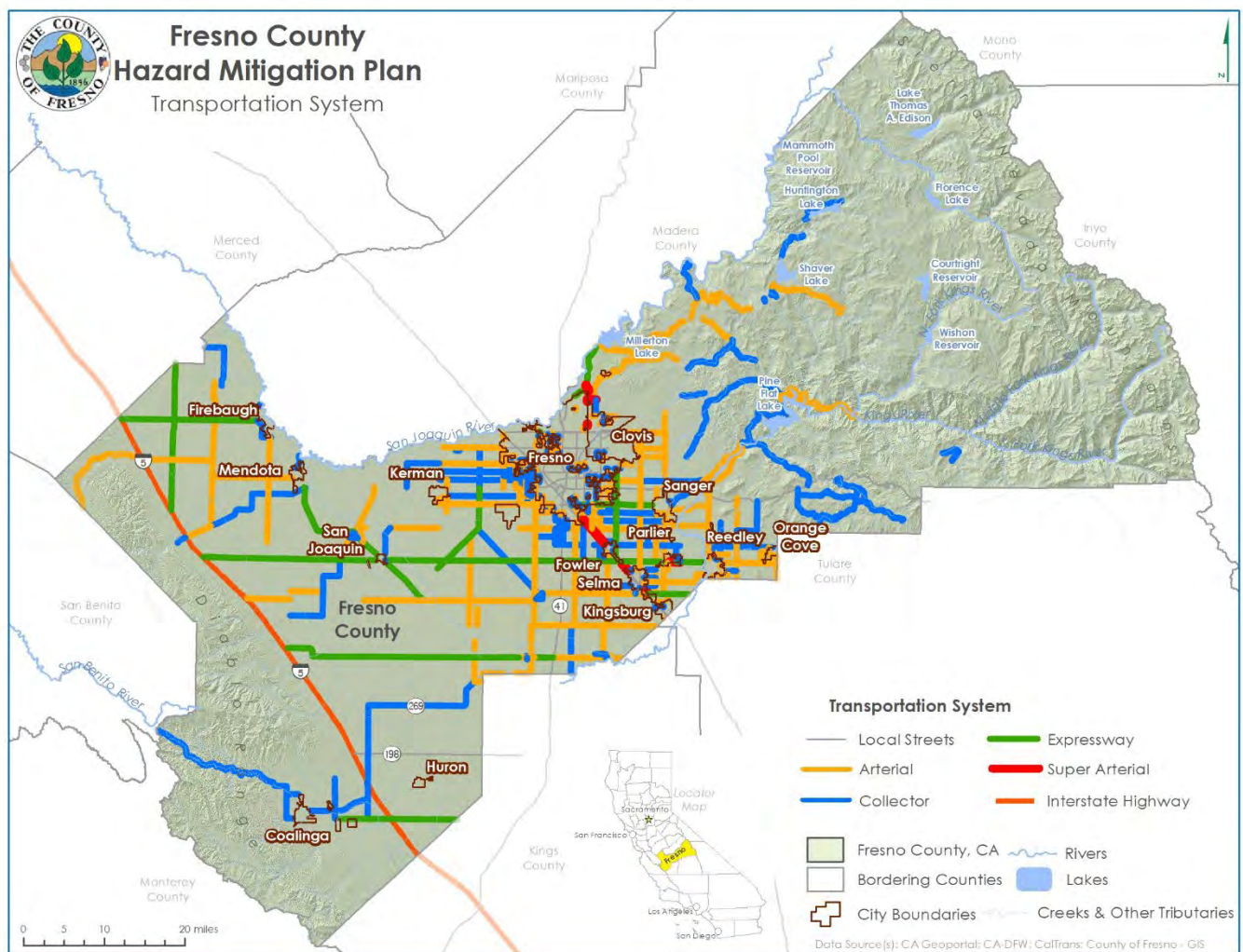
Table 162. DOT Hazardous Materials Classifications

Class Number	Description
Class 1	Explosives
Class 2	Gases
Class 3	Flammable Liquids (and combustible liquids)
Class 4	Flammable solids; substances liable to spontaneous combustion; substance which, on contact with water, emit flammable gases
Class 5	Oxidizing substances and Organic substances
Class 6	Toxic (poisonous) substances
Class 7	Radioactive materials
Class 8	Corrosive substances
Class 9	Miscellaneous dangerous goods/hazards materials and articles

Source: USDOT

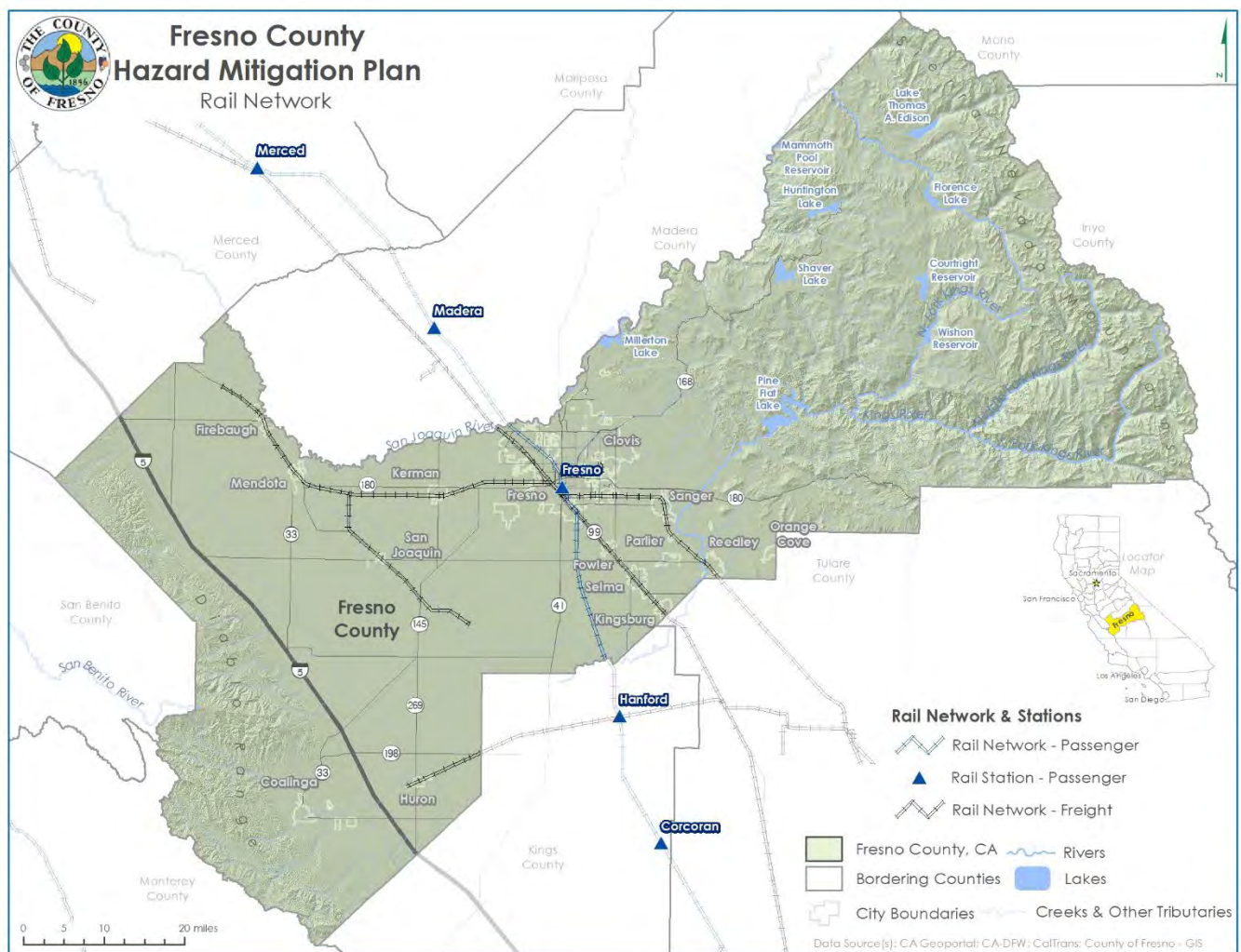
Transporters of such materials must adhere to routing requirements that are enforced by the California Highway Patrol. Transportation must take the most direct route, utilizing State or interstate highways whenever possible, and only roadways with sufficient width and load bearing capacity. All nine classes of hazardous materials, including hazardous waste, may be transported on Interstate 5. Materials that are poisonous by inhalation, explosives or high level radioactive may be transported on certain State Routes, including SR 33, 41, 63, 99, 180, and 198, but are subject to restrictions.

Figure 85. Fresno County Transportation System



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

Figure 86. Fresno County Rail Network



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

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Of the County's transportation corridors, Interstate 5, Highway 99, and State Route 41 are the most significant because they provide direct links between the County transportation system, the surrounding regions, and beyond.

According to the Fresno County General Plan Background Report, truck transportation, followed by rail, air, and pipeline, provides the majority of goods movement in Fresno County, including the transportation of hazardous materials. Fresno County has considerable long-distance trucking activity due to the presence of Interstate 5, State Route 198, and Highway 99. According to the background report, Highway 99 carries the greatest volume of truck traffic in Fresno County.

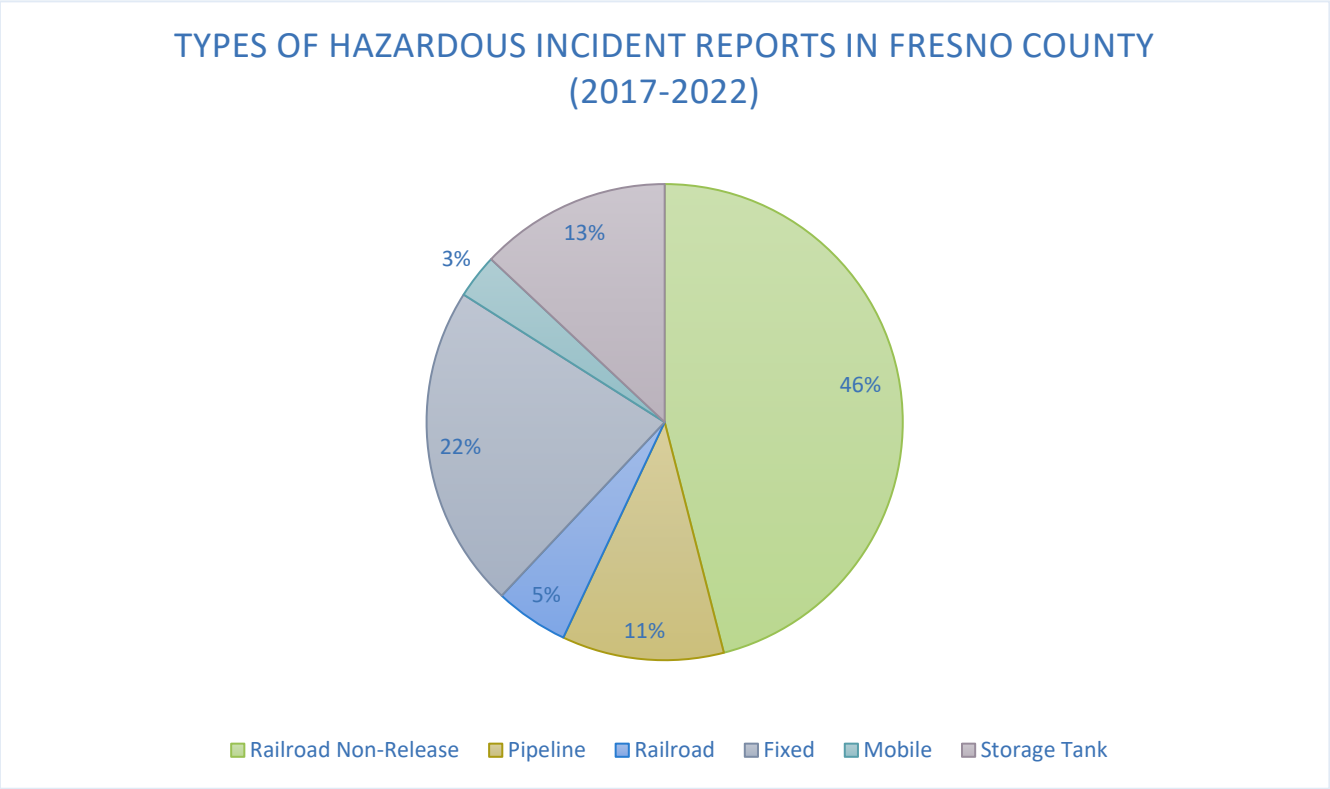
There are two mainline rail lines that run north-south through Fresno County. The first, owned by the Burlington Northern and Santa Fe Company, connects the County to Sacramento and the San Francisco Bay Area to the north and Bakersfield to the south. The second, owned by Union Pacific Railways, parallels the Highway 99 corridor and connects the County to Sacramento and the Bay Area to the north and Bakersfield to the south. Both lines service the City of Fresno. Other lines provide rail service primarily to communities within the County and to adjacent counties. According to the HMPC, approximately 40 trains travel through the City of Fresno each day, and sometimes the trains carry hazardous materials very close to schools and residential areas.

PAST OCCURRENCES

Hazardous materials incidents in Fresno County are frequent events. Statistics from the National Response Center, which serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories, indicate that between 2009 and the end of 2022, 553 incidents were reported in Fresno County. Of these, 64 included fatalities, 92 included injuries, 62 included hospitalizations. The incident required 2,265 people to be evacuated, and it caused nearly \$900,000 in property damage.

Figure 87. Reports of Hazardous Materials Incidents in Fresno County, 2017-2022 and Table 163. Reports of Hazardous Materials Incidents in Fresno County, 2017-2022 shows the breakdown of the types of incidents that occurred in Fresno County in this time period. Of the incidents, 46 percent were railroad non-release, 22 percent fixed, 13 percent storage tank, 11 percent pipeline, 5 percent railroad, 3 percent railroad.

Figure 87. Reports of Hazardous Materials Incidents in Fresno County, 2017-2022



Source: National Response Center, www.nrc.uscg.mil/

Table 163. Reports of Hazardous Materials Incidents in Fresno County, 2017-2022

Incident Type	Number of Incidents
Air Craft	1
Unknown	1
Railroad	5
Pipeline	11
Mobile	15
Storage Tank	15
Fixed	68
Railroad Non-Release	89

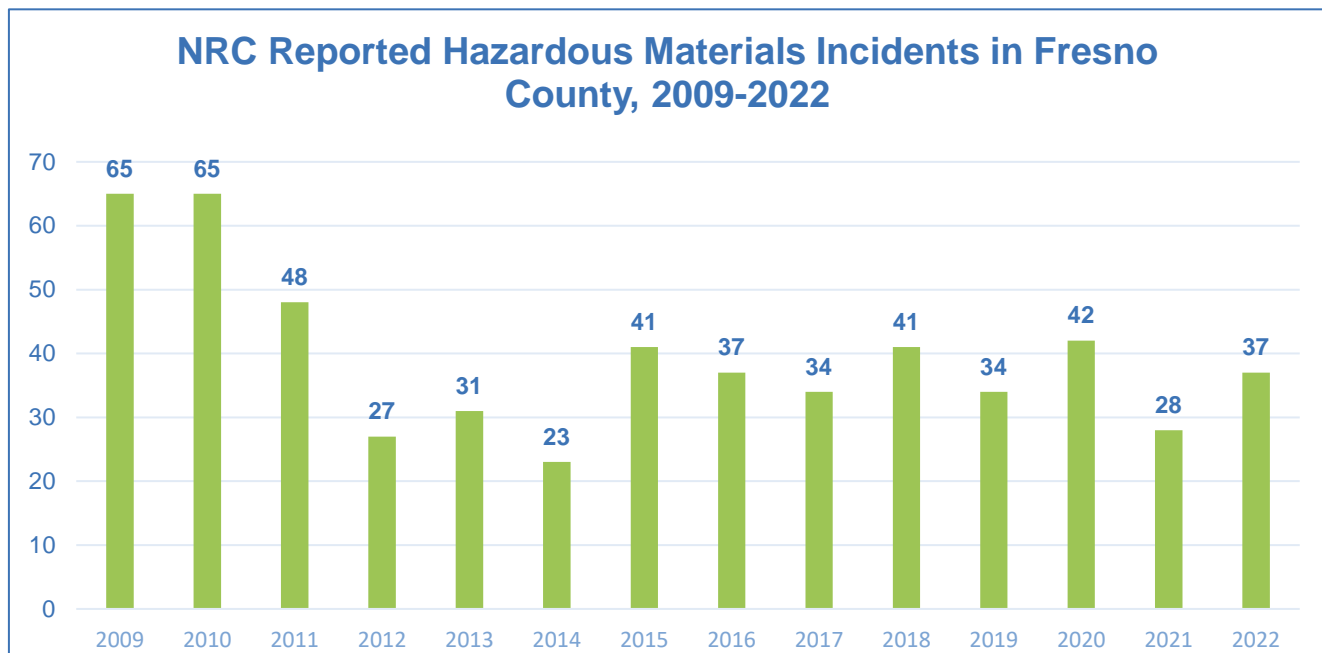
Source: National Response Center, www.nrc.uscg.mil/

Trend data between 2009 and 2016 shows a high of 65 incidents reported to the NRC per year (2009, 2010), and a low of 23 incidents per year (2014). The data shows a gradual decline in number of incidents per year until 2015, and since then has remain relatively stable. The number of incidents per

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year since 2009 is shown in **Figure 88. NRC Reported Hazardous Materials Incidents in Fresno County, 2009-2022**, with 338 reported.

Figure 88. NRC Reported Hazardous Materials Incidents in Fresno County, 2009-2022



Source : National Response Center, www.nrc.uscg.mil/

Table 164. NRC-Reported Hazardous Materials Incidents by Jurisdiction 2009-2022 shows total number of incidents reported to the NRC for Fresno County by jurisdiction.

Table 164. NRC-Reported Hazardous Materials Incidents by Jurisdiction 2009-2022

Cities	Incidents
Auberry	12
Avenale	1
Balch Camp	2
Big Creek	7
Bowles	2
Calwa	2
Canejo	1
Cantua Creek	2
Caruthers	1
Clovis*	12
Coalinga*	16
Conejo	3
Corcoran	1

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Cities	Incidents
Del Rey	3
Firebaugh*	6
Five Points	1
Fowler*	12
Fresno*	338
Hammond	2
Helm	5
Huron*	3
Kerman*	5
Kingsburg*	10
Lake Shore	1
Laton	4
Lemoore	2
Mendota*	1
NAS Lemoore	1
North Fork	1
Not Identified	7
Old Fig Garden	16
Pickley	1
Pinedale	1
Pitdria	1
Reedley*	8
Riverdale	1
San Joaquin	4
Sanger*	28
Selma*	10
Shaver Lake	7
Shirley	1
Sigarden	1
Squaw Valley	2
Sunmaid	1
Tranquility	2
Traver	1
Trigo	1

Source: National Response Center, www.nrc.uscg.mil/

Note: Municipalities are noted with an *

The County's emergency response team receives numerous calls each year related to hazardous materials releases. Since 2004, the team has received over 1,000 reports. The majority of incidents in Fresno County were fuel spills and characterized as relatively minor. As such, it is just a response/cleanup issue that generally does not pose a significant impact to the community. However,

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other incidents can and have occurred in the County. More detailed information about hazard materials incidents in each jurisdiction is described in the annexes.

ASSET INVENTORY AND VULNERABILITY ASSESSMENT

The probability and potential losses of human-caused technological hazards are difficult to quantify due to the “human” element. These hazards can occur at any time and virtually any place with little or no warning. However, they can often be inventoried because they typically occur in conjunction with a particular facility/business that produces, transports, stores, or uses substances that present a specific hazard to the local community or environment, or the hazard is present due to the shipment of potentially harmful substances from outside the region across various transportation arteries that bisect Fresno County communities.

The facilities and transportation corridors identified in the previous figures are those that the HMPC has identified as potential sites for hazardous materials releases that may adversely affect the Fresno County planning area.

ASSET INVENTORY

Section 4.3 Vulnerability Assessment and the jurisdictional annexes identify the total assets at risk in the Fresno County planning area to both natural and human-caused hazards. Also included in those sections are inventories of critical facilities. These critical facilities, as previously defined, are considered vital to the daily continuity of life, unobstructed flow of commerce, and the continued health and welfare of the planning area as a whole.

VULNERABILITY ASSESSMENT

As previously stated, it is often quite difficult to quantify the potential losses from human-caused hazards. While the facilities themselves have a tangible dollar value, loss from a human-caused hazard often inflicts an even greater toll on a community, both economically and emotionally. The impact to identified assets will vary from event to event and depend on the type, location, and nature of a specific technological hazard event.

Given the difficulty in quantifying the losses associated with technological hazards, this section focuses on analyzing key assets and populations relative to the hazardous materials sites identified previously.

FIXED FACILITY INCIDENTS

As discussed above, there are over 157 fixed facilities (CalARP sites) identified in the Fresno County planning area with the potential to cause a hazardous materials release of sufficient type and magnitude to adversely impact surrounding areas. These sites are regulated, and most have emergency action plans in place. The impact to surrounding areas would depend on the nature and quantity of any release as well as the time of the event and prevailing weather conditions.

Critical Facilities at Risk

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Table 165. Critical Facilities Within a ½ Mile Buffer from Hazmat Facilities is derived from a GIS analysis on the CalARP data and focuses on the number and types of critical facilities within each jurisdiction that are located within a half-mile of a hazardous materials facility. The analysis indicates the City of Fresno having the highest number of critical facilities within a half-mile mile of CalARP designated facilities.

Table 165. Critical Facilities Within a ½ Mile Buffer from Hazmat Facilities

Jurisdiction	Facility Type	Counts
Clovis	Fire Stations	1
	Child Care Facilities	1
	Total	2
Firebaugh	Fire Station	1
	Police Stations	1
	Schools	2
	EOCs	2
	Medical Care Facilities	1
	Child Care Facilities	3
	Total	10
Fresno	Bus Facilities	1
	Communication Facilities	2
	Electric Power Facilities	1
	Fire Stations	5
	Medical Care Facilities	3
	Police Stations	1
	Railway Facilities	3
	Schools	7
	Nursing Homes	3
	Child Care Facilities	18
	Total	46
Huron	Schools	1
	Child Care Facilities	1
	Total	2
Kingsburg	Electric Power Facilities	1
	Fire Stations	1
	Oil Crude Pipeline Facilities	1
	Police Stations	1
	Railway Facilities	1
	Schools	1
	Child Care Facilities	6
	Total	14
Mendota	Airport Facilities	1
	Fire Stations	1

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Jurisdiction	Facility Type	Counts
	Schools	6
	Child Care Facilities	2
	Total	10
Parlier	Police Stations	1
	Schools	1
	Child Care Facilities	3
	Total	5
Reedley	Airport Facilities	1
	Schools	4
	Nursing Homes	1
	Child Care Facilities	10
	Total	16
Sanger	Electric Power Facilities	1
	Fire Stations	1
	Schools	4
	Nursing Homes	1
	Child Care Facilities	6
	Total	13
Selma	Schools	1
	Medical Care Facilities	1
	Nursing Homes	1
	Child Care Facilities	1
	Total	4
Unincorporated	Communication Facilities	1
	Electric Power Facilities	8
	Fire Stations	3
	Railway Facilities	2
	Schools	6
	Nursing Homes	1
	Child Care Facilities	4
	Total	25
	Grand Total	147

VULNERABILITY ASSESSMENT SUMMARY

Table 166. Vulnerability Assessment Summary provides a summary of the implications of recent trends on vulnerability in Fresno County, as described in further detail in each of the hazard profiles. It uses the following symbols to describe how each trend (climate changes, population pattern changes, and changes in land use and development) have increased risk in each participating jurisdiction for each hazard:

↑ - Increased vulnerability

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↔ - No change to vulnerability

↓ - Decreased vulnerability

Changes in vulnerability to climate change are determined through a review of current data and literature; if a reasonable and supportable connection between climate change and a hazard exists, the vulnerability change will reflect this. With regard to population changes, a change of -2 percent or greater between 2010 and 2020 *decreases* vulnerability, while a change of 2 percent or more *increases* the vulnerability. If the population change for a jurisdiction is between -2 and 2 percent between 2010 and 2020 then the vulnerability remains unchanged. A similar methodology is used for vulnerability changes as a result of development trends. Using data from the Census Bureau, the percent change in housing units (including both vacant and occupied) between 2010 and 2020 is determined. An increase of more than 2 percent *increases* vulnerability, while a decrease of -2 percent or more *decreases* vulnerability.

Table 166. Vulnerability Assessment Summary

Agricultural Hazards			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑
City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑
City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑
City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑
City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔
Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/	↑	↔	↔

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Highway 168 Fire Safe Council			
Kings River Conservation District	↑	↔	↔
Westlands Water District	↑	↔	↔
Avalanche			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Dam Failure			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑

4. Risk Assessment

City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Drought			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑
City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑
City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑
City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑
City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔

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Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↑	↔	↔
Kings River Conservation District	↑	↔	↔
Westlands Water District	↑	↔	↔
Earthquake			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Flood			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑

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City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑
City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑
City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑
City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔
Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↑	↔	↔
Kings River Conservation District	↑	↔	↔
Westlands Water District	↑	↔	↔
Wildfire			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑
City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑
City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑
City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑

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City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔
Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↑	↔	↔
Kings River Conservation District	↑	↔	↔
Westlands Water District	↑	↔	↔
Volcano			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Epidemic/Pandemic			

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Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
West Nile Virus			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑
City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑
City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑

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City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑
City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔
Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↑	↔	↔
Kings River Conservation District	↑	↔	↔
Westlands Water District	↑	↔	↔
Extreme Temperatures			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑
City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑
City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑
City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑
City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔
Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↑	↔	↔
Kings River Conservation District	↑	↔	↔

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Westlands Water District	↑	↔	↔
Fog			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Heavy Rain, Thunderstorms, Hail, Lightning, High Winds			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑
City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑

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City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑
City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑
City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔
Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↑	↔	↔
Kings River Conservation District	↑	↔	↔
Westlands Water District	↑	↔	↔
Winter Storms			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/	↔	↔	↔

4. Risk Assessment

Highway 168 Fire Safe Council			
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Tornado			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Erosion			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑

4. Risk Assessment

City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Expansive Soils			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔

4. Risk Assessment

Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Land Subsidence			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↔	↑	↑
City of Clovis	↔	↑	↑
City of Coalinga	↔	↑	↑
City of Firebaugh	↔	↑	↑
City of Fowler	↔	↑	↑
City of Fresno	↔	↑	↑
City of Kerman	↔	↑	↑
City of Kingsburg	↔	↑	↑
City of Mendota	↔	↑	↑
City of Reedley	↔	↑	↑
City of San Joaquin	↔	↓	↔
City of Sanger	↔	↑	↑
City of Selma	↔	↑	↑
Fresno Metropolitan Flood Control District	↔	↔	↔
Lower San Joaquin Levee District	↔	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↔	↔	↔
Kings River Conservation District	↔	↔	↔
Westlands Water District	↔	↔	↔
Landslides			
Jurisdiction	Changes in Climate	Changes in Population	Changes in Development
Fresno County	↑	↑	↑
City of Clovis	↑	↑	↑

4. Risk Assessment

City of Coalinga	↑	↑	↑
City of Firebaugh	↑	↑	↑
City of Fowler	↑	↑	↑
City of Fresno	↑	↑	↑
City of Kerman	↑	↑	↑
City of Kingsburg	↑	↑	↑
City of Mendota	↑	↑	↑
City of Reedley	↑	↑	↑
City of San Joaquin	↑	↓	↔
City of Sanger	↑	↑	↑
City of Selma	↑	↑	↑
Fresno Metropolitan Flood Control District	↑	↔	↔
Lower San Joaquin Levee District	↑	↔	↔
Sierra Resource Conservation District/ Highway 168 Fire Safe Council	↑	↔	↔
Kings River Conservation District	↑	↔	↔
Westlands Water District	↑	↔	↔

5. Mitigation Strategy



Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the mitigation strategy process and mitigation action plan for the Fresno County Multi-Jurisdictional Hazard Mitigation Plan. The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the HMPC led to the action plan provided in this chapter. Taking all the above into consideration, the HMPC developed the following overall mitigation strategy:

- Communicate the hazard information collected and analyzed through this planning process as well as HMPC success stories so that the community better understands what can happen where and what they themselves can do to be better prepared.
- Implement the action plan recommendations of this plan.
- Use existing rules, regulations, policies, and procedures already in existence. Given the flood hazard in the planning area, an emphasis should be placed on continued compliance with the National Flood Insurance Program and participation by all communities in the Community Rating System.
- Monitor multi-objective management opportunities so that funding opportunities may be shared and packaged, and broader constituent support may be garnered.

GOALS AND OBJECTIVES

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Up to this point in the planning process, the HMPC has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the community;
- Encompass all aspects of 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
- Are time-independent, in that they are not scheduled events.

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.

Based on a review of the risk assessment and a conversation about changes in the last five years, the HMPC identified the following goals and objectives, which provide the direction for reducing future hazard-related losses within the Fresno County planning area. These are the same goals and objectives as were listed in the previous plan, with a small change to reflect FEMA's transition from the PDM to BRIC program.

GOAL 1: PROVIDE PROTECTION FOR PEOPLE'S LIVES FROM HAZARDS

Objective 1.1: Provide timely notification and direction to the public of imminent and potential hazards

Objective 1.2: Protect public health and safety by preparing for, responding to, and recovering from the effects of natural or technological disasters

Objective 1.3: Improve community transportation corridors to allow for better evacuation routes for the public and better access for emergency responders

GOAL 2: IMPROVE ALL COMMUNITIES' RESILIENCE AND CAPABILITIES TO MITIGATE HAZARDS AND REDUCE EXPOSURE TO HAZARD-RELATED LOSSES

Objective 2.1: Reduce wildfires/protect life, property, and natural resources from damaging wildfires

Objective 2.2: Reduce flood and storm-related losses

5. Mitigation Strategy

Objective 2.3: Reduce hazards that adversely impact the agricultural industry

Objective 2.4: Minimize the impact to the communities due to recurring drought conditions that impact both ground water supply and the agricultural industry

Objective 2.5: Minimize the risk/loss to endangered species, native plants, land (erosion), and native wildlife

GOAL 3: IMPROVE COMMUNITY AND AGENCY AWARENESS ABOUT HAZARDS AND ASSOCIATED VULNERABILITIES THAT THREATEN FRESNO COUNTY PLANNING AREA COMMUNITIES

Objective 3.1: Increase public awareness about the nature and extent of hazards they are exposed to, where they occur, what is vulnerable, and recommended mitigation and preparedness for identified hazards

GOAL 4: PROVIDE PROTECTION FOR CRITICAL FACILITIES, UTILITIES, AND SERVICES FROM HAZARD IMPACTS

GOAL 5: MAINTAIN COORDINATION OF DISASTER PLANNING

Objective 5.1: Coordinate with changing U.S. Department of Homeland Security/FEMA needs

Objective 5.2: Coordinate with other community plans

Objective 5.3: Maximize the use of shared resources between jurisdictions and special districts for mitigation/communication

Objective 5.4: Standardize systems among agencies to provide for better interoperability

GOAL 6: MAINTAIN/PROVIDE FOR FEMA ELIGIBILITY AND WORK TO POSITION JURISDICTIONS FOR GRANT FUNDING

Objective 6.1: Provide County departments and other jurisdictions with information regarding mitigation opportunities

Objective 6.2: As part of plan implementation, review actions in this plan on an annual basis to be considered for annual FEMA Building Infrastructure and Resilient Communities (BRIC) grant allocations or after a presidential disaster declaration in California for Hazard Mitigation Grant Program funding as well as for other local, state, and federal funding opportunities.

PROGRESS TOWARDS 2018 PLAN ACTIONS

The mitigation strategy update included a thorough review and status update of the existing actions.

Table 166: Summary of Number of Actions in Previous Plan provides a summary of the number of actions that each jurisdiction identified in the previous plan.

Table 166: Summary of Number of Actions in Previous Plan

Jurisdiction	Actions in Previous Plan
Multi-Jurisdictional	1
Fresno County	13
Clovis	12
Coalinga	2
Firebaugh	2
Fowler	2
Fresno (City)	6
Kerman	3
Kingsburg	4
Mendota	2
Reedley	1
San Joaquin	1
Sanger	7
Selma	5
Fresno Metropolitan Flood Control District	7
Lower San Joaquin Levee District	2
Sierra Resource Conservation District	18
Westlands Water District	1
Kings River Conservation District	1
Total	90

Of the 90 actions in the previous plan, 14 were deleted or combined with other actions, and 76 were continued in the plan update. **Table 167 – Status of 2018 Plan Actions** provides a summary of the status of these 90 actions.

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Table 167 – Status of 2018 Plan Actions

Status of 2018 Plan Actions			
Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Multi-Jurisdictional 1	Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program	Continuing	This is an ongoing action
County 1	Identify Critical Facilities and Inspect for Vulnerability to Major Hazards	Continuing	This is an ongoing action
County 2	Upgrade or Replace Critical County Facilities Found to be Vulnerable to Major Hazards	Continuing	This is an ongoing action
County 3	Enhance the County Emergency Operations Center	Continuing	Facility and funding have been identified. Currently working with vendors, anticipate being operational by Spring 2025.
County 4	Control Bubonic Plague through Coyote and California Ground Squirrel Population Management	Continuing	This is an ongoing action
County 5	Minimize Flood Events by Exercising Reclamation's Emergency Action Plan and Provide an Early Warning System to Downstream Emergency Response Agencies	Continuing	Fresno County continues to work with dam operators and other local partners to exercise and modify current plans.
County 6	Update Dam Failure Evacuation Plan	Deleted	

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Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
County 7	Compliance including Groundwater Sustainability Planning and Implementation	Continuing	Working with DWR, local water districts, and community partners to develop a drought plan.
County 8	Conduct Feasibility Study for Panoche -Silver Creek Flood Detention Facility (see Mendota)	Continuing	This is an ongoing action
County 9	Investigate and Construct Water Shortage-Options for the Upper San Joaquin River Basin	Continuing	This is an ongoing action
County 10	Analyze System, Condition, and Management of Flood Water Conveyance Facilities	Continuing	This is an ongoing action
County 11	Prepare Stormwater Drainage Master Plan	Continuing	This is an ongoing action
County 12	Control West Nile Virus through Beaver Population Management	Deleted	
County 13	Wildfire Defensible Fuel Modification Zones in Areas of Tree Mortality	Continuing	This is an ongoing action



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Clovis 1	Construct a Water Intertie between the Cities of Clovis and Fresno	Continuing	The Southern intertie is complete. City of Fresno is holding up the northern intertie.
Clovis 2	Modernize Information Technology Backup Infrastructure	Continuing	No Updates
Clovis 3	Improve the City's Capabilities for Sheltering Animals in a Disaster	Continuing	No Updates
Clovis 4	Purchase Hazard Mitigation Public Notification Boards	Continuing	No Updates
Clovis 5	Improve Emergency Evacuation and Emergency Vehicle Routes	Continuing	No Updates
Clovis 6	Conduct a Seismic Vulnerability Assessment of City-Owned Critical Facilities	Continuing	On hold – focusing on water, sewer and well facilities.
Clovis 7	Construct Channel Improvements for Dog Creek Stream, South of Gettysburg-Ashlan	Continuing	No Updates



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Clovis 8	Improve Flow Design Parameters for Big Dry Creek and the Enterprise Canal	Continuing	In progress. FID has been removing channel obstructions in the Big Dry Creek. Flow rate and channel capacity has been improved.
Clovis 9	Improve City's Floodplain Management Program and Apply to Community Rating System	Continuing	No Updates
Clovis 10	Enforce Master Drainage Plan Requirements	Continuing	No Updates
Clovis 11	Install a System of Surface Water Hazard Detection	Continuing	No Updates
Clovis 12	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	The Groundwater Sustainability Plan (GSP) for the NKGSA has been approved by DWR. The city is working toward sustainability by the year 2040.
Coalinga 1	Plan for Alternative Water Sources for the Water System	Continuing	No Updates
Coalinga 2	Plan for Water System Sustainability in the Event of Long-Term Power Failure	Continuing	No Updates



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Firebaugh 1	Assess Levee System for Necessary Improvements	Continuing	Substantive work completed, but continuing to assess
Firebaugh 2	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	Substantive work completed, but continuing to work on sustainability
Fowler 1	Install Back-up Power System for City Critical Facilities	Continuing	In progress for wells, generators, power wall
Fowler 2	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	The City of Fowler is part of the SKGSA plan and a member of the Groundwater Sustainability Plan.
Fresno 1	Establish Post-Disaster Action Plan for City Continuity of Operations Plan	Continuing	No Updates
Fresno 2	Improve the City's Capabilities for Sheltering Animals in a Disaster	Continuing	Working with local NGO to provided concurrent shelter for small animals and people
Fresno 3	Train and Certify City Inspectors to Conduct Post-Disaster Damage Assessment	Continuing	The SAP program should be something that multiple agencies should accomplish together



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Fresno 4	Implement a Flood Awareness Program for the Public	Continuing	Work would include the Fresno Metropolitan Flood Control District
Fresno 5	Southwest Fresno - Recycled Water Distribution System Construction	Continuing	Ongoing program
Fresno 6	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	Ongoing program
Kerman 1	Construct California Avenue Parallel Storm Drain Line	Continuing	Unknown; Need to review Storm Water Management Plan and Capital projects associated with this item.
Kerman 2	Install Warning Lights for the Intersection of State Route 145 and Highway 180	Deleted	Fully signalized intersection
Kerman 3	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	On-going
Kingsburg 1	Enhance Traffic Diversion System	Continuing	Phase 1 is complete and working with COG and Measure C funding on Phase 2



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Kingsburg 2	Create Emergency Evacuation Plan for Large Scale Incident	Continuing	Still in progress.
Kingsburg 3	Identify High Risk and High Value Target Areas	Continuing	As part of the city's 2024 EOP update all current high risk target hazards have been identified.
Kingsburg 4	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	The city is working with the appropriate water basin to become compliant with SGWA.
Mendota 1	Build a Stormwater Detention/Desilting Basin	Continuing	No updates to report
Mendota 2	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	No updates to report
Reedley 1	Develop Stormwater Detention Basin	Deleted	The city has opted out due to partnership and funding reasons
San Joaquin 1	Construct Water Storage Tank and Booster Pump Station including emergency generators	Continuing	Water storage tank and booster pump station work completed; adjusting action in new plan to only reflect emergency generators



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Sanger 1	Establish Post-Disaster Action Plan for City Continuity of Operations Plan	Continuing	Will seek consultant assistance summer 2025.
Sanger 2	Add Potable Water Storage Capacity (500,000 Gallon above Ground Tank) to the City of Sanger's Water System	Deleted	Completed in 2020 – increased capacity to 750,000
Sanger 3	Provide Backup Power to City Pumps/Wells	Continuing	No significant progress has been made at this time. New well sites that are in planning process have redundant systems in place
Sanger 4	Replace Old Drainage System to Prevent Flooding	Continuing	Continues to be addressed with road projects on a case-by-case basis
Sanger 5	Provide Fire Department Office Security	Continuing	Renovation of Fire Station completion date scheduled for early winter 2025
Sanger 6	Provide Compound Security for Police and Fire Departments	Deleted	Completed in 2022
Sanger 7	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	SGMA Plan adopted in 2020, requires implementation



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
Selma 1	Institute a Disaster Preparedness Education Program for the Public	Continuing	Ongoing
Selma 2	Install Back-up Power for Storm Drain Pumps	Continuing	Ongoing, Progress dependent on funding availability
Selma 3	Sheridan Street Pump Station	Continuing	Ongoing, Progress dependent on funding availability
Selma 4	Construct New Police and Fire Department Headquarters	Continuing	Police Department Headquarters completed. Fire Department Headquarters ongoing
Selma 5	Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation	Continuing	Ongoing, Progress dependent on funding availability
FMCD 1	Construct the Gould Canal to Fancher Creek Detention Basin Pipeline	Deleted	Project completed in 2020
FMCD 2	Construct the Fancher Creek Detention Basin Pump Station and Telemetry System	Deleted	Project completed in 2023



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
FMCD 3	Provide for Local Stormwater Drainage System Infrastructure	Continuing	Perpetually ongoing task, successful
FMCD 4	Retain 200-Year Flood Control Protection	Continuing	Perpetually ongoing task, successful
FMCD 5	Retrofit Areas with Surface Outlets to Protect Existing Structures	Continuing	Not completed
FMCD 6	Install Back-up Generators for Pump Only Facilities	Continuing	Not completed
FMCD 7	Big Dry Creek Diversion Additional Drop Structure	Continuing	Not completed
LSJLD 1	Institute a Dredging Management Program for the Purpose of Flood Damage Reduction	Continuing	Still in planning stage
LSJLD 2	Institute an Invasive Vegetation Management Program for the Purpose of Flood Damage Reduction	Continuing	Still in planning stage

5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
SRCD 1	Strengthen Non-Native Noxious Weed Control Efforts	Continuing	SRCD has partnered with the San Joaquin River Conservancy and Parkway Trust for the removal of invasive species along the San Joaquin River. Sierra RCD has also implemented non-native noxious weed control for watershed restoration on the upper San Joaquin river watershed.
SRCD 2	Strengthen Dam Failure/Flood Planning, Coordination, and Training	Deleted	No updates.
SRCD 3	Improve Alternate Emergency Access Roads	Continuing	Up to a dozen alternate emergency access roads have been improved in the Wildland Urban Interface. Plans are being developed within Firewise Communities to improve additional emergency access roads.
SRCD 4	Conduct Community Fuel Break Construction and Maintenance on a Landscape Scale	Continuing	Highway 168 FireSafe Council, Oak to Timberline FireSafe Council, and Fresno County have partnered with CalFire to develop community fire breaks.
SRCD 5	Create a Fuel Break Along Highway 168	Continuing	No updates.
SRCD 6	Implement a Neighborhood Chipper Program	Continuing	Sierra RCD successfully launched a community chipper program and have done several dozen community chipper workdays in the effort to reduce post fire fuels and improve defensible space within communities along highway 168 and highway 180
SRCD 7	Conduct Prescribed Fires	Continuing	Sierra RCD has successfully launched a prescribed fire program for small acre and low severity fire. To date, the Sierra RCD has completed two burn units.

5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
SRCD 8	Establish a System of Fire Pumper/Tanker Fill Stations and Water Storage	Continuing	Due to the Creek Fire, the Creek Fire Recovery Collaborative has assisted approximately 10 landowners with repairing their water system and/or replacing water storage containers. Firewise Communities are being educated on the importance of establishing fire suppression systems in their communities.
SRCD 9	Implement a Public Fire Prevention, Survival, and Mitigation Education Program	Continuing	Sierra RCD's Forestry and Watershed Program has provided over the past 5 years 496 Fire Risk Evaluations to private landowners living in the Wildland Urban Interface. These Evaluations focus on Home Hardening, Defensible Space, and Forest Stewardship. Completed approximately 9000 hours of outreach to local landowners through community events.
SRCD 10	Update Highway 168 FireSafe Council's Community Wildfire Protection Plan through CA FireSafe Council Funding	Deleted	The Highway 168 FireSafe Council's CWPP was completed in 2018. The Highway 168 FireSafe Council plan needs to be updated to reflect changes post the 2020 Creek Fire.
SRCD 11	Develop Wildfire Protection Plan with Oak to Timberline FireSafe Council through CA FireSafe Council Funding	Deleted	The Highway 180 Oak to Timberline FireSafe Council's CWPP was completed in 2018. The Oak to Timberline FireSafe Council is in the process of updating their plan as of 2024.
SRCD 12	Implement a biomass utilization and dispositioning program for excessive forest and rangeland vegetation	Continuing	Sierra RCD has completed a feasibility study for a biomass to biofuel utilization campus for Fresno County.
SRCD 13	Partner with U.S. Forest Service to reduce fire risk in Wildland Urban Interface (WUI)	Continuing	Sierra RCD received a USFS Community Wildfire Defense Grant in 2023 to reduce the wildfire risk for 9 Firewise Communities in Fresno County. In 2024, the Sierra Nevada Conservancy funded Sierra RCD to continue to develop WUI projects on the Sierra National Forest



5. Mitigation Strategy

Status of 2018 Plan Actions

Action ID	Mitigation Project / Activity Description	Action Status (Continuing or Deleted)	Notes and Status Updates
SRCD 14	Removal of Illegal marijuana grows to reduce fire risk in Wildland Urban Interface (WUI)	Deleted	No Updates
SRCD 15	Burns Flat Fuel Break	Deleted	No Updates
SRCD 16	Whispering Springs Fuel Break	Deleted	Sierra RCD is working to establish a Firewise Community for this community. We completed a 9-acre ingress egress project for seven properties benefitting 21 landowners.
SRCD 17	The Beal Fire Road Fuel Break	Continuing	Working to establish a FireWise community. CalFire is working on this fuel break project.
SRCD 18	Peterson Road Fuel Break	Continuing	Working to establish a FireWise community. County is doing a fuel break.
WWD 1	Institute a Groundwater Replenishment and Drought Resiliency Project	Continuing	No updates to report
KRCD 1	Analysis of Levee Integrity and Improvement Project	Continuing	Analysis of the system occurs twice a year.

NFIP PARTICIPATION AND COMPLIANCE

The National Flood Insurance Program (NFIP) provides flood insurance to property owners, renters, and businesses in flood prone areas across the country. NFIP participating communities agree to adopt, implement, and enforce local flood plain regulations to protect lives and reduce the risk from future flooding. Participation in the NFIP is voluntary; the following communities in Fresno County currently do not participate in the NFIP due to funding, logistical, administrative, or other constraints:

- Kerman (the City of Kerman is not subject to floodwaters from a 100-year storm and thus is not required to participate in the NFIP)
- Selma

The following plan participants are not municipal governments and do not have residents, and thus are ineligible to participate in the NFIP:

- Fresno Metropolitan Flood Control District
- Kings River Conservation District
- Lower San Joaquin Levee District
- Sierra Resource Conservation District
- Westlands Water District

Table 168- NFIP Participation and Compliance addresses participating jurisdictions continued compliance with NFIP requirements:

Table 168- NFIP Participation and Compliance

Jurisdiction	Has your community adopted a floodplain management ordinance that meets NFIP Minimum criteria?	Has your community adopted the latest effective Flood Insurance Rate Map (FIRM)?	Do you regulate/ permit development in the Special Flood Hazard Area (SFHA)?	Which position or agency is in charge of NFIP compliance for your community?	How do you implement the substantial improvement / substantial damage provisions of your floodplain management ordinance?
Fresno County	Yes	Yes	Yes	County Building Official	Via permit process
Clovis	Yes	Yes	Yes	City Building Official	Via permit process
Coalinga	Yes	Yes	Yes	City Manager	Via permit process
Firebaugh	Yes	Yes	Yes	City Manager	Via permit process

5. Mitigation Strategy

Jurisdiction	Has your community adopted a floodplain management ordinance that meets NFIP Minimum criteria?	Has your community adopted the latest effective Flood Insurance Rate Map (FIRM)?	Do you regulate/ permit development in the Special Flood Hazard Area (SFHA)?	Which position or agency is in charge of NFIP compliance for your community?	How do you implement the substantial improvement / substantial damage provisions of your floodplain management ordinance?
Fowler	Yes	Yes	Yes	Community Development Director	Via permit process
Fresno	Yes	Yes	Yes	City Building Official	Via permit process
Kingsburg	No	Yes	Not Specified	Not Specified	Not Specified
Mendota	Yes	Yes	Yes	City Manager	Via permit process
Reedley	Yes	Yes	Yes	City Building Official	Via permit process
San Joaquin	No	Yes	Not Specified	Not Specified	Not Specified
Sanger	Yes	Yes	Yes	City Manager	Via permit process

2024 MITIGATION ACTIONS

Only those actions where the County is the lead jurisdiction, or are multi-jurisdictional, are detailed further in this section. Actions specific to other participating jurisdictions, or where other jurisdictions are taking the lead, are detailed in the jurisdictional annexes.

PRIORITIZATION OF MITIGATION ACTIONS

As noted above, the mitigation actions included in the 2024 Fresno County Hazard Mitigation Plan does not represent a commitment by participating communities to take on every listed action. Rather, this is a list of *potential* actions that they may wish to pursue, depending on the availability of funding. When determining how to use available hazard mitigation funding, or identifying (during annual plan reviews) which actions to pursue in the coming year, the HMPC will consider the following factors when identifying and reviewing priority actions:

- The benefit-cost ratio (BCR) of proposed projects
- BCR is a measure of the return on investment the community can expect to receive, and one of the most important factors in determining whether or not to implement an action
- Communities may opt to conduct a full benefit-cost analysis, or may consider the relative costs and benefits qualitatively, depending on the availability of detailed project cost information.
- Degree to which the project impacts or protects life safety
- Degree to which the project reduces the need for response actions
- Size of the population who would benefit from the action
- Benefit to the county's economy overall
- Useful life of project, taking into consideration the expected impacts of climate change
- Benefits to underserved communities
- Other non-monetary benefits not specified here

MULTI-JURISDICTION MITIGATION ACTIONS

All communities participating in the 2024 Fresno County Hazard Mitigation Plan wish to pursue increased awareness of hazard-related risks as reflected in the action below. The action listed below applies to all participating jurisdictions.

DEVELOP AND CONDUCT A MULTI-HAZARD SEASONAL PUBLIC AWARENESS PROGRAM

Hazards Addressed: Agricultural Hazards, Avalanche, Dam Failure, Drought, Earthquake, Flood/Levee Failure, Epidemic/Pandemic, Erosion, Expansive Soils, Extreme Temperatures, Fog, Heavy Rain/Thunderstorm/Hail/Lightning/wind, Landslide, Land Subsidence, Tornado, Volcano, West Nile Virus, Wildfire, Winter Storm.

Issue/Background: The jurisdictions within Fresno County are at risk to the natural hazards identified in this plan. Each hazard poses a different degree of risk and associated vulnerability, depending on the

5. Mitigation Strategy

location within the County, but drought, flooding, wildfire and earthquake represent some of the most significant hazards. Some hazards such as flooding, have a high likelihood of occurrence, a specific location that would likely be impacted, and proven approaches that could reduce the impact. For other hazards, where either the likelihood of occurrence is very low, the area of likely impact is not specifically known, or there is very little that can be done to reduce the impacts. The public needs to be made aware of the hazards so they can take action to reduce potential impacts to their own personal property and safety. The County and HMPC, including participating jurisdictions and special districts involved in the plan, have determined that public awareness is a key component of the overall mitigation strategy for this plan. People should have information describing historical events and losses, the likelihood of future occurrences, the range of possible impacts, appropriate actions to save lives and minimize property damage, and where additional information can be found. Any information provided through this effort should be accurate, specific, timely, and consistent with current and accepted local emergency management procedures as promoted by the California State Office of Emergency Services and the American Red Cross. This public outreach effort will be conducted annually and will include:

- Using a variety of information outlets, including local news media, social media, and web- based information;
- Creating and printing (where applicable) brochures, leaflets, water bill inserts, websites, and public service announcements;
- Displaying current brochures and flyers in County and City office buildings, libraries, and other public places;
- Developing public-private partnerships and incentives to support public education activities;
- Provide information on priority hazards including Agricultural Hazards, Dam Failure, Drought, Earthquake, Flood/Levee Failure, Human Health, Severe Weather, Soil Hazards (subsidence), Wildfire;
- Provide information on water conservation, particularly during times of drought;
- Participation in statewide events such as The 2018 Great California ShakeOut earthquake awareness drill

Other Alternatives: Continue public information activities currently in place

Responsible Office: Fresno County Office of Emergency Services, Department of Public Works and Planning, and Chamber of Commerce; American Red Cross. All municipalities and special districts will be partners including:

- City of Clovis
- City of Coalinga
- City of Firebaugh
- City of Fowler
- City of Fresno
- City of Kerman
- City of Kingsburg
- City of Mendota
- City of Reedley
- City of San Joaquin

5. Mitigation Strategy

- City of Sanger
- City of Selma
- Fresno Metropolitan Flood Control District
- Lower San Joaquin Levee District
- Sierra Resource Conservation District (including Highway 168 Fire Safe Council and Oak to Timberline Fire Safe Council)
- Kings River Conservation District
- Westlands Water District

Priority (High, Medium, Low): High

Cost Estimate: \$5,000-20,000 annually, depending on printing and mailing costs, level of volunteer participation, and scope and frequency of events

Potential Funding: FEMA's Hazard Mitigation Grant Program, Fresno County funds, other available grants

Benefits (Avoided Losses): Heightened awareness that can lead to enhanced life safety, reduction in property losses; relatively low cost

Schedule: Part of seasonal multi-hazard public awareness campaign

Status: 2009 project, implementation ongoing at County level but revised in 2018 to make it more of a multi-jurisdictional effort.

FRESNO COUNTY MULTI-HAZARD MITIGATION ACTIONS

IDENTIFY CRITICAL FACILITIES AND INSPECT FOR VULNERABILITY TO MAJOR HAZARDS

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, volcano, hazardous materials

Issue/Background: The County has various facilities that may need to function in times of crisis and/or emergency.

- The facilities should be identified.
- The identified facilities should be reviewed and inspected to determine if the infrastructure can withstand and operate under critical conditions.
- Required upgrades to each of the facilities should be identified and prioritized.

Other Alternatives: No action

Responsible Office: Internal Services Department in coordination with Fresno County Department of Public Works and County OES

Priority (High, Medium, Low): High

Cost Estimate: Up to \$3 million, depending on the number of facilities identified for review

Potential Funding: Annual budgets

Benefits (Avoided Losses): The County will be able to develop a plan to methodically upgrade the infrastructure and systems necessary to operate in times of emergency.

Schedule: Continuous

Status: Implementation ongoing

UPGRADE OR REPLACE CRITICAL COUNTY FACILITIES FOUND TO BE VULNERABLE TO MAJOR HAZARDS

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, volcano, hazardous materials

Issue/Background: The County has various facilities that may need to function in times of crisis and/or emergency. The County should upgrade or replace those facilities found to be vulnerable in accordance with a developed prioritized schedule.

Other Alternatives: Contact other jurisdictions to determine if capacity exists to accommodate County critical functions within facilities they control.

Responsible Office: Fresno County Department of Public Works and Planning Capital Projects Division

Priority (High, Medium, Low): High

Cost Estimate: Unknown at this time, will depend on the number of facilities identified, total cost could approach \$100 million or more

Potential Funding: FEMA's Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) Programs, state funds, Fresno County budgets

Benefits (Avoided Losses): The County will have reliable infrastructure and systems necessary to operate in times of emergency

Schedule: 2-10 years

Status: Implementation in progress

ENHANCE THE COUNTY EMERGENCY OPERATIONS CENTER

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, human health hazards, severe weather, wildfire, volcano, hazardous materials

Issue/Background: The Emergency Operations Center (EOC) for Fresno County is located in multiple rooms on multiple floors within the Public Health Department. Because the EOC sections are isolated, communications are limited, and section staff are unable to interact well. A centralized modern day EOC in a single location would greatly enhance communications and improve the effectiveness of those who work in it.

Other Alternatives: Enhance the EOCs of other jurisdictions and activate them in the event of an emergency

Responsible Office: Fresno County Office of Emergency Services

Priority (High, Medium, Low): High

Cost Estimate: \$2.5 million

Potential Funding: Fresno County General Fund, Capital improvement funds, HMGP, HMPG Post Fire, BRIC

Benefits (Avoided Losses): A modern EOC in one location would decrease emergency response time and the public notification process, reducing potential loss of life and damage. The more time people are given to prepare for a potential emergency, the better chance they have of avoiding the effects of that event. The benefits would reduce set-up time currently needed. This would result in greater efficiencies that could leverage current technologies and result in improved communication and save time, money and lives through a faster response

Schedule: within 15-20 years

Status: 2009 project, implementation in progress; Some improvements are in place. A centralized EOC is not yet in place.

CONTROL BUBONIC PLAGUE THROUGH COYOTE AND CALIFORNIA GROUND SQUIRREL POPULATION MANAGEMENT

Issue/Background: Bubonic plague is endemic to parts of Fresno County. Coyotes and the California ground squirrel are free ranging wildlife that are present in all of Fresno County. Coyotes and ground squirrels cause extensive agricultural livestock, crop, and property damage. Coyotes are very mobile and can travel 20 to 25 miles in a day. Coyotes are known to carry and transmit diseases to humans, domestic animals, and livestock. Coyotes are carriers of the bubonic plague bacteria, which they receive from the bite of an infected flea. Coyotes can spread the disease to various California ground squirrel colonies. Human interaction with ground squirrels in open spaces, parks, and recreational areas can potentially result in bubonic plague infection through flea bites. Blood samples from coyotes can be tested for the presence of bubonic plague.

Other Alternatives: No action

Responsible Office: Fresno County Department of Agriculture Wildlife Damage Management

Priority (High, Medium, Low): High

Cost Estimate: \$100,000

Potential Funding: Fresno County General Fund, California Department of Public Health, unrefunded gas tax

Benefits (Avoided Losses):

- One human life saved is \$3.1 million
- Avoids disease transmission to humans
- Reduces the discomfort and adverse effects of flea bites

Schedule: Annually, June through October

Status: 2009 project, routine implementation on an as needed basis

MINIMIZE FLOOD EVENTS BY EXERCISING RECLAMATION'S EMERGENCY ACTION PLAN AND PROVIDE AN EARLY WARNING SYSTEM TO DOWNSTREAM EMERGENCY RESPONSE AGENCIES

Issue/Background: Friant Dam was constructed in 1942 and is located 20 miles northeast of the City of Fresno. It serves as a water conservation and flood control facility. The dam has a structural height of 319 feet with a top of crest elevation of 581.25 feet. Millerton Lake reservoir has a storage capacity of 520,500 acre-feet.

The Bureau of Reclamation has the ability to divert water to the Friant Kern Canal, Madera Canal, and the San Joaquin River. During unforeseen events, the Bureau of Reclamation may be required to release water into the San Joaquin River that may exceed the river channel capacity.

Other Alternatives: Divert flood water to the Friant Kern Canal and the Madera Canal, reduce encroachment of development in the San Joaquin River floodplain, construct a new storage facility

Responsible Office: Fresno County Emergency Management, U.S. Bureau of Reclamation, South Central California Area Office-Fresno; U.S. Army Corps of Engineers Sacramento Branch

Priority (High, Medium, Low): High

Cost Estimate: \$5,000-10,000 to exercise and update emergency action plan

5. Mitigation Strategy

Potential Funding: FEMA's HMGP, California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Minimized risk of loss of life and property damage

Schedule: 1-3 years

Status: In progress

SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Issue/Background: Like many groundwater basins throughout the State, all four of the groundwater subbasins that underlay Fresno County are in overdraft condition and three (Kings, Westside, and Delta-Mendota) have been prioritized by DWR as critical, meaning, underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. Recognizing the importance of groundwater and the consequences of overuse, the Sustainable Groundwater Management Act (SGMA) was signed into law in 2014, to address the sustainable management of groundwater in California. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). Each GSA is required to develop and implement, no later than January 31, 2020, a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Fresno County is working cooperatively with multiple GSAs within the four subbasins located within Fresno County towards the preparation and implementation of required GSPs. Maintaining sustainable groundwater supplies will provide insurance against periods of long-term drought and assist in the mitigating the potential for land subsidence.

As required in §10724(a) of the Water Code, the areas within the priority basins that underlay Fresno County that are not within the management area of one of these GSAs, the County is presumed to be the GSA for that area. There are nineteen (19) GSAs that have been formed within Fresno County, of these the County is the Authority for two GSAs (Management Area 'B', and Management Area 'A'). The Westside Subbasin is covered by two GSAs, as such the County and Westlands Water District work cooperatively through an MOU. Other jurisdictions in Fresno County have formed their own GSAs (City of Firebaugh and City of Mendota) for the portions of the Delta-Mendota Subbasin that underlay each jurisdictions boundary. While other jurisdictions have formed a GSA along with other local agencies as a joint powers authority, listed below. These jurisdictions have similar mitigation actions and can be found in their respective jurisdictional annexes. North Kings GSA: City of Fresno, City of Clovis and City of Kerman South Kings GSA: City of Fowler, City of Kingsburg, City of Sanger Central Kings GSA: City of Selma

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: Responsibilities for compliance with the Sustainable Groundwater Management Act have been assumed through the formation of Groundwater Sustainability Agencies within the four Fresno County groundwater subbasins recognized by the California Department of Water Resources. Fresno County is generally party to each of the GSAs within Fresno County by agreement or memorandum of understanding.

Priority (High, Medium, Low): High

5. Mitigation Strategy

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: New project in 2018, implementation in progress

CONDUCT FEASIBILITY STUDY FOR PANOCHESILVER CREEK FLOOD DETENTION FACILITY

Issue/Background: Panoche-Silver Creek downstream of the California Aqueduct causes frequent flooding of Belmont Avenue, a major transportation corridor connecting west Fresno County to I-5, the future Route 180 alignment, and the City of Mendota, a downstream community. Flooding occurs during normal-intensity storm events. High-intensity events result in extended road closures in an area of the County with limited transportation corridors. A feasibility study is needed to assess feasibility and location of facilities to route flood flows to a detention reservoir.

Other Alternatives: None identified

Responsible Office: Joint, possible partners include California Department of Water Resources, Bureau of Reclamation, Fresno County, City of Mendota, Westlands Water District

Priority (High, Medium, Low): High

Cost Estimate: \$1.2 million

Potential Funding: USACE, HMGP, BRIC, California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Finding potential solution to reduce traffic disruptions

Schedule: 2-5 years

Status: Project has not started

INVESTIGATE AND CONSTRUCT WATER STORAGE OPTIONS FOR THE UPPER SAN JOAQUIN RIVER BASIN

Issue/Background: The Upper San Joaquin River Storage Investigation will investigate feasibility and cost to provide on- or off-stream storage in the upper San Joaquin River Basin. The objectives are conjunctive beneficial uses, including restoration of the San Joaquin River, increased management and exchange opportunities to secure and stabilize deliveries to urban and agricultural uses, flood control, recreation, reduced groundwater overdraft, and potentially hydropower.

Other Alternatives: No action

5. Mitigation Strategy

Responsible Office: Fresno County, California Department of Water Resources, Bureau of Reclamation

Priority (High, Medium, Low): High

Cost Estimate: Study—to be determined; resulting project—\$1-1.5 billion

Potential Funding: BRIC, California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Reduction of flood risk downstream of Friant Dam

Schedule: 10-20 years

Status: 2009 project; As of March 2018, a draft Environmental Impact Statement has been completed and funding is being sought for implementation

ANALYZE SYSTEM, CONDITION, AND MANAGEMENT OF FLOOD WATER CONVEYANCE FACILITIES

Issue/Background: Flood water conveyance occurs over a disparate system of natural and manmade channels, levees, irrigation canals, and ad-hoc structures whose primary function may be for purposes other than flood management. A systemwide inventory and analysis is needed to develop priorities across many jurisdictions, both public and private, for rehabilitation and upgrade of critical flood management facilities, including public and private levees.

Other Alternatives: No action

Responsible Office: Potentially San Joaquin Valley-wide, possible lead or joint lead entities include California Department of Water Resources; Bureau of Reclamation; irrigation, water, and conservation districts; regional partners through integrated regional water management plans; Fresno County

Priority (High, Medium, Low): High

Cost Estimate: \$5 million (Fresno County)

Potential Funding: BRIC or FMA, California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Reduced flood risk and flood losses

Schedule: 10-20 years

Status: 2009 project; Deferred. Implementation of this project has not started

PREPARE STORMWATER DRAINAGE MASTER PLANS

Issue/Background: Some unincorporated communities in Fresno County do not have master plans for stormwater drainage, which provide for flow, collection, and diversion of stormwater from public streets to detention or recharge facilities. Lacking appropriate drainage, stormwater may flood streets and/or property, and standing water may persist, leading to health or traffic safety concerns.

Other Alternatives: No action

Responsible Office: Fresno County Public Works, special or community service districts or County service area zones of benefit

Priority (High, Medium, Low): Medium

Cost Estimate: \$150,000-500,000 per community

Potential Funding: EPA

Benefits (Avoided Losses): Reduced property damage and adverse impacts on health and traffic safety

Schedule: 3-5 years

Status: In progress

WILDFIRE DEFENSIBLE FUEL MODIFICATION ZONES IN AREAS OF TREE MORTALITY

Issue/Background: The foothill and mountain areas of Fresno County have been severely impacted by the drought and subsequent bark beetle outbreak since 2014. This has caused tree mortality across 216,000 acres and over 21 million trees have died. Not only have the trees died but the brush and shrubs throughout the County have died back creating an additional fuel load. All the communities in these areas are at an increased risk of a damaging wildland fire due to the mortality and fuel loading. Much of this mortality is on open land, both private and public, that will not get removed causing an increased ground fuel loading that will persist for decades to come. The Communities, businesses and local infrastructure will need increased Defensible Fuel Modification Zones (DFZ's) and hazard tree removal to reduce the damaging effects of a wildland fire. In addition, this project would help mitigate wind-fall hazards on property and people.

Other Alternatives: In the past CAL FIRE, United State Forest Service and local fire safe councils have been creating DFZ's throughout the County in high fire prone areas. Due to the change in the fuels and health of the forest all communities in the affected areas are at high risk and need to implement integrated community DFZ's. These community DFZ's need to tie into existing DFZ's, roads, designated escape routes and homeowner defensible space to create a network that allows for increased community protection. Ingress and egress corridors need to be created by removing both dead trees and brush for the public to evacuate safely and allow emergency response personnel safe access. These DFZ's will need to be created using heavy equipment, masticators, hand crews and prescribed fire to remove dead trees, reduce understory brush and remove ground fuels. This network will need to be maintained over time and retreatment of the fuels will need to occur every 3 to 7 years for them to be effective. Community education related to fire safety, building construction, evacuation procedures and fuels management is a main part of this plan to be successful.

Responsible Office: CAL FIRE, Fresno County (Public Works, OES), USFS; partner agencies include Fire Safety Councils, PG&E, Cal Trans

Priority (High, Medium, Low): High

Cost Estimate: \$10,000,000

Potential Funding: CAL FIRE grants, CAL OES funds, County funds, CAL FIRE Unit funds, USDA Forest Service funds, HMGP, HMPG Post Fire

Benefits (Avoided Losses): By completing these types of projects, it is estimated to reduce the impacts of fire to over 4,816 residences, numerous businesses and critical infrastructure directly affected by the tree mortality.

Schedule: 1-3 years implementation with ongoing maintenance

Status: Planning phase

6. Plan Implementation and Maintenance





Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of the plan is critical to the overall success of hazard mitigation planning. This chapter provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the plan. The chapter also discusses incorporating the plan into existing planning mechanisms and how to address continued public involvement.



ADOPTION

The purpose of formally adopting this plan is to secure buy-in from Fresno County and participating jurisdictions, raise awareness of the plan, and formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of DMA 2000. This adoption also establishes compliance with AB 2140 requiring adoption by reference or incorporation into the safety element of the general plan. The governing board for each participating jurisdiction has adopted this multi-hazard mitigation plan by passing a resolution. A copy of the generic resolution and the executed copies are included in Appendix A: Adoption Resolutions.



IMPLEMENTATION

Once adopted, the plan faces the truest test of its worth: implementation. While this plan contains many worthwhile actions, the participating jurisdictions will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

Implementation will be accomplished by adhering to the schedules identified for each action (see Chapter 5 Mitigation Strategy for the County and the actions detailed in the jurisdictional annexes) and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits of each project to the Fresno County community and its stakeholders. These efforts include the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. The three main components of implementation are:

- Monitoring: Tracking implementation of the plan over time
- Evaluating: Assessing how well the plan meets its stated purpose and goals

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. Implementation will be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to each program and the Fresno County community and its stakeholders. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

One example of an important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans and mechanisms, such as the general plans for Fresno County and the participating jurisdictions. The County and participating jurisdictions already implement 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.

Simultaneously to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This will include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the participating jurisdictions will be in a position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, special district budgeted funds, state and federal earmarked funds, and other grant programs, including those that can serve or support multi-objective applications.

ROLE OF HAZARD MITIGATION PLANNING COMMITTEE IN IMPLEMENTATION AND MAINTENANCE

With adoption of this plan, the participating jurisdictions will be tasked with plan implementation and maintenance. The participating jurisdictions, led by the Fresno County Office of Emergency Services, agrees to:



- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Keep the concept of mitigation in the forefront of community decision making by identifying plan recommendations when other community goals, plans, and activities overlap, influence, or directly affect increased community vulnerability to disasters;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the community implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in implementation and update of this plan;
- Report on plan progress and recommended changes to the Fresno County Board of Supervisors and the governing boards of the other participating jurisdictions; and
- Inform and solicit input from the public.

The primary duty of the participating jurisdictions is to see the plan successfully carried out and to report to their community governing boards and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the County website (and others as appropriate).



MAINTENANCE/MONITORING

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update the plan as progress, roadblocks, or changing circumstances are recognized.

MAINTENANCE/MONITORING SCHEDULE

The Emergency Manager in the Fresno County Office of Emergency Services within the Department of Public Health is responsible for initiating plan reviews and will consult with the heads of participating departments and other participating jurisdictions. In order to monitor progress and update the mitigation strategies identified in the action plan, the Fresno County Office of Emergency Services will revisit this plan annually and after a hazard event. The annual review will be conducted by re-convening the HMPC each year.

This plan will be updated, approved and adopted within a five-year cycle as per Requirement §201.6(c)(4)(i) of the Disaster Mitigation Act of 2000 unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With the initial approval of this plan occurring in mid-2024, the plan will need to be updated, reviewed by Cal OES and FEMA Region IX, and re-adopted by all participating jurisdictions by mid-2029. The County will monitor planning grant opportunities from Cal OES and FEMA for funds to assist with the update. These grants should be pursued as early as 2026, as some grants have a three-year performance period to expend the funds. In addition, there is no guarantee that the grant will be awarded when initially submitted. This allows time to resubmit the grant in 2027 if needed.

MAINTENANCE EVALUATION PROCESS

The planning team will continually observe the incorporation process, evaluation method, updating method, continued public participation, and completion of the action/projects to assure that the planning team and the plan itself are performing as anticipated. By monitoring these processes, the planning team will then be able to evaluate them at the time of the plan update, determining if any changes are needed.

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions,
- Increased vulnerability as a result of failed or ineffective mitigation actions, and/or
- Increased vulnerability as a result of new development (and/or annexation).

The HMPC will use the following process to evaluate progress and any changes in vulnerability as a result of plan implementation.

- A representative from the responsible entity identified in each mitigation measure will be responsible for tracking and reporting on an annual basis to the HMPC on project status and provide input on whether the project as implemented meets the defined objectives and is likely to be successful in reducing vulnerabilities.



- If the project does not meet identified objectives, the HMPC will determine what alternate projects may be implemented, and an assigned individual will be responsible for defining action scope, implementing the action, monitoring success of the action, and making any required modifications to the plan.
- New projects identified will require an individual assigned to be responsible for defining the project scope, implementing the project, and monitoring success of the project.
- Projects that were not ranked high priority but were identified as potential mitigation strategies will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation.
- Changes will be made to the plan to accommodate for projects that have failed or are not considered feasible after a review for their consistency with established criteria, the time frame, priorities, and/or funding resources.

Updating of the plan will be by written changes and submissions, as the Fresno County Office of Emergency Services deems appropriate and necessary, and as approved by the Fresno County Board of Supervisors and the governing boards of the other participating jurisdictions. Updates to this plan will:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Document hazard events and impacts that occurred within the five-year period;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate documentation of continued public involvement;
- Incorporate documentation to update the planning process that may include new or additional stakeholder involvement;
- Incorporate growth and development-related changes to building inventories;
- Incorporate new project recommendations or changes in project prioritization;
- Include a public involvement process to receive public comment on the updated plan prior to submitting the updated plan to Cal OES/FEMA; and
- Include re-adoption by all participating entities following Cal OES/FEMA approval.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

Another important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other County and City plans and mechanisms. Where possible, plan participants will use existing plans and/or programs to implement hazard mitigation actions. As previously stated in Section 7.1 of this plan, mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. This point is re-emphasized here. As described in this plan's capability assessment, the



County and participating jurisdictions already implement 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 (but not limited to) the following:

- County and city general and master plans
- County and city emergency operations plans
- County and city ordinances
- Flood/stormwater management/master plans
- Community Wildfire Protection plans
- Drought management and response plans
- Capital improvement plans and budgets
- Other plans and policies outlined in the capability assessments in the jurisdictional annexes
- Other plans, regulations, and practices with a mitigation focus

HMPC members involved in the updates to the planning mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, programs, etc, as appropriate. As an action step to ensure integration with other planning mechanisms the County Office of Emergency Services Manager or designee will discuss this topic at the annual meeting of the HMPC previously described in the Maintenance Schedule. The HMPC will discuss if there are opportunities to incorporate the plan into other planning mechanisms and who would be responsible for leveraging those opportunities. HMPC members representing local jurisdictions will work with their jurisdictional planning teams to integrate their identified mitigation actions into their own local plans and programs. Efforts to integrate the hazard mitigation plan into local plans, programs, and policies will be reported on at the annual HMPC plan review meeting, and a record of successful integration efforts will be kept.

Examples of a process for incorporation of the LHMP into existing planning mechanisms include:

- As recommended by Assembly Bill (AB) 2140, each community 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 wildfire actions identified in this mitigation strategy with the actions and implementation priorities established in existing Community Wildfire Protection Plans (CWPPs). This has already occurred and will continue to occur as the CWPPs are updated and implemented. Specifically, key people responsible for development of the Highway 168 Fire Safe Council CWPP and Oak to Timberline Fire Safe Council CWPP participated as a member of the HMPC in the original development and 2017-2018 update of this LHMP. They identified key projects in the CWPPs and integrated them into the Mitigation Strategy of this LHMP. Likewise, actual implementation of these wildfire projects will likely occur through the CWPP implementation process through the efforts of these same individuals.
- Using the risk assessment information to update the hazard analysis in the Fresno County Operational Area Master Emergency Services Plan.



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.

CONTINUED PUBLIC INVOLVEMENT

Continued public involvement is imperative to the overall success of the plan's implementation. Efforts will be made to involve the public in the plan maintenance, evaluation, and review process. This includes maintaining a digital version of the plan on the County Office of Emergency Services website for public review. In addition, information on who to contact within the Office of Emergency Services will be posted with the plan. The Emergency Manager in the Fresno County Office of Emergency Services will maintain a file of comments received for reference during the next five-year update. Any revisions to the plan that may occur as a result of a disaster will also be made public and posted on the County website.

The next five-year update process also provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stories from the plan implementation and seek additional public comment. A public hearing(s) or survey to receive public comment on the plan will be held during the plan update period. When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process, including those who joined the HMPC after the initial effort, to update and revise the plan. Public notice will be posted and public participation will be invited, at a minimum, through available website postings and press releases to the local media outlets as well as email and social media announcements.

Continued public outreach and education is also an aspect of the mitigation strategy in Chapter 5 of this plan through inclusion of an action to develop and conduct a multi-hazard seasonal public awareness program on an annual basis.

Appendix B – Process and Participation Documentation

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1 - Participants

Jurisdiction	Name	Email	Title	Participated in Kickoff?	Participated in HIRA Meeting?	Participated in Strategy Meeting?	Participated in 1:1	Notes
City of Clovis	Chad Fitzgerald	chadf@ci.clovis.ca.us	Life Safety Enforcement Manager, FD			x		
City of Clovis	Chris Ekk	chrise@ci.clovis.ca.us	Fire Chief	X				
City of Clovis	John Holt	johnh@ci.clovis.ca.us	City Manager					
City of Coalinga	Greg DuPuis	firechief@coalinga.com	Fire Chief					
City of Coalinga	Robert Long	rlong@coalinga.com					x	
City of Coalinga	Marissa Trejo	mtrejo@coalinga.com	City Manager					
City of Firebaugh	Ben Gallegos	BGallegos@Firebaugh.org	City Manager	X				
City of Firebaugh	Salvador Raygoza	salvador.raygoza@fcle.org	Police Chief		X			
City of Fowler	Trish McAvoy	pmcavoy@ci.fowler.ca.us			X		x	
City of Fowler	Wilma Tucker	wtucker@ci.fowler.ca.us	City Manager					
City of Fresno	Billy Long	william.long@fresno.gov		X			x	
City of Fresno	Martin Wendels	Martin.Wendels@fresno.gov	Project Manager, Public Utilities				x	
City of Fresno	Georgianne White	Georgianne.White@fresno.gov	City Manager					
City of Fresno	Jeffrey Guynn	jeffrey.guynn@fresno.gov	Floodplain Management / Fire Captain / Emergency Preparedness Officer				x	
City of Kerman	John Jansons	jjansons@cityofkerman.org	City Manager				x	
City of Kerman	Steve Wilkins	steve.wilkins@fcle.org	Police Chief		X		x	
City of Kingsburg	John Benaski	jbinaski@cityofkingsburg-ca.gov	Interim fire chief				X	Met 1:1 with Katie Norris on 4/4/2024
City of Kingsburg	Alexander Henderson	ahenderson@cityofkingsburg-ca.gov	City Manager					
City of Mendota	Cristian Gonzlez	cristian@cityofmendota.com	City Manager	X				
City of Reedley	Jerald Isaak	jerry.isaak@reedley.ca.gov	Fire Chief	X	X			
City of Reedley	Nicole Zieba	Nicole.Zieba@reedley.ca.gov	City Manager					
City of San Joaquin	Elizabeth Cabrera	elizabethc@cityofsanjoaquin.org		X				
City of San Joaquin	Elizabeth Nunez	elizabethn@cityofsanjoaquin.org	City Manager					
City of Sanger	Greg Tarascou	grept@ci.sanger.ca.us	Fire Chief		X		x	
City of Sanger	Nathan Olson	nathan.olson@ci.sanger.ca.us	City Manager				x	
City of Selma	Rudy Alcaraz	rudya@cityofselma.com	Police Chief				x	
City of Selma	Fernando Santillan	fernandos@cityofselma.com	City Manager					
City of Selma	Jordan Webster	JordanW@cityofselma.com	Fire Chief					
City of Selma	Paul Demmers	PaulD@cityofselma.com	Division Chief	X				
Fresno County	Chris Motta	cmotta@fresnocountyca.gov	Floodplain Management		X			
Fresno County	Dave Davis	dadavis@fresnocountyca.gov	Emergency Management Specialist	X	X		x	
Fresno County	Douglas Loera	dloera@fresnocountyca.gov	EMS Staff Analyst	X	X			
Fresno County	Jason Passmore	jpassmore@fresnocountyca.gov		X			x	
Fresno County	Michelle Avalos	mavalos@fresnocountyca.gov	Public Information Officer	X				
Fresno County	Sarah Villa	savilla@fresnocountyca.gov			X		x	
Fresno County	Tendai Mtunga	tmtunga@fresnocountyca.gov	Floodplain Management				x	
Fresno County	Terri Mejorado	tmejorado@fresnocountyca.gov	Emergency Manager	X	X		x	
Fresno County Public Works and Planning	Dana Ritschel	dritschel@fresnocountyca.gov	Engineer, Grading Department				x	
Fresno County Public Works and Planning	James Anders	janders@fresnocountyca.gov	Principal Planner				x	
Fresno County Public Works and Planning	Moriah Bastian	mbastian@fresnocountyca.gov	Engineering Technician					
Fresno Metropolitan Flood Control District	Brent Sunamoto	brenths@fresnofloodcontrol.org	District Engineer / Assistant General Manager					
Fresno Metropolitan Flood Control District	Jarrod Takemoto	jarrodt@fresnofloodcontrol.org	Operations Engineer	X			x	
Kings River Conservation District	Charlotte Gallock	cgalloock@krcd.org	Director of Water Resources	X	X		x	
Kings River Conservation District	David Merritt	dmerritt@krcd.org	General Manager					
Kings River Conservation District	Steve Haugen	shaugen@kingsriverwater.org	Manager	X	X			
Lower San Joaquin Levee District	Shane Swartz	shane.swartz.LSJD@gmail.com	Secretary/Manager				X	Met 1:1 on 4/2/2024
Sierra Resource Conservation District	Tanner Michaelson	tmichaelson@sierrarcld.com	Manager	X	X		x	
Wetlands Water District	Bobby Phillips	bphillips@wwd.ca.gov	Resources Engineer	X			x	

2 – Stakeholders

Jurisdiction	Name	Email	Title	Type	Participated in Kickoff?	Participated in HIRA Meeting?	Participated in Strategy Meeting?
American Red Cross of the Central Valley	Kaylin Crough	Kaylin.crough@redcross.org	Senior Disaster Program Manager	Nonprofits and Community Orgs (housing, healthcare, social services)			
California State University, Fresno	Amy Luna	amyluna@csufresno.edu	Emergency Operations Manager	Academia			
Cargill	Katrina Robertson	katrina_robertson@cargill.com	General Manager	Businesses			
Central Valley Flood Protection Board	David Ismailyan	David.ismailyan@cvflood.ca.gov		Businesses			
City of Huron	George Turegano	george.turegano@fcle.org	Police Chief	Neighboring Communities			
City of Huron	John Kunkel	john@cityofhuron.com	City Manager	Neighboring Communities			
City of Huron	Virginia Peñaloza			Neighboring Communities			
City of Orange Cove	Daniel T Parra	dparra@cityoforange Cove.com	City Manager	Neighboring Communities		X	
City of Orange Cove	Marty Rivera	marty.rivera@oc-pd.com	Police Chief	Neighboring Communities			
City of Parlier	David Cerda	david.cerda@fcle.org	Chief of Police	Neighboring Communities			
City of Parlier	Sonia Hall	shall@parlier.ca.us	City Manager	Neighboring Communities			
Clovis Community College	Lorrie Hopper	lorri.hopper@cloviscollege.edu	VP, Administrative Services	Academia			
Fresno Chamber of Commerce	Scott Miller	smiller@fresnochamber.com	President/CEO	Businesses			X
Fresno City College	GENERAL LINE	AdminServices@fresnocitycollege.edu	Administrative Services	Academia			
Fresno Madera Continuum Of Care (FMCoC)	GENERAL LINE	Info@FresnoMaderaHomeless.Org	GENERAL LINE	Nonprofits and Community Orgs (housing, healthcare, social services)			
Inyo County Office of Emergency Services	Mikaela Torres	mtorres@inyocounty.us	Emergency Services Manager	Neighboring Communities			
Kern County Fire	Georgianna Armstrong	garmstrong@kerncountyfire.org	Emergency Services Manager	Neighboring Communities			
Kings County Emergency Management	Abraham Valencia	Abraham.Valencia@co.kings.ca.us	Emergency Services Manager	Neighboring Communities			
Madera County Emergency Management	Joseph Wilder	jwilder@maderacounty.com	Sergeant	Neighboring Communities			
Mariposa County Emergency Management	Raquel Sandoval	rsandoval@mariposacounty.org		Neighboring Communities			X
Mariposa County Emergency Management	Wes Smith	wsmith@mariposacounty.org	Sheriff's Sergeant	Neighboring Communities			X
Merced County Emergency Management	Adam Amaral	adam.amaral@countyofmerced.com	Emergency Services Manager	Neighboring Communities			
Mono County	Paul Roten	proten@mono.ca.gov	Public Works Director	Neighboring Communities			
Monterey County Emergency Management	GENERAL LINE	info.dem@co.monterey.ca.us	GENERAL LINE	Neighboring Communities			
PG&E	Charlotte Jordan	CGJ5@pge.com	Senior Public Safety Specialist	Other Private Organizations (Utilities, Major Employers)			X
Pilot Power Group	GENERAL LINE	regulatory@pilotpowergroup.com	GENERAL LINE	Other Private Organizations (Utilities, Major Employers)			
Reedley College	Kelly Murgia	kelly.murgia@reedleycollege.edu	Health Services Coordinator	Academia			
Reedley College	Melanie Highfill	melanie.highfill@reedleycollege.edu	VP, Administrative Services	Academia			X
San Benito County Emergency Management	Kris Mangano	kmangano@cosb.us	Emergency Services Manager	Neighboring Communities			X
San Joaquin College of Law	Rick Rodriguez	rodriguez@sjcl.edu	Facilities Manager	Academia			
San Joaquin River Exchange Contractors Water Authority	Adam Hoffman	ahoffman@sirecwa.net		Regulatory Authorities (zoning, planning, development, buildings)			
Southern California Edison	Angla Babcock	angela.babcock@sce.com		Other Private Organizations (Utilities, Major Employers)			X
Southern California Edison	Brian Thoburn	Brian.thoburn@sce.com	Government Relations Manager	Other Private Organizations (Utilities, Major Employers)			X
Sun-Maid	GENERAL LINE	info@sunmaid.com	GENERAL LINE	Businesses			
Tulare County OES	Richard Meorado	RMeorado@tularecounty.ca.gov		Neighboring Communities			X
Tulare County OES	Megan Gilles	mgilles@tularecounty.ca.gov		Neighboring Communities			X
United Way of Tulare County	Rosemary Caso	rosemary@unitedwaytc.org	Executive Director	Nonprofits and Community Orgs (housing, healthcare, social services)			X
West Hill College Coalinga	Shaun Bailey	shaunbailey@whccd.edu	Director of Maintenance & Operations and A	Academia			
Loyd's Liberty Homes	Brittany Cupps	brittany.cupps@sevitahhealth.com		Nonprofits and Community Orgs (housing, healthcare, social services)			
Amputees of Central California	Liz Zemke	lzemke@sbcglobal.net	RN	Nonprofits and Community Orgs (housing, healthcare, social services)			
The Fresno-Madera Area Agency on Aging	Jennifer Webb	jwebb@fmaaa.org	Administrative Manager	Nonprofits and Community Orgs (housing, healthcare, social services)			
American Red Cross	Katrina Poitras	katrina.poitras@redcross.org		Nonprofits and Community Orgs (housing, healthcare, social services)			
Central Valley Regional Center (CVRC)	Annette D. Rogers	arogers@cvrc.org	Emergency Operations Manager	Nonprofits and Community Orgs (housing, healthcare, social services)			

Thursday, May 16, 2024 at 09:37:39 Eastern Daylight Time

Subject: Fresno County Hazard Mitigation Plan Update
Date: Monday, March 18, 2024 at 1:10:01 PM Eastern Daylight Time
From: Norris, Katie
To: Norris, Katie
BCC: amyluna, lorri.hopper@cloviscollege.edu, AdminServices@fresnocitycollege.edu, Kelly.murguia@reedleycollege.edu, melanie.highfill@reedleycollege.edu, rrodriguez@sjcl.edu, shaunbailey@whccd.edu, katrina_robertson@cargill.com, smiller@fresnochamber.com, info@sunmaid.com, mtorres@inyocounty.us, garmstrong@kerncountyfire.org, Abraham.Valencia@co.kings.ca.us, jwilder@maderacounty.com, wsmith@mariposacounty.org, adam.amaral@countyofmerced.com, proten@mono.ca.gov, info.dem@co.monterey.ca.us, kmangano@cosb.us, slbustamante@tularecounty.ca.gov, Kaytlin.crough@redcross.org, Info@FresnoMaderaHomeless.Org, rosemary@unitedwaytc.org, CGJ5@pge.com, regulatory@pilotpowergroup.com, Brian.thoburn@sce.com
Attachments: image001.png

Good morning –

I am part of the team that is helping update the Fresno County, California [Hazard Mitigation Plan](#). This plan describes the hazard risks faced by the community, and identifies strategies and actions that the county (and municipalities) can take to reduce vulnerability to disasters. We want to consult as many voices as possible in this process, and would like to provide your feedback, and help us identify actions that will make Fresno County more resilient. We will soon be sending you an invitation to an upcoming strategy meeting, and (when completed) sharing a draft copy of the plan with you for your review and feedback.

If you are able, we would love to get your input on how hazards have impacted your organization, and your ideas for how we can reduce those impacts in the future. Thank you in advance for your participation.

Best,



Katie Norris
Hazard Mitigation Planner
+1 803 999 7014
wittobriens.com | ambipar.com

[Witt O'Brien's is now part of the Ambipar Response group \(NYSE: AMBI\)](#)

Thursday, May 16, 2024 at 09:43:24 Eastern Daylight Time

Subject: Draft for Review: 2024 Fresno County Hazard Mitigation Plan
Date: Thursday, May 16, 2024 at 9:41:23 AM Eastern Daylight Time
From: Norris, Katie
To: Kaytlin.crough@redcross.org, amyluna, katrina_robertson@cargill.com, David.Ismailyan@cvflood.ca.gov, george.turegano@fcle.org, john@Cityofhuron.com, dparra@cityoforangecove.com, marty.rivera@oc-pd.com, david.cerda@fcle.org, shall@parlier.ca.us, lorri.hopper@cloviscollege.edu, smiller@fresnochamber.com, AdminServices@fresnocitycollege.edu, Info@FresnoMaderaHomeless.Org, mtorres@inyocounty.us, garmstrong@kerncountyfire.org, Abraham.Valencia@co.kings.ca.us, jwilder@maderacounty.com, rsandoval@mariposacounty.org, wsmith@mariposacounty.org, adam.amaral@countyofmerced.com, proten@mono.ca.gov, info.dem@co.monterey.ca.us, CGJ5@pge.com, regulatory@pilotpowergroup.com, Kelly.murguia@reedleycollege.edu, melanie.highfill@reedleycollege.edu, kmangano@cosb.us, rrodriguez@sjcl.edu, ahoffman@sjrecwa.net, angela.babcock@sce.com, Brian.thoburn@sce.com, info@sunmaid.com, RMejorado@tularecounty.ca.gov, mgilles@tularecounty.ca.gov, rosemary@unitedwaytc.org, shaunbailey@whccd.edu, brittany.cupps@sevitahhealth.com, lzemke@sbcglobal.net, jwebb@fmaaa.org, katrina.poitras@redcross.org, arogers@cvrc.org
Attachments: image001.png, DRAFT - 2024 Fresno County Hazard Mitigation Plan.pdf

All –

As noted in a previous email, you have been identified as a potential stakeholder in the effort to reduce disaster-related risk in Fresno County. I'm excited to share for your review the draft 2024 Fresno County Hazard Mitigation Plan. This plan describes the hazard risks faced by the community and identifies strategies and actions that the county (and municipalities) can take to reduce vulnerability. We want to consult as many voices as possible in this process and would like to ask you to provide your feedback on the draft if you are able.

We acknowledge that this request represents an addition to your busy plate and thank you in advance for your participation. Feel free to provide any feedback on the draft to me directly via email.

Best,



Katie Norris
Hazard Mitigation Planner
+1 (803) 999 7014 (mobile)
wittobriens.com | ambipar.com

[Witt O'Brien's is now part of the Ambipar Response group \(NYSE: AMBI\)](#)

3 – Sample Worksheets



Hazard Identification Exercise

Community/Organization:	
Name and Title:	

PART I: Identified Hazards

Has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community?

Identified Hazards (2020 HMP)	NC=No Change I=Increase D=Decrease	Comments (Provide input for any hazards marked I or D)
Natural Hazards		
Agricultural Hazards		
Avalanche		
Dam Failure		
Drought		
Earthquake		
Flood		
Landslide		
Erosion		
Expansive Soils		
Land Subsidence		
Severe Weather: General		
Severe Weather: Extreme Temperatures		
Severe Weather: Fog		
Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind		
Severe Weather: Tornado		
Severe Weather: Winter Storm		

Identified Hazards (2020 HMP)	NC=No Change I=Increase D=Decrease	Comments (Provide input for any hazards marked I or D)
Volcano		
Wildfire		
Human Health Hazards		
Epidemic/Pandemic		
West Nile Virus		

PART II: Potential Hazards

Should any of these hazards not previously profiled be included in the Risk Assessment as a separate, stand-alone hazard – meaning they have the potential to negatively affect your community and require a focused mitigation effort?

Other Hazards	No	Yes	Comments (Provide input for any hazard marked “Yes”)
Natural Hazards			
Hurricane			
Tsunami			
Human Health			
Air Quality			
Technological Hazards (Human-Made)			
Chemical			
Biological			
Hazardous Materials			
Radiological			
Nuclear			
Additional Hazards			

4 – Kickoff Meeting

WITT ÓBRIEN'S

ambipar[®]
response

WITH YOU WHEN IT COUNTS

FRESNO COUNTY MULTI-
JURISDICTIONAL HAZARD
MITIGATION PLAN
Kickoff Meeting

NOVEMBER 17, 2023

wittobriens.com



Agenda

- Introductions
- Overview
- Planning Process
- Data Gathering Exercises:
 - Exercise 1: Hazard Ranking
 - Exercise 2: Capability Assessment Survey
 - Exercise 3: Asset Validation
- Questions and Next Steps

Introductions

HAZARD MITIGATION PLANNING TEAM ROLL CALL

- Participant vs Stakeholder

CONTRACTOR SUPPORT

- Chelsea Morganti, CFM – Director for Hazard Mitigation
- Katie Norris – Deputy Project Manager
- Erika Estrada – Lead Planner

FILE SHARING

- Microsoft Teams

BASE PLAN

- 2018 Fresno County County Multi-Jurisdictional Hazard Mitigation Plan
 - Approved July 10, 2018
 - Expires July 9, 2024
- New FEMA Policy Effective April 19, 2023



Overview

What is a Natural Hazard?

- Naturally occurring event vs. man-made
- Destructive or negative impact on health, safety, life, and/or property

What is Mitigation?

- Steps taken by the public, civic leadership, or private companies to reduce negative impacts
- Most effective through innovative, systemic, and informed steps
- “Mitigation Actions”
 - removing property or infrastructure from the mapped hazard area (elevation and acquisition)
 - assisting and supporting naturally resilient acreage (wetlands, dunes, reefs)
 - hardening the built environment (electrical micro grids, hurricane straps)
 - strategic city planning (building codes and zoning restrictions)



Overview

What Federal Mitigation Grant Programs are Available?

- Hazard Mitigation Grant Program (HMGP)
- Hazard Mitigation Grant Program – Post Fire (HMGP-PF)
- Flood Mitigation Assistance (FMA)
- Building Resilient Infrastructure and Communities (BRIC)
 - Buyout Program Implementation and Residential Elevations
 - Residential and Commercial Floodproofing and Wind Retrofit
 - Flood Control Projects
 - Coastal Resilience
 - Nature-Based Solutions
 - Infrastructure and Utility Hardening
- Rehabilitation Of High Hazard Potential Dam (HHPD)
- *Pre-Disaster Mitigation Grant Program (L-PDM)*
- Community Development Block Grant – Mitigation (CDBG-MIT)



HMGP



HMGP Post Fire



FMA



BRIC

The Planning Process



The Planning Process

Why are you here?

- Attend meetings
- Provide data and review draft sections
- Identify Natural Hazards
 - What hazards have impacted your community?
 - Where do hazards have the most destructive or negative impacts on health, safety, life, and/or property?
- Locate assets, infrastructure, at-risk communities
- What tools do you have to support your community through disasters?
- What tools do you need?
- Have the actions from the last plan been implemented? What is their status?
- What can we do in the future to be more resilient?
- Adopt the Plan
- Break the disaster cycle!

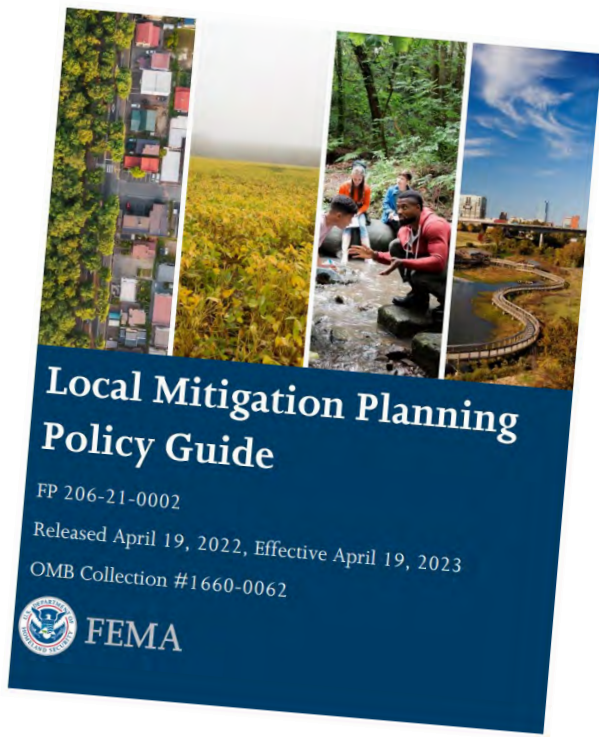


The Planning Process

Element A2-A Requirements

The FEMA Local Hazard Mitigation Planning Policy Guide requires that the County creates the opportunity for many stakeholders to be involved in the planning process:

- Local and regional agencies involved in hazard mitigation activities
 - Public works, emergency management, local floodplain administration and GIS departments
- Agencies that have the authority to regulate development
 - Zoning, planning, community and economic development departments; building officials; planning commissions; or other elected officials
- Neighboring communities:
 - Adjacent local governments, including special districts, those affected by similar hazard events or share a mitigation action/project that crosses boundaries
 - Neighboring communities that are partners in hazard mitigation and response activities, or that are where critical assets, such as dams, are located

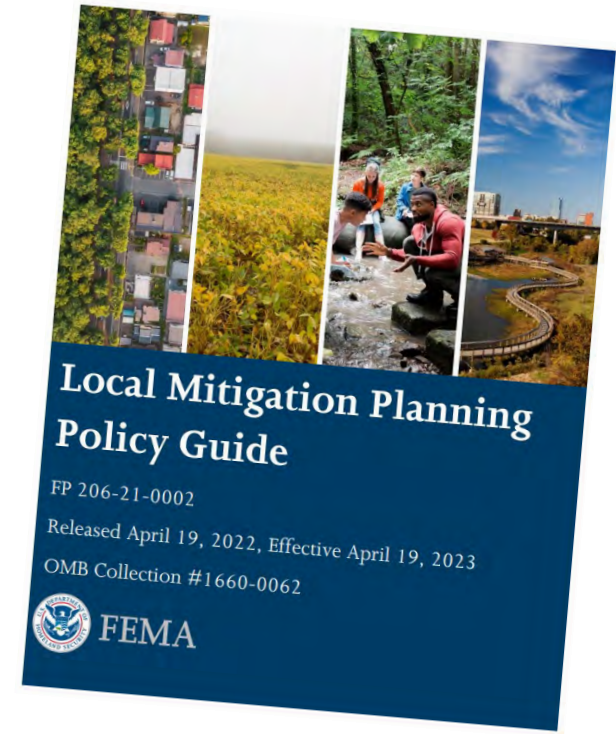


The Planning Process

Element A2-A Requirements

The FEMA Local Hazard Mitigation Planning Policy Guide requires that the County creates the opportunity for many stakeholders to be involved in the planning process:

- Representatives of businesses, academia, and other private organizations
 - Private utilities or major employers that sustain community lifelines
- Representatives of nonprofit organizations, including community-based organizations, that work directly with and/or provide support to underserved communities and socially vulnerable populations
 - Among others, housing, healthcare or social service agencies



The Planning Process

20 Profiled Hazards

- Agricultural Hazards
- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flood
- Human Health Hazards: Epidemic/Pandemic
- Human Health Hazards: West Nile Virus
- Landslide
- Soil Hazards: Erosion
- Soil Hazards: Expansive Soils
- Soil Hazards: Land Subsidence
- Severe Weather: General
- Severe Weather: Extreme Temperatures
- Severe Weather: Fog
- Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind
- Severe Weather: Tornado
- Severe Weather: Winter Storm
- Volcano
- Wildfire



Data Gathering Exercises

- Exercise 1: Evaluation of Hazards (worksheet)
- Exercise 2: Capability Assessment Survey (worksheet)
- Exercise 3: Asset Validation



Exercise 1: Evaluation of Hazards

- Have the frequency, extent, or magnitude of hazards changes since the previous plan?
- Should we add any hazards to our profile?

Fresno County 2024 Multi-Jurisdictional Hazard Mitigation Plan Update



Hazard Identification Exercise

Community/Organization:

Name and Title:

PART I: Identified Hazards

Has the frequency of occurrence, magnitude of impact, and/or geographic extent changed in your community?

Identified Hazards (2020 HMP)	NC=No Change I=Increase D=Decrease	Comments (Provide input for any hazards marked I or D)
Natural Hazards		
Agricultural Hazards		
Avalanche		
Dam Failure		
Drought		
Earthquake		
Flood		
Landslide		
Erosion		
Expansive Soils		
Land Subsidence		
Severe Weather: General		
Severe Weather: Extreme Temperatures		
Severe Weather: Fog		
Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind		
Severe Weather: Tornado		
Severe Weather: Winter Storm		

Fresno County 2024 Multi-Jurisdictional Hazard Mitigation Plan Update

Identified Hazards (2020 HMP)	NC=No Change I=Increase D=Decrease	Comments (Provide input for any hazards marked I or D)
Volcano		
Wildfire		
Human Health Hazards		
Epidemic/Pandemic		
West Nile Virus		

PART II: Potential Hazards

Should any of these hazards not previously profiled be included in the Risk Assessment as a separate, stand-alone hazard – meaning they have the potential to negatively affect your community and require a focused mitigation effort?

Other Hazards	No	Yes	Comments (Provide input for any hazard marked "Yes")
Natural Hazards			
Hurricane			
Tsunami			
Human Health			
Air Quality			
Technological Hazards (Human-Made)			
Chemical			
Biological			
Hazardous Materials			
Radiological			
Nuclear			
Additional Hazards			

Exercise 2: Capability Assessment Survey

What resources and capabilities does your community have that might help implement the hazard mitigation plan?



Fresno County 2024 Multi-Jurisdictional Hazard Mitigation Plan Update

Capability Assessment Survey

Community/Organization:	
Name and Title:	

Staff and Technical Assistance:

Please indicate whether your jurisdiction has the following personnel resources on-staff or available to assist with hazard mitigation efforts. If the support is provided through the county or through a contract, please indicate it in the comments section.

Staff or Personnel Resource	Yes	No	Department or Single Staff Member	Comments
Emergency Manager				
Engineers or professionals trained in construction practices related to buildings and/or infrastructure				
Fiscal Management or Procurement Specialists				
Floodplain Manager				
Land Surveyors				
Land Use/Management/Development Planning				
Planners or engineers with an understanding of natural and/or human-caused hazards				
Resource Development Staff or Grant-writing				
Scientists familiar with the hazards of the community				
Staff experienced with Geographic Information Systems (GIS) or HAZUS				
Staff with education or expertise to assess the community's vulnerability to hazards				

Exercise 3: Asset Validation

- Starting point – FEMA “Critical Facilities” list
 - EOCs, Fire and Police Stations, and schools
 - Railways, bus facilities, airports
 - Wastewater, oil, gas, power, communications
- Are there valuable assets to the community, located outside of your jurisdiction?
- Are there valuable assets to the community that wouldn't be on the FEMA list?
 - Key employers or industries
 - Recreational assets



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QUESTIONS & NEXT STEPS

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Thank you for your participation!

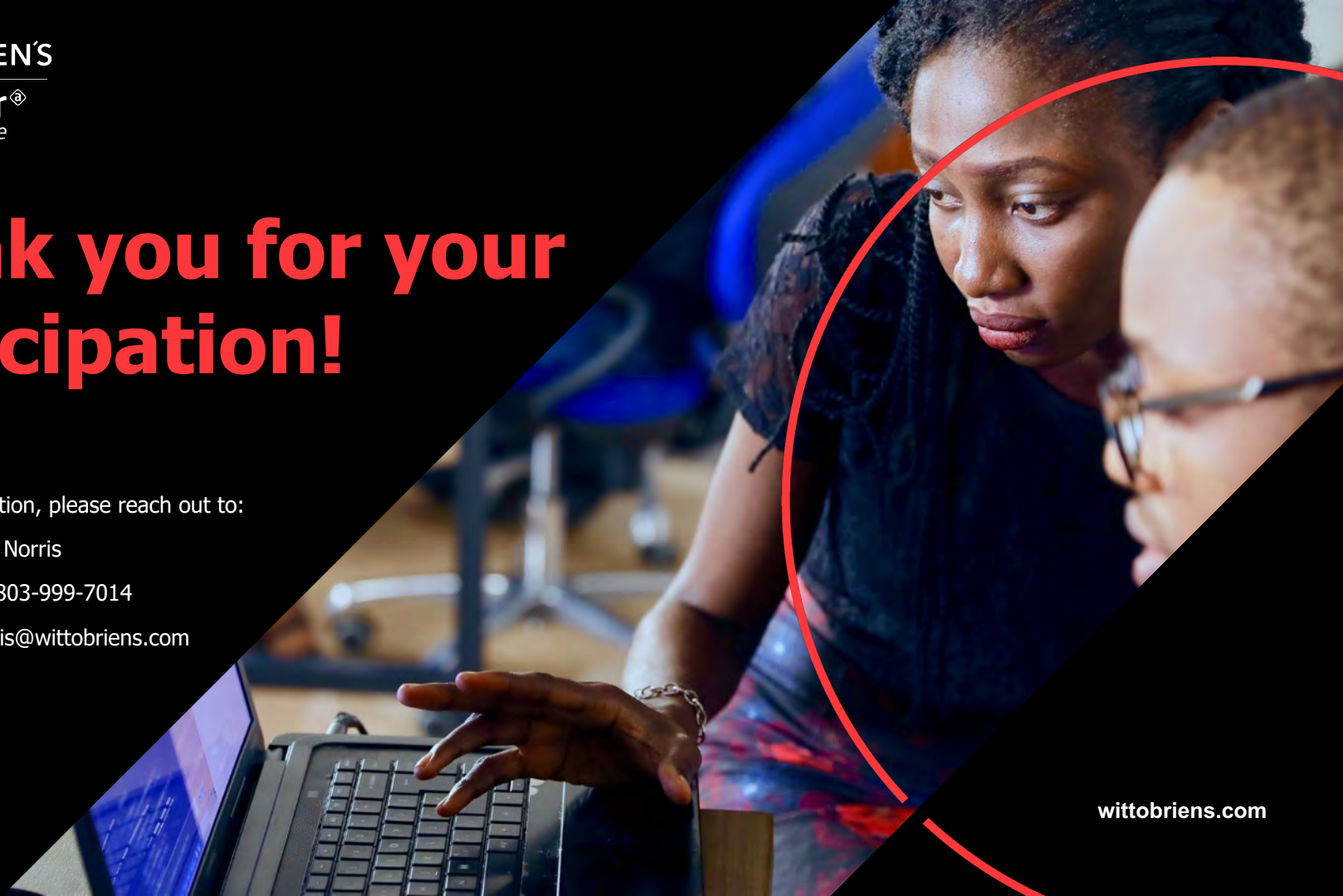
For more information, please reach out to:

Katie Norris

cell: 803-999-7014

knorris@wittobriens.com

wittobriens.com



1. Summary

Meeting title	Kickoff Meeting: Fresno County Multi-Jurisdictional Hazard Mitigation Plan Update
Attended participants	22
Start time	11/17/23, 1:25:17 PM
End time	11/17/23, 2:35:10 PM
Meeting duration	1h 9m 53s
Average attendance time	58m

2. Participants

Name	First Join	Last Leave	In-Meeting D	Email	Participant ID	Role
Norris, Katie	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 6m 32s	KNorris@witi	KNorris@witi	Organizer
Villa, Sarah	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 6m 36s	savilla@fresr	savilla@fresr	Presenter
Charlotte Gallock	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 5m 56s	cgallock@krc	cgallock@krc	Presenter
Billy Long	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 6m 12s			Presenter
Davis, David	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 5m 44s	dadavis@fres	dadavis_fres	Presenter
Estrada, Erika Lynn	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 4m 55s	eeestrada@wi	eeestrada@wi	Presenter
Steve Haugen	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 4m 52s	shaugen@kin	shaugen@kin	Presenter
Tanner Michaelson	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	56m 33s	tmichaelson	tmichaelson	Presenter
Mejorado, Terri	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 3m 25s	tmejorado@f	tmejorado@f	Presenter
Jerry Isaak City of Reedley	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 3m 9s			Presenter
Avalos, Michelle	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 3m 10s	mavalos@fre	mavalos@fre	Presenter
Ben Gallegos	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 3m 7s			Presenter
Jarrold M. Takemoto	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 2m 23s	jarroldt@fres	jarroldt@fres	Presenter
Paul Demmers	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 2m 15s			Presenter
Elizabeth Cabrera	11/17/23, 1:25:17 PM	11/17/23, 1:58:28 PM	28m 35s	elizabethc@ci	elizabethc@ci	Presenter
Cristian	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 5m			Presenter
Loera, Douglas	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 1m 59s	dloera@fresr	dloera@fresr	Presenter
Chris Ekk	11/17/23, 1:25:17 PM	11/17/23, 1:58:11 PM	1m 40s	chrise@ci.cl	chrise@City	Presenter
Passmore, Jason	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 1m 44s	jpassmore@f	jpassmore@f	Presenter
Morganti, Chelsea	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 1m 29s	cmorganti@v	cmorganti@v	Presenter
Bobby Phillips	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 1m 1s	bphillips@ww	bphillips@ww	Presenter
Chris Ekk	11/17/23, 1:25:17 PM	11/17/23, 2:39:13 PM	139m 46s			Presenter

3. In-Meeting Activities

Name	Join Time	Leave Time	Duration	Email	Role
Norris, Katie	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 6m 32s	KNorris@witi	Organizer
Villa, Sarah	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 6m 36s	savilla@fresr	Presenter
Charlotte Gallock	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 5m 56s	cgallock@krc	Presenter
Billy Long	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 6m 12s		Presenter
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Steve Haugen	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 4m 52s	shaugen@kin	Presenter
Tanner Michaelson	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	56m 33s	tmichaelson	Presenter
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Paul Demmers	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 2m 15s		Presenter
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Passmore, Jason	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 1m 44s	jpassmore@f	Presenter
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Bobby Phillips	11/17/23, 1:25:17 PM	11/17/23, 2:35:10 PM	1h 1m 1s	bphillips@ww	Presenter
Chris Ekk	11/17/23, 1:25:17 PM	11/17/23, 2:39:13 PM	139m 46s		Presenter

5 – HIRA Meeting

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FRESNO COUNTY MULTI-
JURISDICTIONAL HAZARD
MITIGATION PLAN
HIRA Meeting

MARCH 6, 2024

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Housekeeping Notes

- This meeting will be recorded.
- Please “mute” your microphone if you are not speaking.
- We are interested in your feedback!
- Use the “chat” feature to ask questions and provide input.

Opening Remarks

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Agenda

- Review Plan Approach
- Hazard Identification and Mapping
- Public Participation Survey Results
- Brainstorm Hazard Mitigation Actions
- Questions and Next Steps

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Review Plan Approach

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What is hazard mitigation?

Hazard mitigation is any action we can take now to reduce the **impact** of future disasters.

Hazard Mitigation Planning Overview

Why is mitigation important?

- Reduce predictable danger to people and property
- Maintain continuity of operations
- Save money in the long term

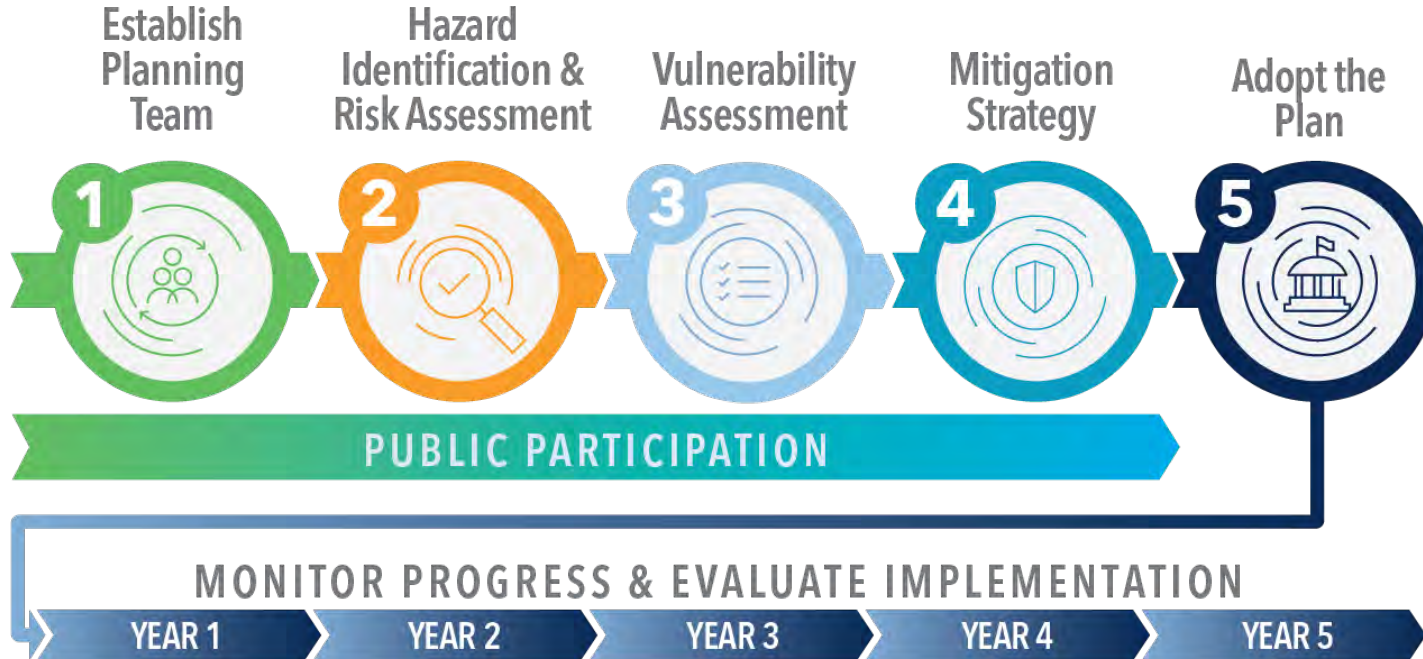


Hazard Mitigation Planning Overview

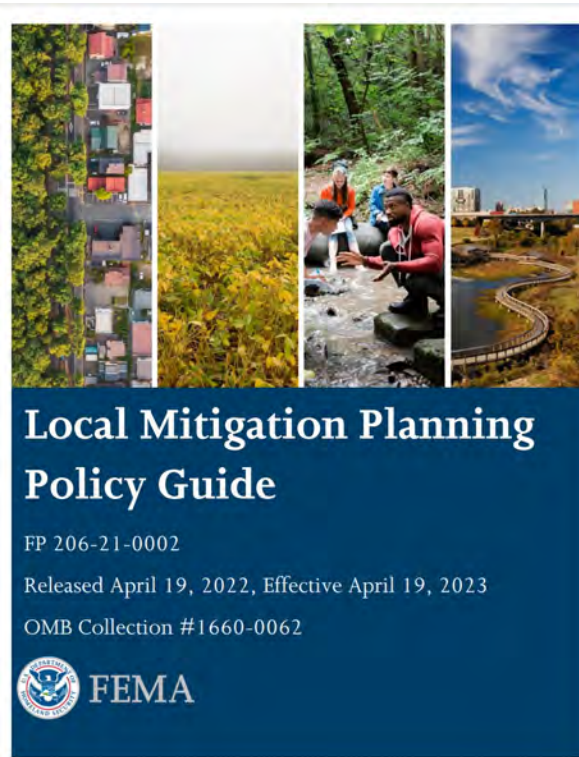
What does a hazard mitigation plan do?

- Profiles the community and its key assets and infrastructure
- Describes hazard-related risks that the community faces
- Maps where risks and critical facilities overlap
- Identifies and prioritizes actions the community can take to reduce identified risks
- When FEMA-approved, maintains eligibility for federal mitigation grant funds.

The Planning Process



Guiding Documents



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Hazard Identification and Mapping

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Hazard Identification

19 Profiled Hazards

- Agricultural Hazards
- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flood
- Human Health Hazards: Epidemic/Pandemic
- Human Health Hazards: West Nile Virus
- Landslide
- Soil Hazards: Erosion
- Soil Hazards: Expansive Soils
- Soil Hazards: Land Subsidence
- Severe Weather: Extreme Temperatures
- Severe Weather: Fog
- Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind
- Severe Weather: Tornado
- Severe Weather: Winter Storm
- Volcano
- Wildfire

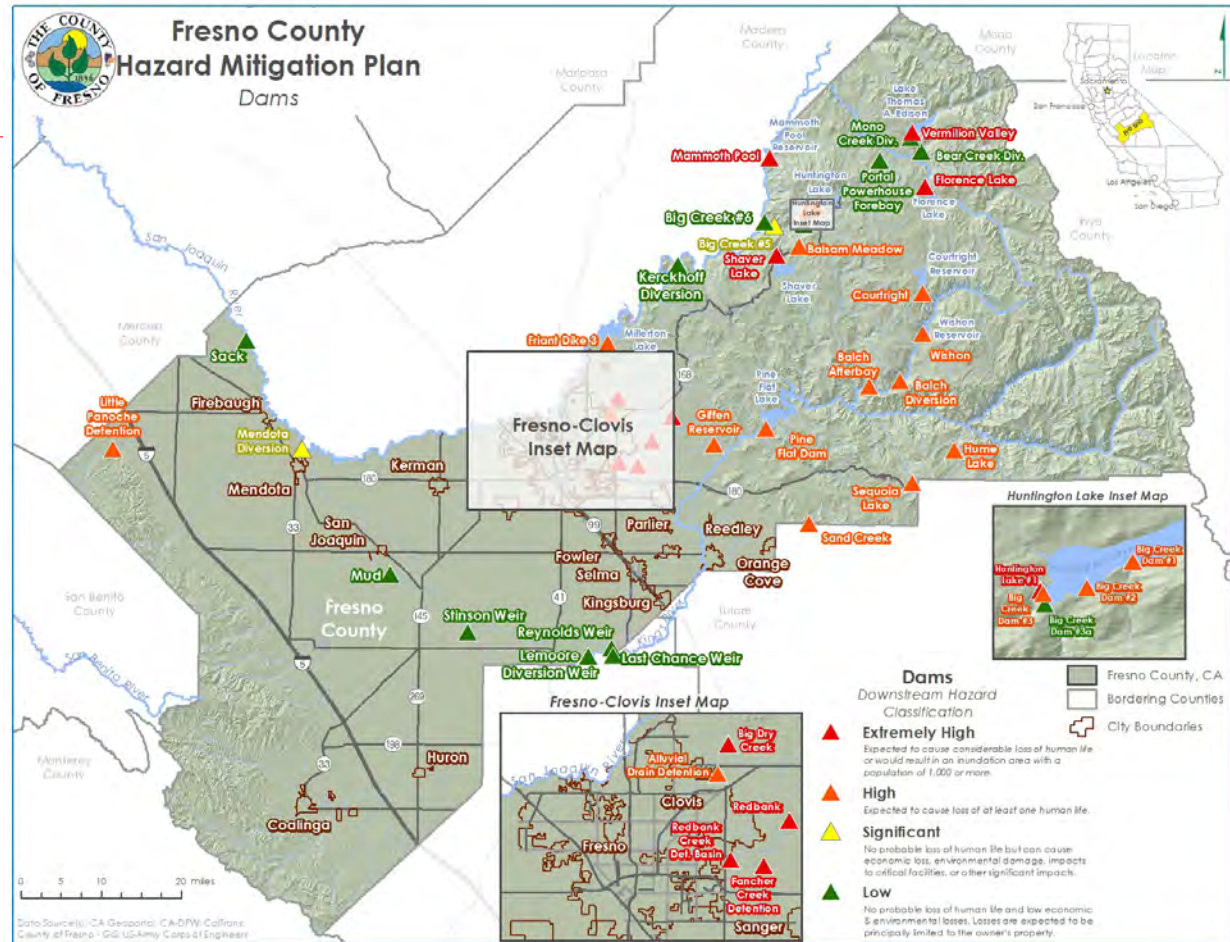


Identifying Critical Facilities



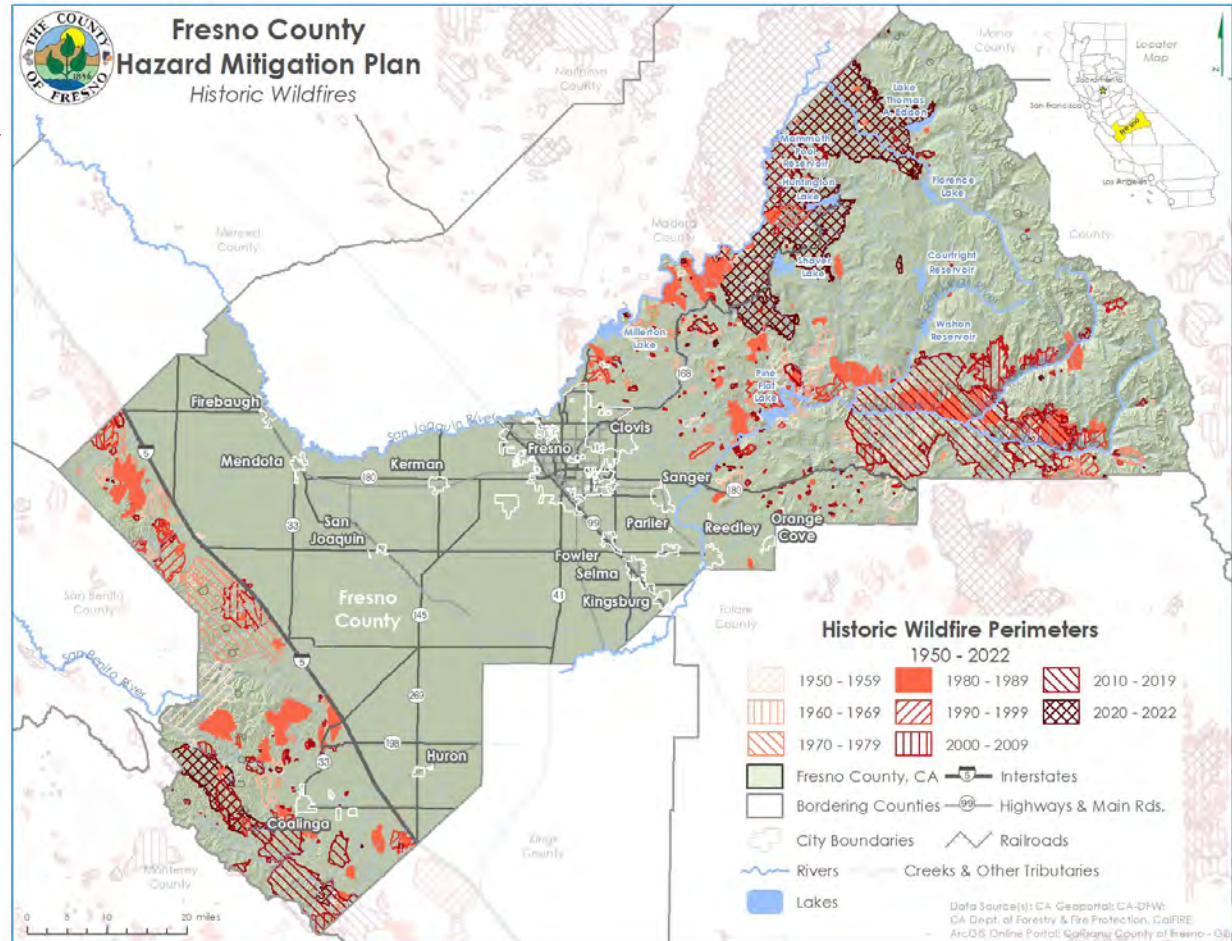
Hazard Mapping

Identifying Critical Facilities



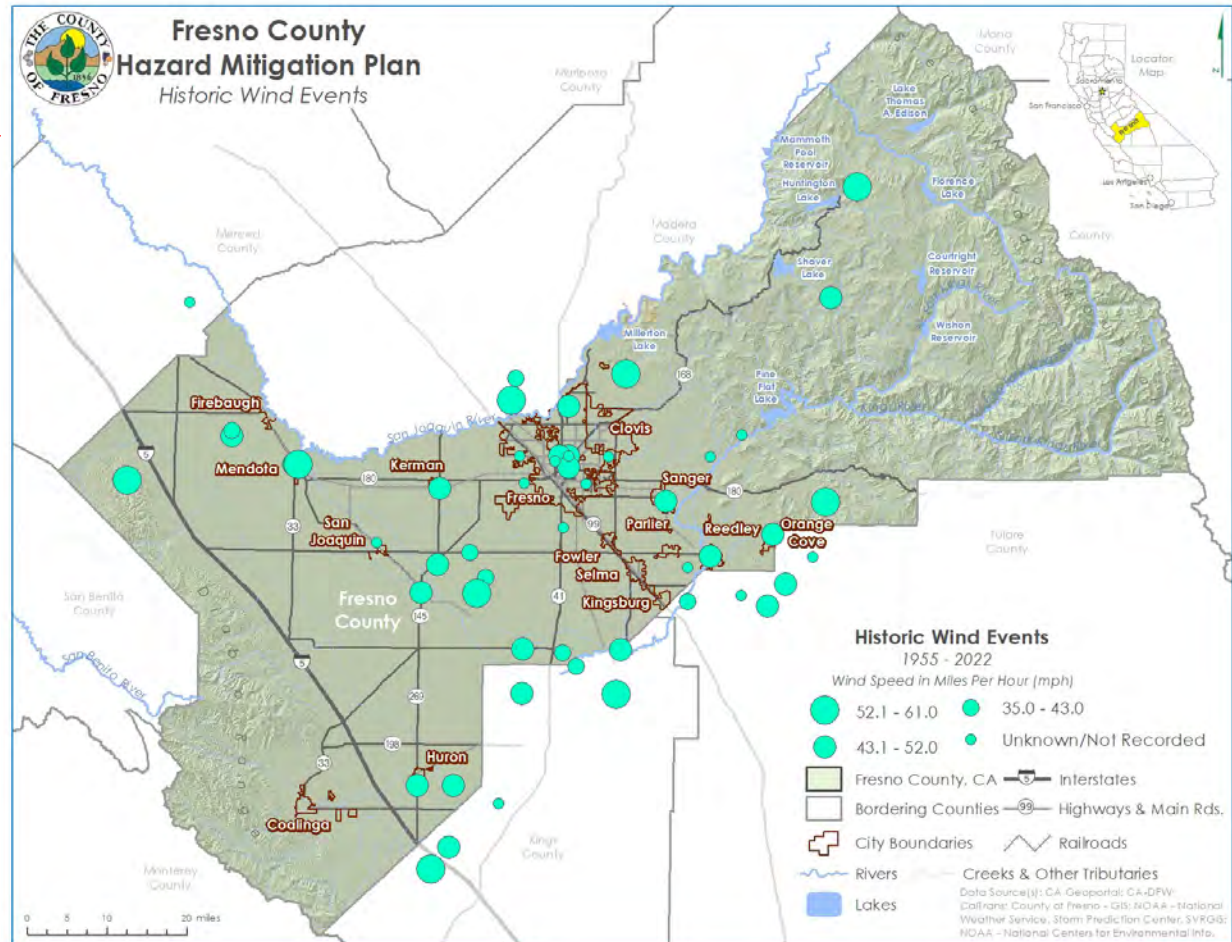
Hazard Mapping

Mapping Historical Events



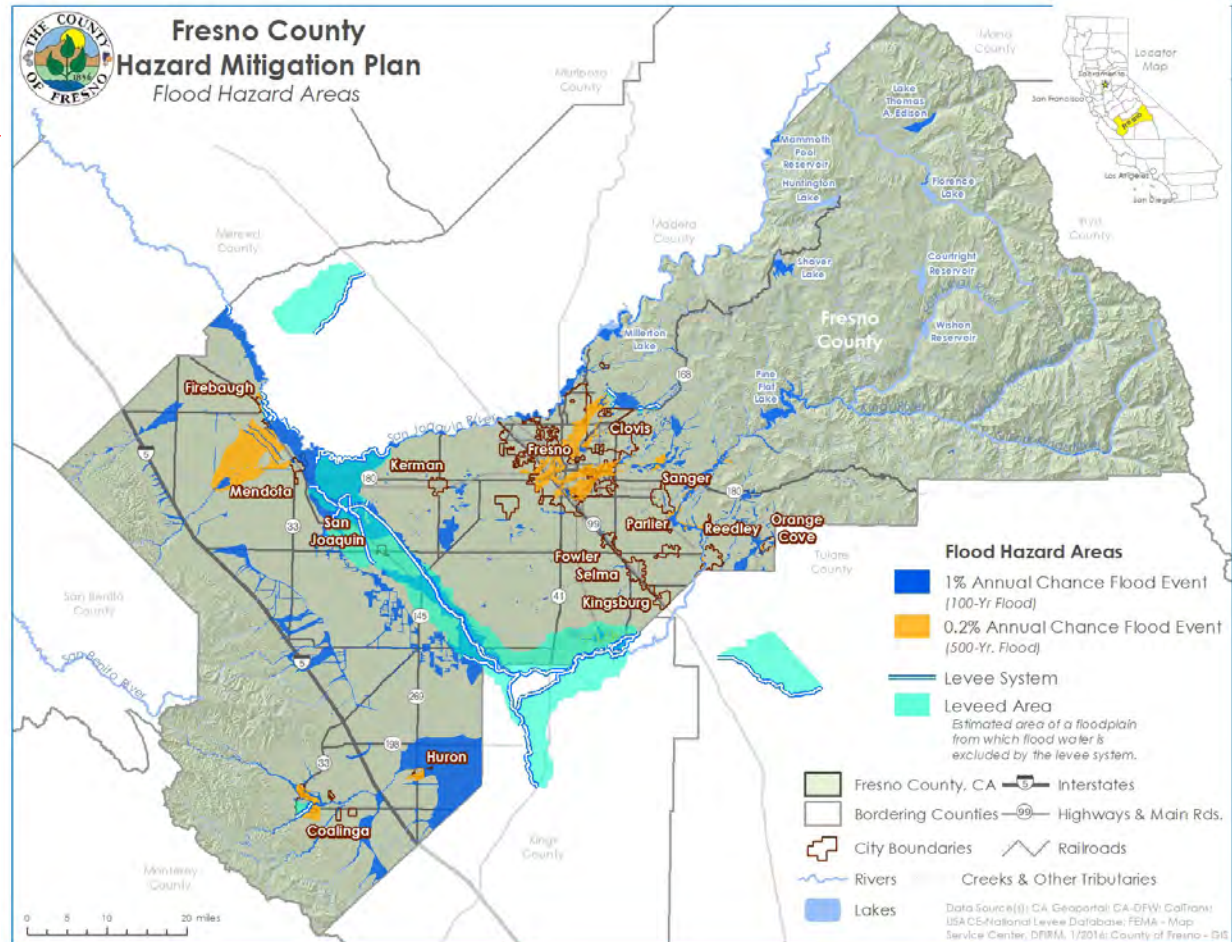
Hazard Mapping

Mapping Historical Events



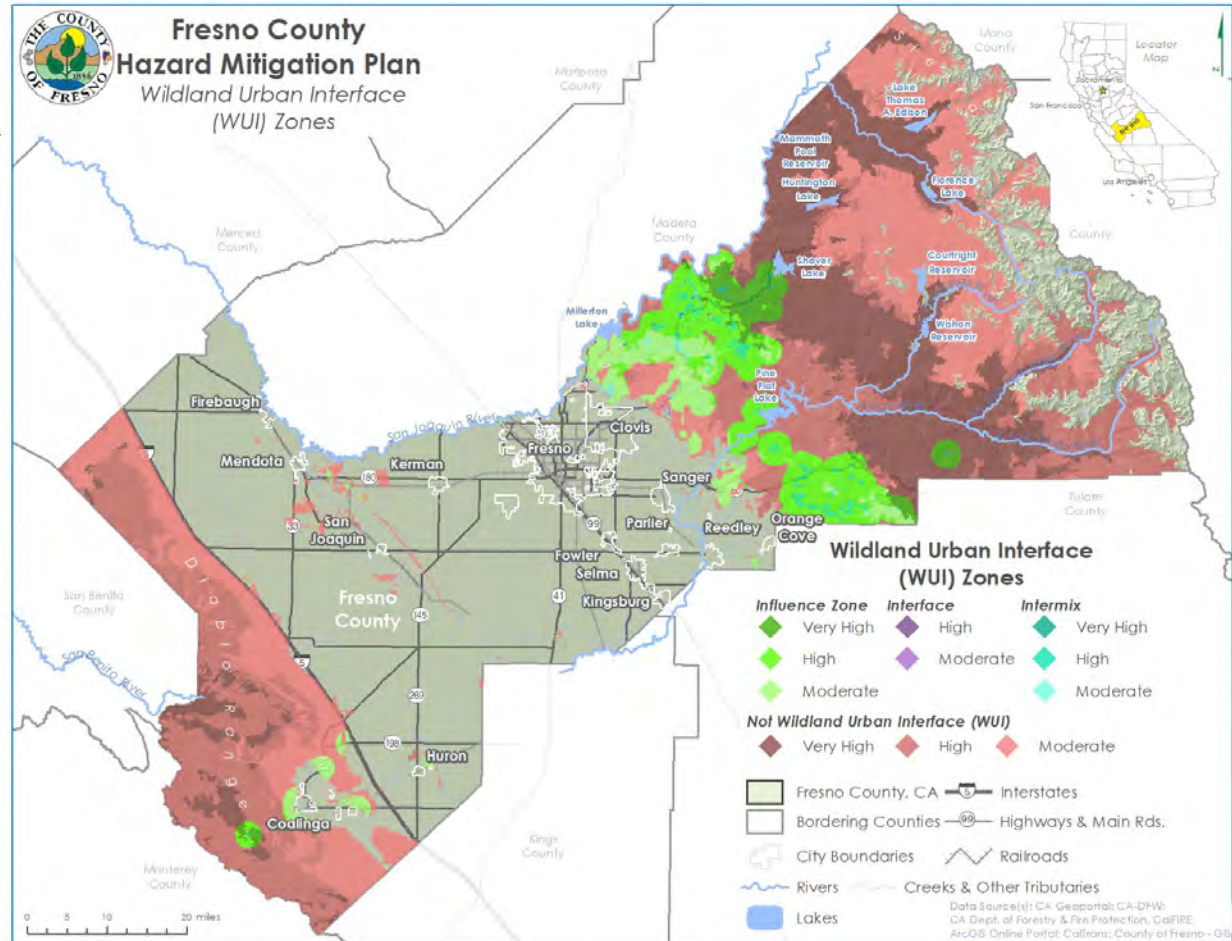
Hazard Mapping

Identifying Hazard-Prone Areas



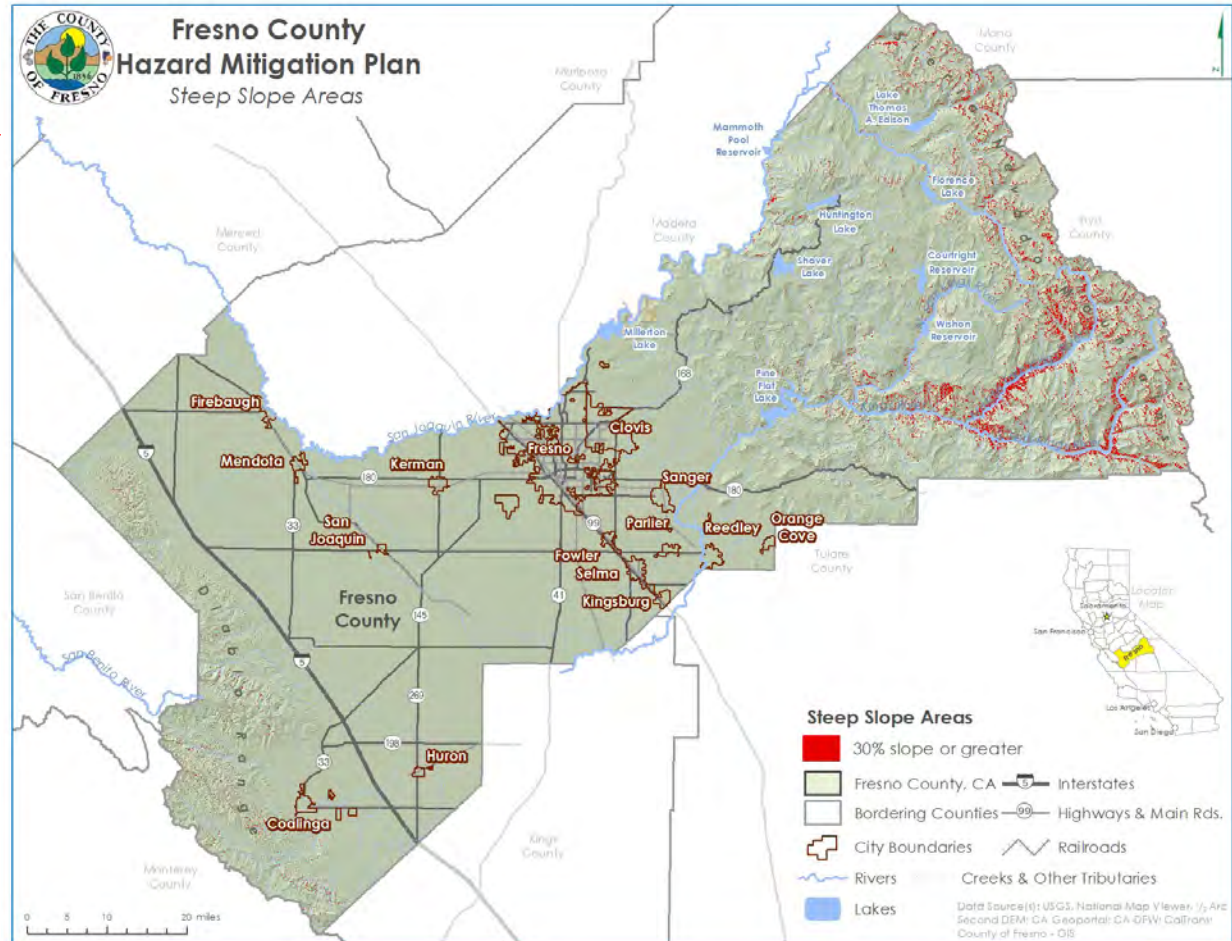
Hazard Mapping

Identifying Hazard-Prone Areas



Hazard Mapping

Identifying Hazard-Prone Areas



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Public Survey Results

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Hazard Mapping

Hazard Name

- The first opportunity for public input on the plan was a survey open January 4-31
- 1,109 people responded to the survey
- The survey was available in both English and Spanish
- Information from the public can help us make more informed decisions about what mitigation action to take

Public Survey Results

Prioritizing Hazard Risk

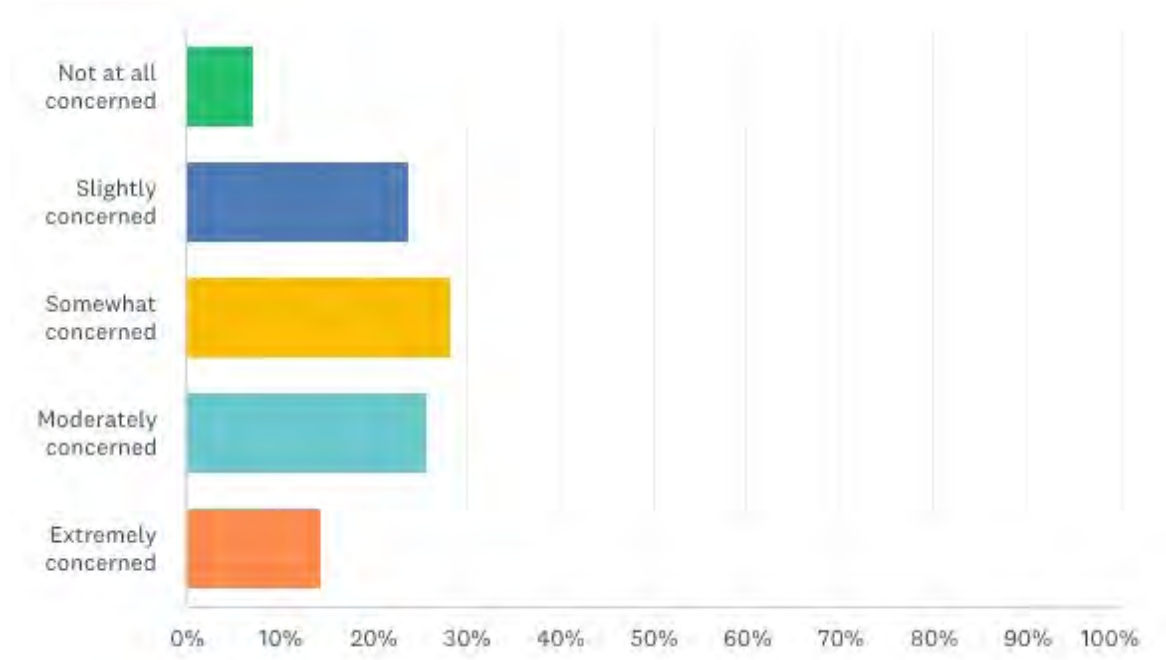
What are the top 3 hazards that present the biggest threat to your community?

- | | |
|--|---------------------|
| 1. Drought | 10. Dam Failure |
| 2. Extreme Temperatures | 11. Winter Storm |
| 3. Wildfire | 12. West Nile Virus |
| 4. Flood | 13. Land Subsidence |
| 5. Heavy Rain / Thunderstorm / Hail / Lightning / Wind | 14. Erosion |
| 6. Earthquake | 15. Landslide |
| 7. Fog | 16. Expansive Soils |
| 8. Agricultural Hazards | 17. Volcano |
| 9. Epidemic/Pandemic | 18. Tornado |
| | 19. Avalanche |

Public Survey Results

Measuring Public Concern

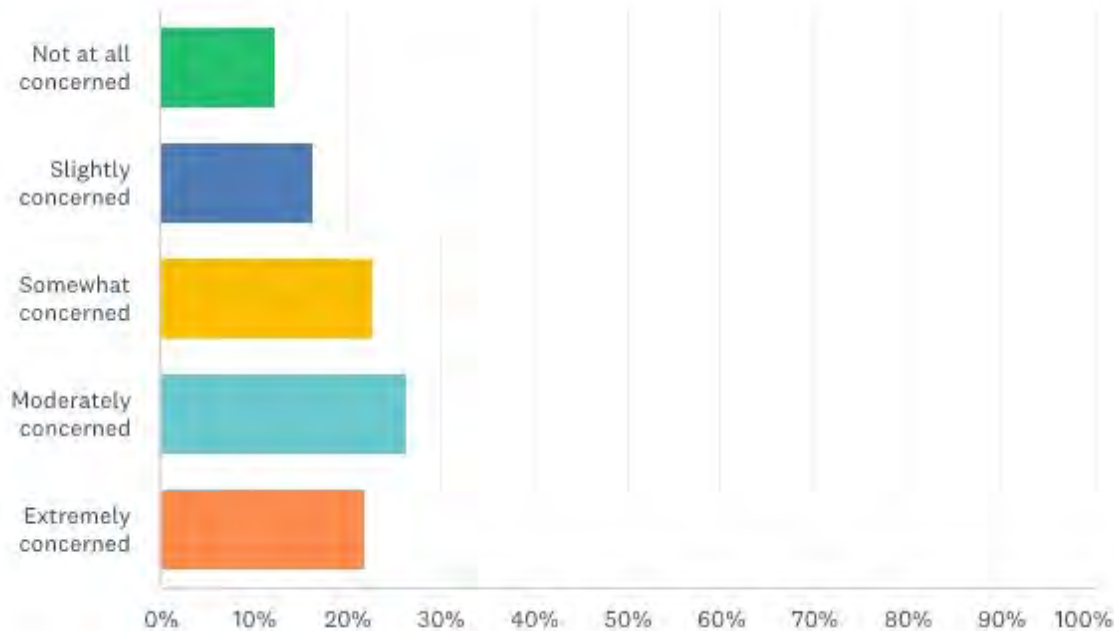
How concerned are you about your community being impacted by a natural disaster?



Public Survey Results

Measuring Public Concern

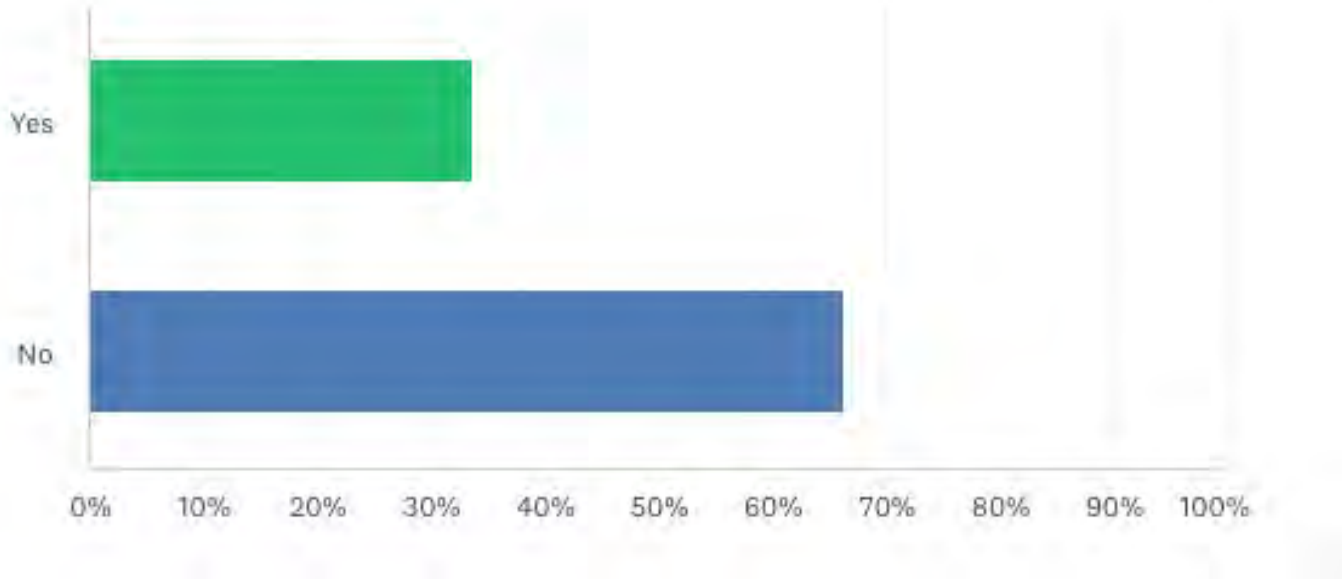
How concerned are you about natural hazard impacts from climate change within your community?



Public Survey Results

Taking Action to Reduce Risk

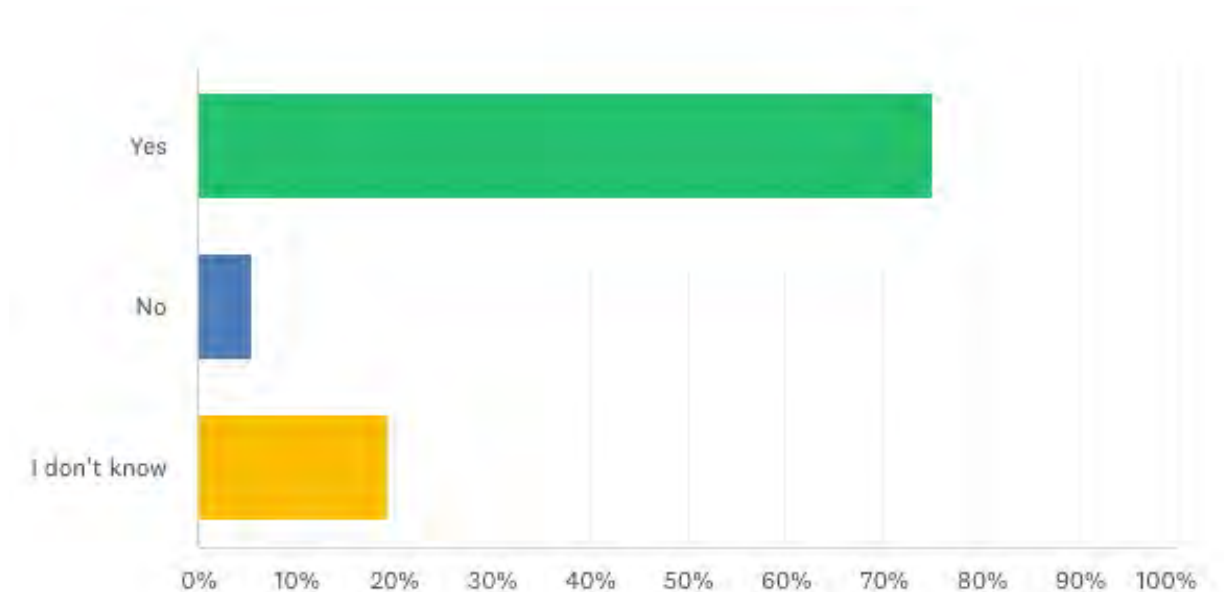
Have you taken any actions to make your home, business, or neighborhood more resilient to natural hazards?



Public Survey Results

Taking Action to Reduce Risk

Would incentives such as insurance discounts, property tax breaks, or low-interest loans motivate you to take additional steps to protect your home or business from natural disasters?



Public Survey Results

Write-In Feedback

“Do you have any ideas or thoughts you would like to share about risk reduction, resiliency, or vulnerability to natural disasters? Please describe.”

- “Create more programs to help people who rent to protect their homes in coordination with their landlords.”
- “I would like to see programs that incentivize or provide solar panels, retrofitting of properties, lower electric rates for using air conditioning in the summer, programs that provide air conditioners for seniors and low income households.
- “More grant funding for residents to transform yards into drought resistant foliage and fake lawns. ”
- “Provide outreach programs to educate the public in case these situations occur and places to go for assistance.”
- “Neighborhood information meetings, passing out resources on where to go if a disaster was to hit in your specific neighborhood.”

Public Survey Results

Write-In Feedback

“Do you have any ideas or thoughts you would like to share about risk reduction, resiliency, or vulnerability to natural disasters? Please describe.”

- “Have more places for people experiencing homelessness to warm up/cool off”
- “We need to learn how to store and manage our rainfall”
- “Maintenance!! Trim city and county trees”
- “Fuel reduction in foothills and mountain communities”
- “The government should restrict development in hazardous areas.”

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MITIGATION ACTIONS

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Mitigation Actions

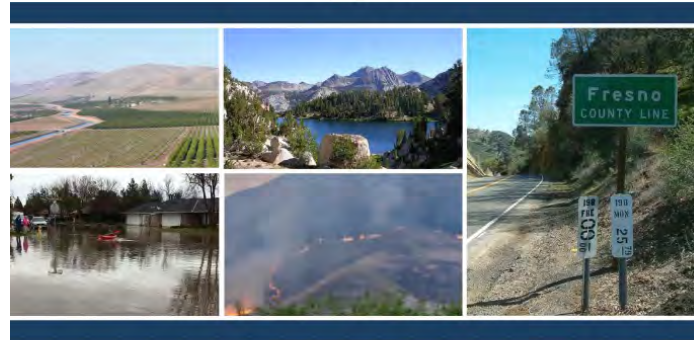
A Note on Mitigation Actions

- The Hazard Mitigation Plan identifies *potential actions* that the county and municipalities may choose to pursue when funding becomes available.
- Fresno County is not committing to implementing every action mentioned in the plan.



Fresno County Multi-Jurisdictional Hazard Mitigation Plan

May 2018



Mitigation Actions

Mitigation Goals in Previous Plan

Goal 1: Provide Protection for People's Lives from Hazards

1. Provide timely notification and direction to the public of imminent and potential hazards Protect public health and safety by preparing for, responding to, and recovering from the effects of natural or technological disasters
2. Improve community transportation corridors to allow for better evacuation routes for the public and better access for emergency responders

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 2: Improve All Communities' Resilience and Capabilities to Mitigate Hazards and Reduce Exposure to Hazard-Related Losses

1. Reduce wildfires/protect life, property, and natural resources from damaging wildfires
2. Reduce flood and storm-related losses
3. Reduce hazards that adversely impact the agricultural industry
4. Minimize the impact to the communities due to recurring drought conditions that impact both ground water supply and the agricultural industry
5. Minimize the risk/loss to endangered species, native plants, land (erosion), and native wildlife

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 3: Improve Community and Agency Awareness about Hazards and Associated Vulnerabilities that Threaten Fresno County Planning Area Communities

1. Increase public awareness about the nature and extent of hazards they are exposed to, where they occur, what is vulnerable, and recommended mitigation and preparedness for identified hazards

Goal 4: Provide Protection for Critical Facilities, Utilities, and Services from Hazard Impacts

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 5: Maintain Coordination of Disaster Planning

1. Coordinate with changing U.S. Department of Homeland Security/FEMA needs
2. Coordinate with other community plans
3. Maximize the use of shared resources between jurisdictions and special districts for mitigation/communication
4. Standardize systems among agencies to provide for better interoperability

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 6: Maintain/Provide for FEMA Eligibility and Work to Position Jurisdictions for Grant Funding

1. Provide County departments and other jurisdictions with information regarding mitigation opportunities
2. As part of plan implementation, review actions in this plan on an annual basis to be considered for annual FEMA Pre-Disaster Mitigation grant allocations or after a presidential disaster declaration in California for Hazard Mitigation Grant Program funding as well as for other local, state, and federal funding opportunities

Mitigation Actions

Mitigation Action Categories in Previous Plan

- **Prevention:** Administrative or regulatory actions or processes that influence the way land and buildings are developed and built.
- **Property protection:** Actions that involve the modification of existing buildings or structures to protect them from a hazard or remove them from the hazard area.
- **Structural:** Actions that involve the construction of structures to reduce the impact of a hazard.

Mitigation Actions

Mitigation Action Categories in Previous Plan

- Natural resource protection: Actions that, in addition to minimizing hazard losses, also preserve or restore the functions of natural systems.
- Emergency services: Actions that protect people and property during and immediately after a disaster or hazard event.
- Public information/education and awareness: Actions to inform and educate citizens, elected officials, and property owners about the hazards and potential ways to mitigate them

Mitigation Actions

Brainstorming

What mitigation actions would you like to see your community prioritize in the updated plan?

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QUESTIONS & NEXT STEPS

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Path Forward

Timeline

- Before next meeting:
 - Review actions from previous plan
 - Draft updated action plan
 - Complete missing worksheets
- Strategy Meeting:
 - Review goals / objectives
 - Address questions or issues
- April:
 - Planning team and public review the draft plan and provide feedback
- Late April/Early May:
 - Plan finalized and submitted

Path Forward

Timeline

- *Timeline Unclear:*
 - State review and feedback
 - FEMA review and feedback, and “APA” status
 - **Adoption process**
 - FEMA approval (and new expiration date)

Path Forward

Next Steps - Strategy Worksheet

Review of Goals and Objectives

Please review the goals and objectives from the previous plan and note any changes or additions you would like to make.

Goal		Feedback or Notes
1	Provide Protection for People's Lives from Hazards	
2	Improve All Communities' Resilience and Capabilities to Mitigate Hazards and Reduce Exposure to Hazard-Related Losses	
3	Improve Community and Agency Awareness about Hazards and Associated Vulnerabilities that Threaten Fresno County Planning Area Communities	
4	Provide Protection for Critical Facilities, Utilities, and Services from Hazard Impacts	
5	Maintain Coordination of Disaster Planning	
6	Maintain/Provide for FEMA Eligibility and Work to Position Jurisdictions for Grant Funding	
7	<i>New proposed goal:</i>	
8	<i>New proposed goal:</i>	

Path Forward

Next Steps – Strategy Worksheet

Review of Actions

Please review your community's actions from the previous plan. Note any progress made towards those actions since the previous plan update and indicate whether or not your community would like to list that action again in the 2024 plan. If you would like to add new actions, please list them below.

	Action	Status, Progress, or Relevant Notes	Keep in 2024 Plan or Remove?
1	Identify Critical Facilities and Inspect for Vulnerability to Major Hazards		
2	Upgrade or Replace Critical County Facilities Found to be Vulnerable to Major Hazards		
3	Enhance the County Emergency Operations Center		
4	Control Bubonic Plague through Coyote and California Ground Squirrel Population Management		
5	Minimize Flood Events by Exercising Reclamation's Emergency Action Plan and Provide an Early Warning System to Downstream Emergency Response Agencies		
6	Update Dam Failure Evacuation Plan		
7	Compliance including Groundwater Sustainability Planning and Implementation		
8	Conduct Feasibility Study for Panoche Silver Creek Flood Detention Facility (see Mendota)		
9	Investigate and Construct Water		

We are happy to help you develop your
community's strategy!

Do you have any questions for the planning team
or the County?

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Thank you for your participation!

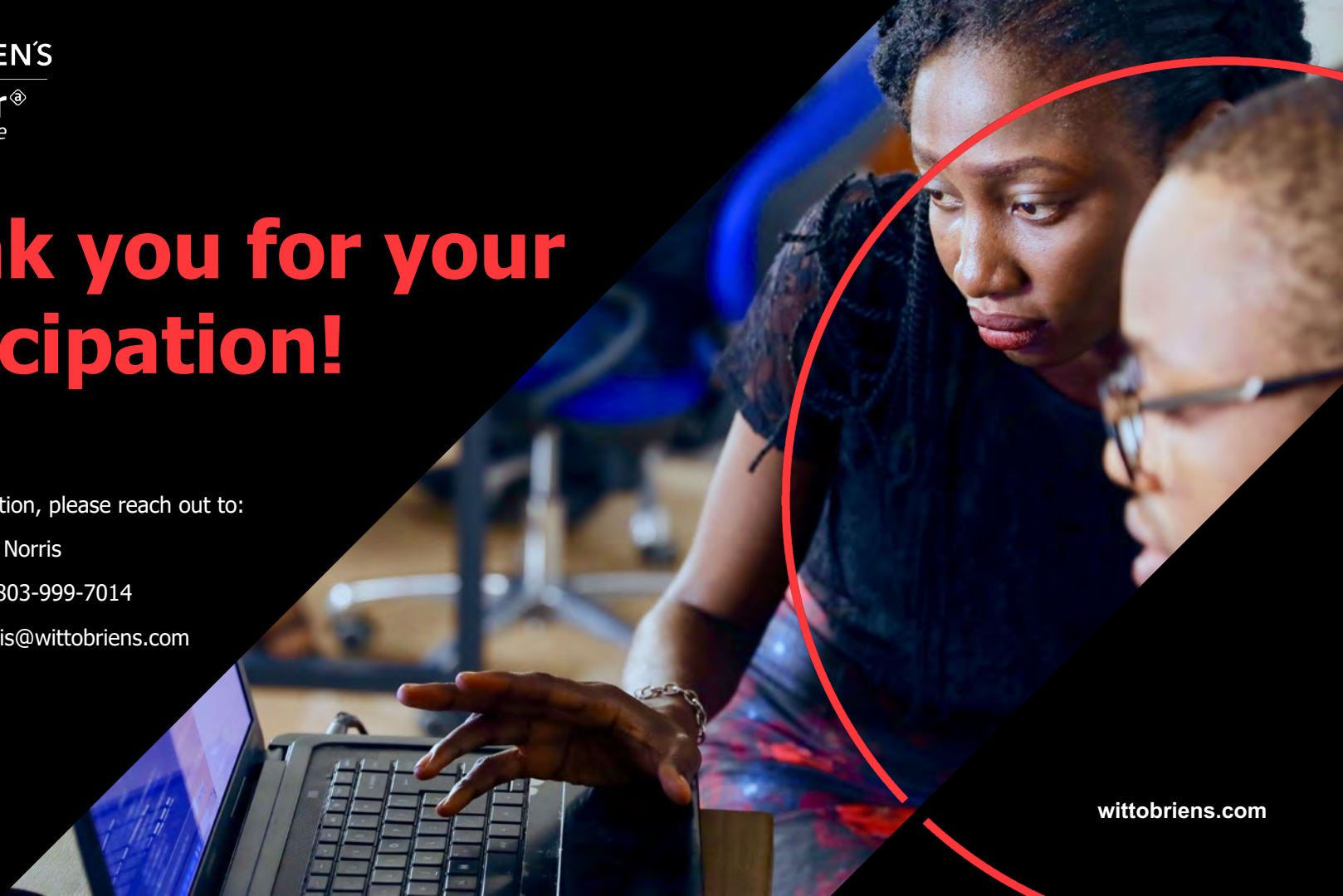
For more information, please reach out to:

Katie Norris

cell: 803-999-7014

knorris@wittobriens.com

wittobriens.com



1. Summary

Meeting title	Fresno County Mitigation Plan Update - HIRA Meeting
Attended participants	17
Start time	3/06/24, 1:56:07 PM
End time	3/06/24, 2:51:09 PM
Meeting duration	55m 1s
Average attendance time	48m 14s

2. Participants

Name	First Join	Last Leave	In-Meeting D	Email	Participant ID	Role
Norris, Katie	3/06/24, 1:57	3/06/24, 2:48	50m 52s	KNorris@witi	KNorris@witi	Organizer
Estrada, Erika Lynn	3/06/24, 1:56	3/06/24, 2:48	52m 33s	eeestrada@wi	eeestrada@wi	Presenter
Charlotte Gallock	3/06/24, 1:57	3/06/24, 2:48	51m 10s	cgallock@krc	cgallock@krc	Presenter
Vissering, Alexander	3/06/24, 1:57	3/06/24, 2:48	51m 9s	AVissering@v	AVissering@v	Presenter
Villa, Sarah	3/06/24, 1:57	3/06/24, 2:48	50m 43s	savilla@fresr	savilla@fresr	Presenter
Tanner Michaelson	3/06/24, 1:58	3/06/24, 2:48	49m 27s	tmichaelson@	tmichaelson@	Presenter
Mejorado, Terri	3/06/24, 1:58	3/06/24, 2:48	49m 23s	tmejorado@f	tmejorado@f	Presenter
Davis, David	3/06/24, 1:58	3/06/24, 2:48	49m 25s	dadavis@fres	dadavis@fres	Presenter
Virginia Peñaloza	3/06/24, 1:58	3/06/24, 2:48	49m 6s			Presenter
sal raygoza	3/06/24, 1:58	3/06/24, 2:51	51m 14s			Presenter
Trish McAvoy	3/06/24, 2:00	3/06/24, 2:48	48m 27s			Presenter
Loera, Douglas	3/06/24, 2:00	3/06/24, 2:48	48m 23s	dloera@fresr	dloera@fresr	Presenter
Motta, Chris	3/06/24, 2:00	3/06/24, 2:48	48m 8s	CMotta@fres	cmotta@fres	Presenter
Greg Tarascou	3/06/24, 2:02	3/06/24, 2:48	46m 20s	greg.tarascoi	greg.tarascoi	Presenter
Jerry Isaak	3/06/24, 2:03	3/06/24, 2:48	44m 41s			Presenter
Wilkins, Steve (Kerman PD)	3/06/24, 2:04	3/06/24, 2:48	44m 18s	Steve.Wilkin	Steve.Wilkin	Presenter
Steve Haugen	3/06/24, 2:13	3/06/24, 2:48	34m 44s	shaugen@kir	shaugen@kir	Presenter

3. In-Meeting Activities

Name	Join Time	Leave Time	Duration	Email	Role
Norris, Katie	3/06/24, 1:57	3/06/24, 2:48	50m 52s	KNorris@witi	Organizer
Estrada, Erika Lynn	3/06/24, 1:56	3/06/24, 2:48	52m 33s	eeestrada@wi	Presenter
Charlotte Gallock	3/06/24, 1:57	3/06/24, 2:48	51m 10s	cgallock@krc	Presenter
Vissering, Alexander	3/06/24, 1:57	3/06/24, 2:48	51m 9s	AVissering@v	Presenter
Villa, Sarah	3/06/24, 1:57	3/06/24, 2:48	50m 43s	savilla@fresr	Presenter
Tanner Michaelson	3/06/24, 1:58	3/06/24, 2:48	49m 27s	tmichaelson@	Presenter
Mejorado, Terri	3/06/24, 1:58	3/06/24, 2:48	49m 23s	tmejorado@f	Presenter
Davis, David	3/06/24, 1:58	3/06/24, 2:48	49m 25s	dadavis@fres	Presenter
Virginia Peñaloza	3/06/24, 1:58	3/06/24, 2:48	49m 6s		Presenter
sal raygoza	3/06/24, 1:58	3/06/24, 2:51	51m 14s		Presenter
Trish McAvoy	3/06/24, 2:00	3/06/24, 2:48	48m 27s		Presenter
Loera, Douglas	3/06/24, 2:00	3/06/24, 2:48	48m 23s	dloera@fresr	Presenter
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6 – Strategy Meeting

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FRESNO COUNTY MULTI-
JURISDICTIONAL HAZARD
MITIGATION PLAN
Strategy Meeting

MARCH 28, 2024

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Opening Remarks

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Housekeeping Notes

- This meeting will be recorded.
- Please “mute” your microphone if you are not speaking.
- We are interested in your feedback!
- Use the “chat” feature to ask questions and provide input.

Agenda

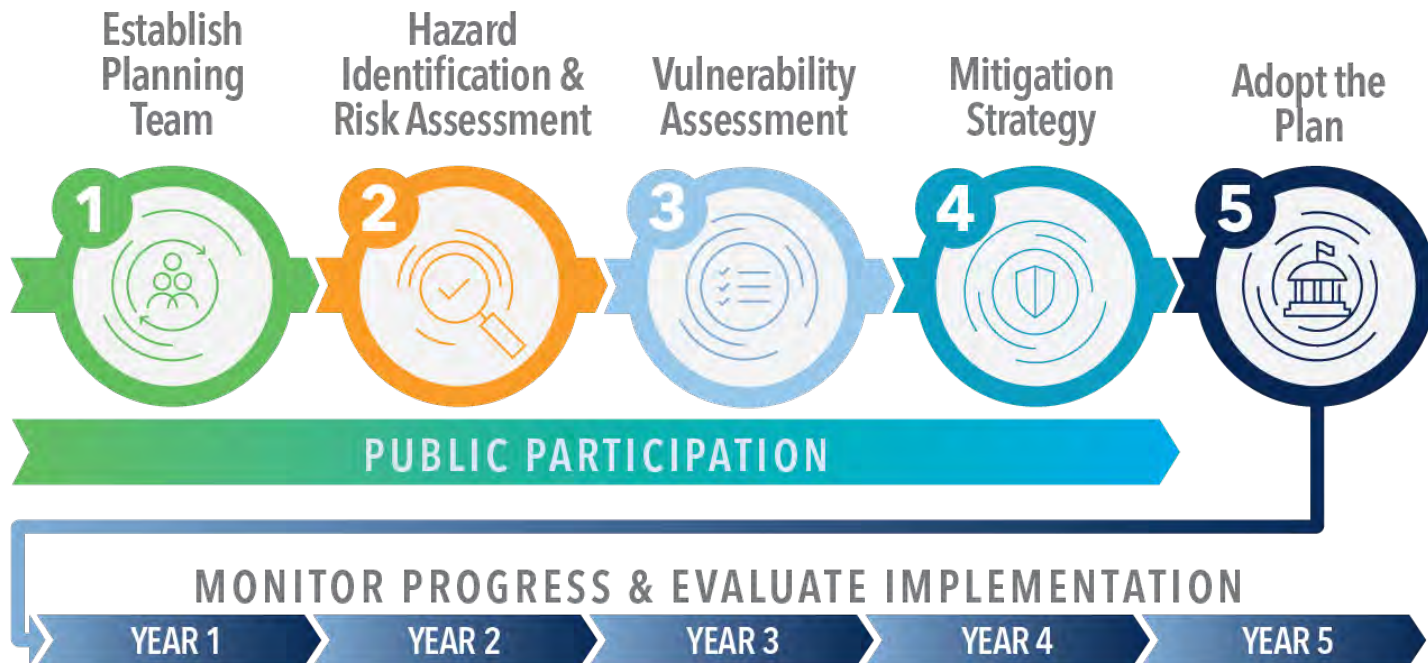
- Plan Status
- Goals and Objectives
- Mitigation Action Development
- Timeline, Next Steps, and Questions

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Plan Status

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Plan Status



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Goals and Objectives

Goals and Objectives

Terminology

1. Mitigation *Goals*

Overarching aspirations of the county; broad policy statements that depict the long-term outcomes which the community seeks to achieve.

2. Mitigation *Objectives*

Strategies or steps aimed at realizing the aforementioned goals; precise, often measurable, and typically come with a defined timeline for achievement.

3. Mitigation *Actions*

Specific tasks the participating jurisdictions can take to reduce risk associated with each hazard profiled in the plan and to achieve the plan's overall goals and objectives.

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 1: Provide Protection for People's Lives from Hazards

1. Provide timely notification and direction to the public of imminent and potential hazards
2. Protect public health and safety by preparing for, responding to, and recovering from the effects of natural or technological disasters
3. Improve community transportation corridors to allow for better evacuation routes for the public and better access for emergency responders

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 2: Improve All Communities' Resilience and Capabilities to Mitigate Hazards and Reduce Exposure to Hazard-Related Losses

1. Reduce wildfires/protect life, property, and natural resources from damaging wildfires
2. Reduce flood and storm-related losses
3. Reduce hazards that adversely impact the agricultural industry
4. Minimize the impact to the communities due to recurring drought conditions that impact both ground water supply and the agricultural industry
5. Minimize the risk/loss to endangered species, native plants, land (erosion), and native wildlife

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 3: Improve Community and Agency Awareness about Hazards and Associated Vulnerabilities that Threaten Fresno County Planning Area Communities

1. Increase public awareness about the nature and extent of hazards they are exposed to, where they occur, what is vulnerable, and recommended mitigation and preparedness for identified hazards

Goal 4: Provide Protection for Critical Facilities, Utilities, and Services from Hazard Impacts

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 5: Maintain Coordination of Disaster Planning

1. Coordinate with changing U.S. Department of Homeland Security/FEMA needs
2. Coordinate with other community plans
3. Maximize the use of shared resources between jurisdictions and special districts for mitigation/communication
4. Standardize systems among agencies to provide for better interoperability

Mitigation Actions

Mitigation Goals in Previous Plan

Goal 6: Maintain/Provide for FEMA Eligibility and Work to Position Jurisdictions for Grant Funding

1. Provide County departments and other jurisdictions with information regarding mitigation opportunities
2. As part of plan implementation, review actions in this plan on an annual basis to be considered for annual FEMA Pre-Disaster Mitigation grant allocations or after a presidential disaster declaration in California for Hazard Mitigation Grant Program funding as well as for other local, state, and federal funding opportunities

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Mitigation Action Development

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Mitigation Action Development

Worksheet Status

- Each plan participant received a worksheet requesting:
 - Status update regarding actions from previous plan
 - List of actions from previous plan to be carried forward into new plan
 - Any additional actions you want to add to the 2024 plan
- If you have any questions about this process, please let us know today!

Mitigation Actions

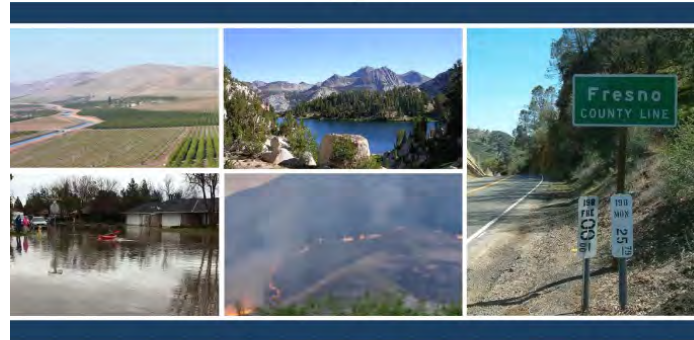
A Note on Mitigation Actions

- The Hazard Mitigation Plan identifies *potential actions* that the county and municipalities may choose to pursue when funding becomes available.
- Fresno County is not committing to implementing every action mentioned in the plan.



Fresno County Multi-Jurisdictional Hazard Mitigation Plan

May 2018



Hazard Identification

19 Profiled Hazards

- Agricultural Hazards
- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flood
- Human Health Hazards: Epidemic/Pandemic
- Human Health Hazards: West Nile Virus
- Landslide
- Soil Hazards: Erosion
- Soil Hazards: Expansive Soils
- Soil Hazards: Land Subsidence
- Severe Weather: Extreme Temperatures
- Severe Weather: Fog
- Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind
- Severe Weather: Tornado
- Severe Weather: Winter Storm
- Volcano
- Wildfire



Has anyone identified a problem or hazard for which that they do not have a proposed solution?

Has anyone identified a potential mitigation action that might make sense as a multi-jurisdictional project?

Does anyone have any other questions or discussion topics related to developing mitigation actions?

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QUESTIONS & NEXT STEPS

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Path Forward

Timeline

- **ASAP:**
 - Review actions from previous plan
 - Draft updated action plan
 - Complete missing worksheets
- **April:**
 - Planning team and public review the draft plan and provide feedback
- **Late April/Early May:**
 - Plan finalized and submitted

Path Forward

Timeline

- *Timeline Unclear:*
 - State review and feedback
 - FEMA review and feedback, and “APA” status
 - **Adoption process**
 - FEMA approval (and new expiration date)

We are happy to help you develop your
community's strategy!

Do you have any questions for the planning team
or the County?

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Thank you for your participation!

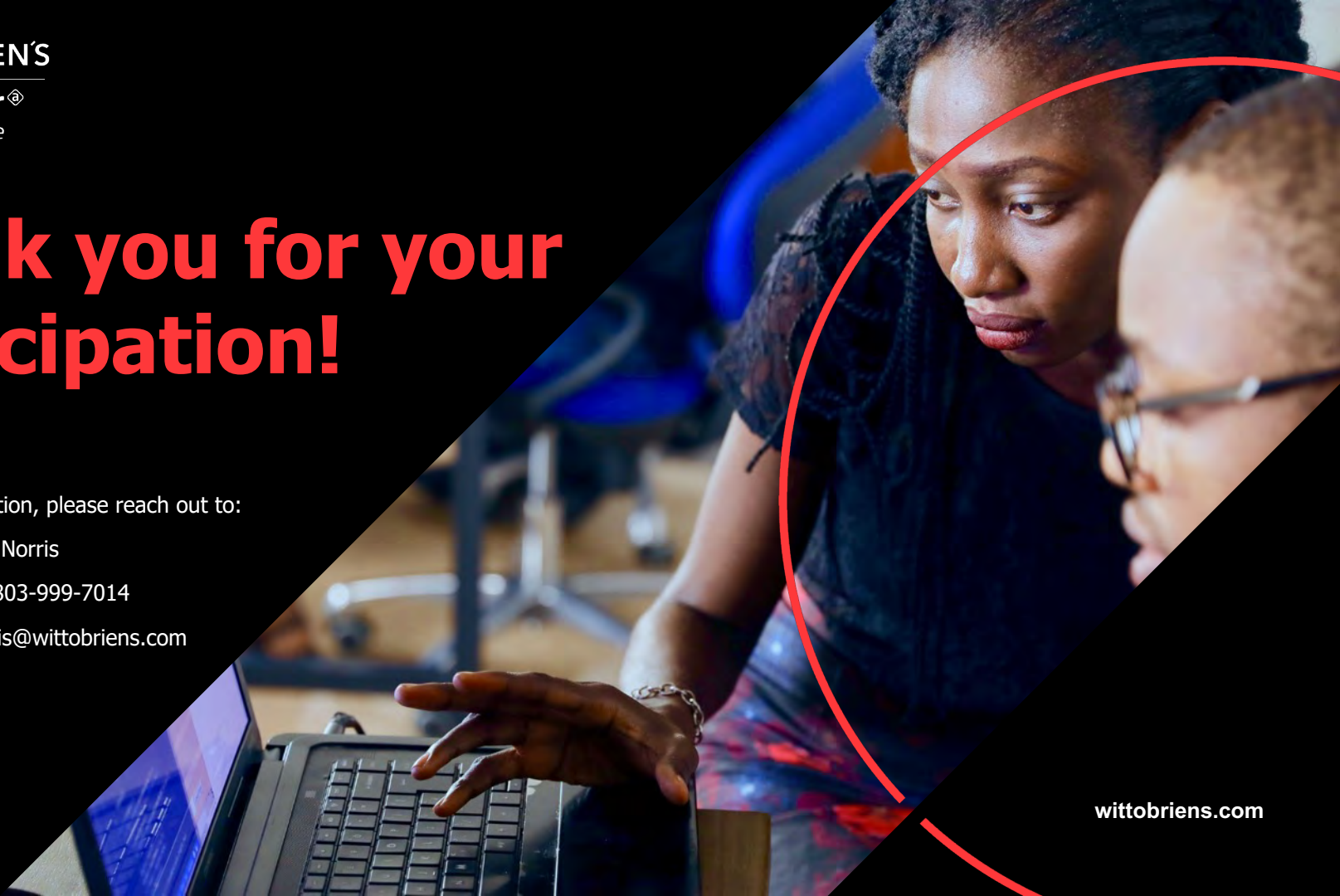
For more information, please reach out to:

Katie Norris

cell: 803-999-7014

knorris@wittobriens.com

wittobriens.com



1. Summary

Meeting title	Fresno County Hazard Mitigation Plan - Strategy Meeting
Attended participants	35
Start time	3/28/24, 5:13:29 PM
End time	3/28/24, 6:37:32 PM
Meeting duration	1h 24m 2s
Average attendance time	38m 37s

2. Participants

Name	First Join	Last Leave	In-Meeting D	Email	Participant ID	Role
Norris, Katie	3/28/24, 5:25	3/28/24, 6:37	48m 23s	KNorris@wittobriens.com	KNorris@wittobriens.com	Organizer
Passmore, Jason	3/28/24, 5:20	3/28/24, 6:05	49m 30s	jpassmore@fresnocountyca.gov	jpassmore_fr	Presenter
Chad Fitzgerald	3/28/24, 5:23	3/28/24, 6:05	46m 54s	ChadF@ci.clavis.ca.us	ChadF@City	Presenter
Megan Gilles	3/28/24, 5:25	3/28/24, 6:05	39m 19s	MGilles@tularecounty.ca.gov	MGilles@tul:	Presenter
United Way of Tulare County	3/28/24, 5:25	3/28/24, 6:05	43m 38s			Presenter
Melanie Highfill	3/28/24, 5:25	3/28/24, 6:37	1h 11m 48s	melanie.highfill@reedleycollege.edu	mh001@reec	Presenter
Villa, Sarah	3/28/24, 5:25	3/28/24, 6:13	47m 19s	savilla@fresnocountyca.gov	savilla@fres	Presenter
Trish McAvoy	3/28/24, 5:25	3/28/24, 6:05	43m 36s			Presenter
Jeffrey Guynn	3/28/24, 5:26	3/28/24, 6:05	43m 7s	Jeffrey.Guynn@fresno.gov	Jeffrey.Guynr	Presenter
Jordan, Charlotte	3/28/24, 5:27	3/28/24, 6:05	42m 18s	CGJ5@pge.com	CGJ5@pge.c	Presenter
Kris Mangano - San Benito Co.	3/28/24, 5:27	3/28/24, 6:05	42m			Presenter
Angela Babcock	3/28/24, 5:28	3/28/24, 5:40	12m 6s	angela.babcock@sce.com	angela.babcc	Presenter
Richard Mejorado	3/28/24, 5:29	3/28/24, 6:05	40m 26s	RMejorado@tularecounty.ca.gov	RMejorado@	Presenter
Bobby Phillips	3/28/24, 5:29	3/28/24, 6:05	40m 27s	bphillips@wwd.ca.gov	bphillips@ww	Presenter
Wilkins, Steve (Kerman PD)	3/28/24, 5:29	3/28/24, 6:13	43m 42s	Steve.Wilkins@fcle.org	Steve.Wilkin	Presenter
Anders, James	3/28/24, 5:29	3/28/24, 6:05	39m 44s	janders@fresnocountyca.gov	janders@fres	Presenter
Martin Wendels	3/28/24, 5:29	3/28/24, 6:05	39m 53s	Martin.Wendels@fresno.gov	Martin.Wend	Presenter
Estrada, Erika Lynn	3/28/24, 5:29	3/28/24, 6:05	39m 44s	eestrada@wittobriens.com	eestrada@wi	Presenter
Davis, David	3/28/24, 5:29	3/28/24, 6:05	39m 28s	dadavis@fresnocountyca.gov	dadavis@fres	Presenter
Brian Thoburn	3/28/24, 5:30	3/28/24, 6:05	39m 5s	Brian.thoburn@sce.com	Brian.thoburn	Presenter
Jarrold M. Takemoto	3/28/24, 5:30	3/28/24, 6:05	38m 54s	jarroldt@fresnofloodcontrol.org	jarroldt@fres	Presenter
Mtunga, Tawanda	3/28/24, 5:31	3/28/24, 6:05	38m 5s	tmtunga@fresnocountyca.gov	tmtunga@fre	Presenter
Nathan	3/28/24, 5:31	3/28/24, 5:42	10m 47s			Presenter
Ritschel, Dana R.	3/28/24, 5:32	3/28/24, 6:05	37m 44s	dritschel@fresnocountyca.gov	dritschel@frc	Presenter
Mejorado, Terri	3/28/24, 5:32	3/28/24, 6:05	37m 6s	tmejorado@fresnocountyca.gov	tmejorado_fr	Presenter
Tanner Michaelson	3/28/24, 5:32	3/28/24, 6:05	37m 9s	tmichaelson@sierrarc.com	tmichaelson@	Presenter
Rudy Alcaraz	3/28/24, 5:34	3/28/24, 6:11	37m 11s			Presenter
Scott Miller	3/28/24, 5:34	3/28/24, 6:05	34m 38s	smiller@fresnochamber.com	smiller@fres	Presenter
Robert Long	3/28/24, 5:34	3/28/24, 6:05	34m 40s	rlong@coalinga.com	rlong@coalir	Presenter
John Jansons	3/28/24, 5:35	3/28/24, 6:37	1h 2m 24s			Presenter
Raquel Sandoval	3/28/24, 5:35	3/28/24, 5:55	19m 17s	rsandoval@mariposacounty.org	rsandoval@n	Presenter
Chief Tarascou	3/28/24, 5:35	3/28/24, 6:13	37m 12s			Presenter
Wes Smith	3/28/24, 5:36	3/28/24, 5:55	18m 49s	wsmith@mariposacounty.org	wsmith@mar	Presenter
Charlotte Gallock	3/28/24, 5:41	3/28/24, 6:05	28m 17s	cgallock@krcc.org	cgallock@krc	Presenter
Nathan	3/28/24, 5:43	3/28/24, 6:10	26m 49s			Presenter

3. In-Meeting Activities

Name	Join Time	Leave Time	Duration	Email	Role
Norris, Katie	3/28/24, 5:25	3/28/24, 6:13	48m 12s	KNorris@wittobriens.com	Organizer
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7 – Public Meeting

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FRESNO COUNTY MULTI-
JURISDICTIONAL HAZARD
MITIGATION PLAN UPDATE
Public Meeting

JANUARY 16, 2024

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Hazard Mitigation Planning Overview

What is hazard mitigation?

Hazard mitigation is any action we can take now to reduce the **impact** of future disasters.

Hazard Mitigation Planning Overview

Why is mitigation important?

- Reduce predictable danger to people and property
- Maintain continuity of operations
- Save money in the long term



Hazard Mitigation Planning Overview

What are some examples of hazard mitigation?

- Elevating or demolishing structures that flood frequently
- Strengthening or burying power lines
- Increasing the size of culverts
- Reinforcing buildings to withstand earthquakes or hurricanes
- Installing generators at critical facilities
- Removing vegetation or creating defensible space buildings to reduce wildfire damage

Hazard Mitigation Planning Overview

What does a hazard mitigation plan do?

- Profiles the community and its key assets and infrastructure
- Describes hazard-related risks that the community faces
- Maps where risks and critical facilities overlap
- Identifies and prioritizes actions the community can take to reduce identified risks
- When FEMA-approved, maintains eligibility for federal mitigation grant funds.

Hazard Mitigation Planning Overview

The Community Rating System (CRS)

- The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the National Flood Insurance Program (NFIP).
- Participating communities can earn discounts on flood insurance for their residents.
- There are two communities in Fresno County that participate in the CRS:
 - Fresno County
 - The City of Fresno
- For these communities, the updated Fresno County Hazard Mitigation Plan will meet the requirements of both programs.

Hazards in Fresno County

20 Profiled Hazards

- Agricultural Hazards
- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flood
- Human Health Hazards: Epidemic/Pandemic
- Human Health Hazards: West Nile Virus
- Landslide
- Soil Hazards: Erosion
- Soil Hazards: Expansive Soils
- Soil Hazards: Land Subsidence
- Severe Weather: General
- Severe Weather: Extreme Temperatures
- Severe Weather: Fog
- Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind
- Severe Weather: Tornado
- Severe Weather: Winter Storm
- Volcano
- Wildfire



Community Feedback

Public Survey

- The first opportunity for public input on the plan is a survey, which will close at midnight on January 30
- 168 people have responded to the survey so far (as of this morning)
- Use this QR code to take the survey (in English or Spanish)



Community Feedback

- What mitigation actions would you like to see your community prioritize in the updated plan?
- Are there any other hazards that you would like to see profiled in the updated plan?
- Do you have any questions for the planning team or the County?

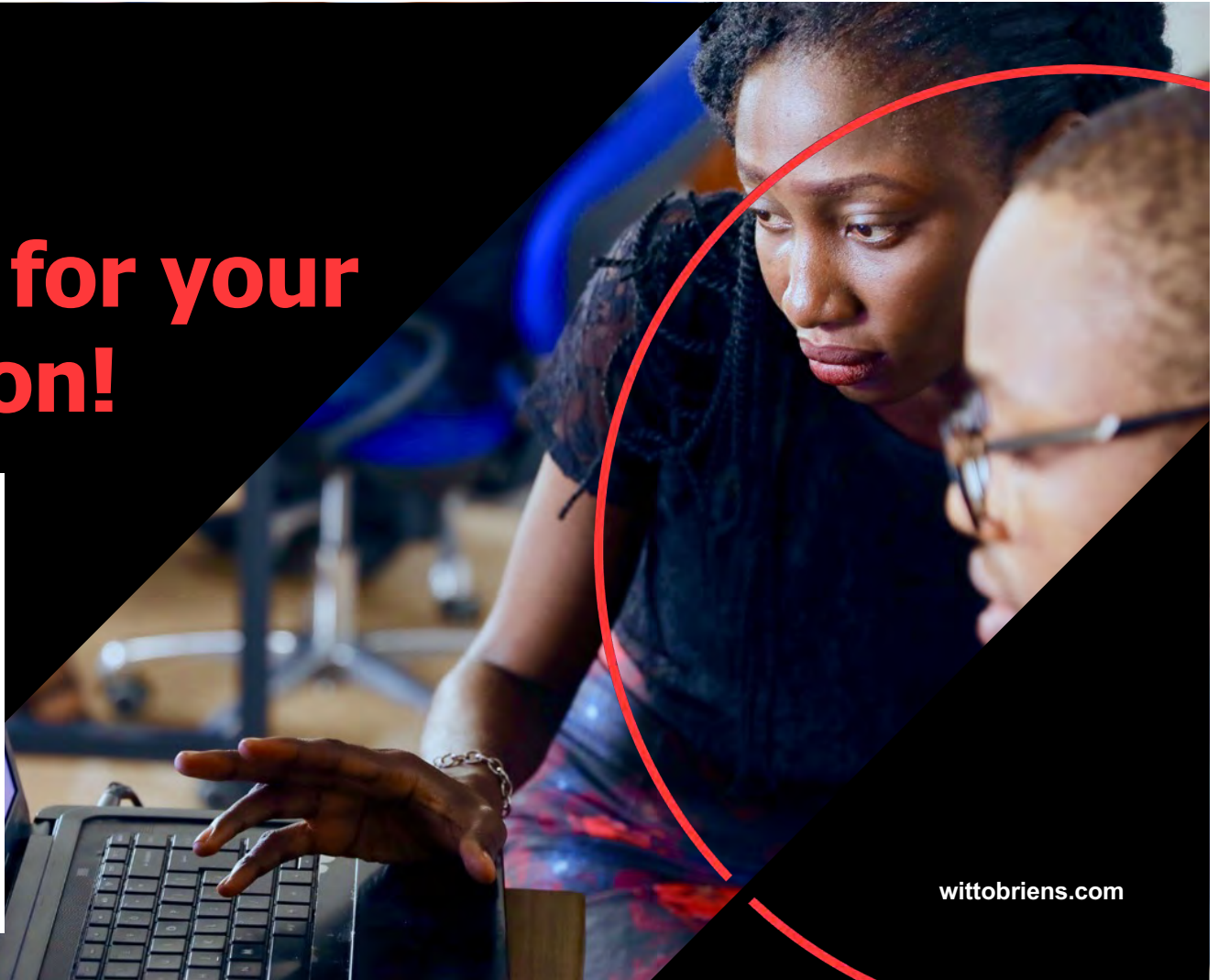


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**Thank you for your
participation!**



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Location: Del Rey

Sign in Sheet

Date: 11/16/24

Name/Nombre:	Phone #/# De Telefono:	Email/Correo Electronico:	Community/Agency; Comunidad/Agencia:
Bill Sano	559-804-8312	wsavio@w.tabriens.com	WOB
Tori Mierida	559-284-2532	tmierida@resnocity.org	
Ricardo Mierida	559-972-9303		
Victoria Santillan	559 908-3003	vsantillan@crla.org	CRLA
Houston Ramirez	559 600-4206		County of Fresno
Rudy Matcham	559-892-9111	rudy matcham@delreyboys.org	Del Rey Boys & Girls Club
Jennifer Lopez	559 301 8119	jlozadoblo@gmail.com	Del Rey Boys & Girls Club
Soer Lopez	559 309 1656	julabubs@gmail.com	Del Rey Boys & Girls Club
Jesus B. Anaya	559-313-5365	NONE	Del-Rey Ca.
Donna Reyna	559-371-2565	donnar1962@hotmail.com	Del Rey
Maria Reyes	559 426 4645	rene maria1986@gmail.com	Del Rey
Maria Vazquez	559-803-1717	5631 S. Van Horn Ave	Del Rey Ca.
Virginia Rivera	559-753-6241	5507 S. Van Horn Ave	Del Rey
Gloria Arredondo	559 480 7600	5444 Sautun	DEL REY
Gloria Nunez	559-888-2887	10634 E stanton	Del Rey

Date: 01/16/24

Date:

[illegible]

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FRESNO COUNTY MULTI-
JURISDICTIONAL HAZARD
MITIGATION PLAN UPDATE
Public Meeting

JANUARY 17, 2024

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 - Fresno County
 - The City of Fresno
- For these communities, the updated Fresno County Hazard Mitigation Plan will meet the requirements of both programs.

Hazards in Fresno County

20 Profiled Hazards

- Agricultural Hazards
- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flood
- Human Health Hazards: Epidemic/Pandemic
- Human Health Hazards: West Nile Virus
- Landslide
- Soil Hazards: Erosion
- Soil Hazards: Expansive Soils
- Soil Hazards: Land Subsidence
- Severe Weather: General
- Severe Weather: Extreme Temperatures
- Severe Weather: Fog
- Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind
- Severe Weather: Tornado
- Severe Weather: Winter Storm
- Volcano
- Wildfire



Community Feedback

Public Survey

- The first opportunity for public input on the plan is a survey, which will close at midnight on January 30
- 619 people have responded to the survey so far (as of 1PM today)
- Use this QR code to take the survey (in English or in Spanish)!



Community Feedback

- What mitigation actions would you like to see your community prioritize in the updated plan?
- Are there any other hazards that you would like to see profiled in the updated plan?
- Do you have any questions for the planning team or the County?

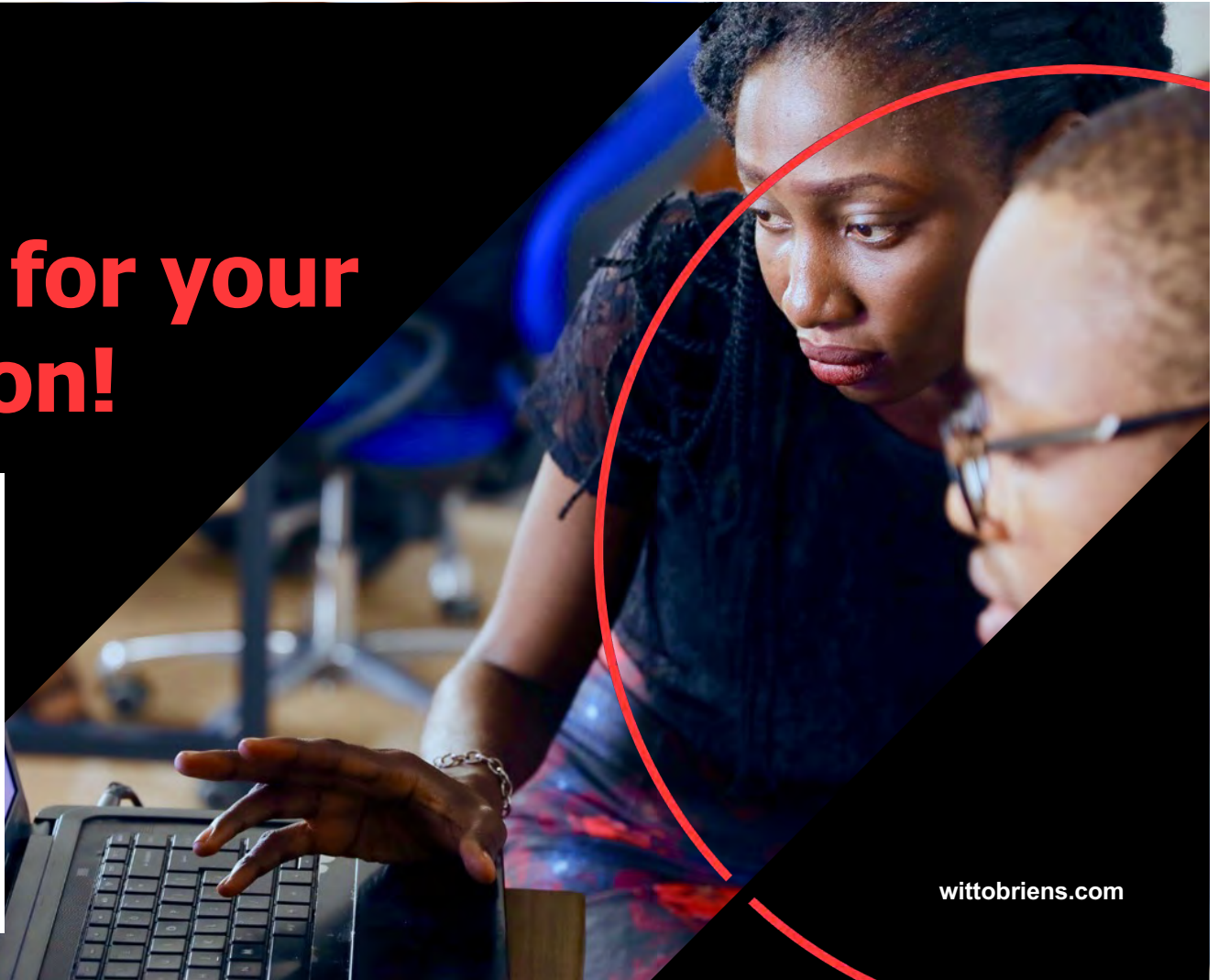


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**Thank you for your
participation!**



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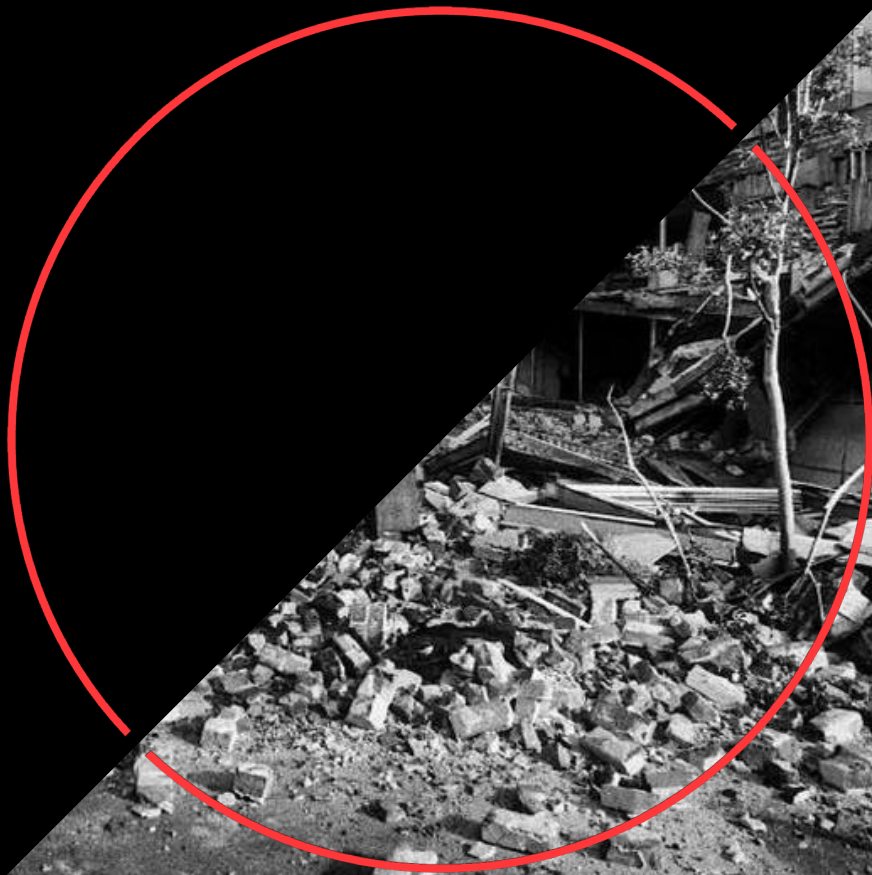
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response



FRESNO COUNTY MULTI- JURISDICTIONAL HAZARD MITIGATION PLAN UPDATE **Public Meeting**

MAY 3, 2024

wittobriens.com



Housekeeping Notes

- This public meeting will be recorded
- Please “mute” your microphone if you are not speaking
- We are interested in your feedback!
- Use the “chat” feature to ask questions and provide input

Opening Remarks



Agenda

- Hazard Mitigation Planning Overview
- Mitigation Strategy Overview
- Opportunity for Input

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HAZARD MITIGATION PLANNING OVERVIEW

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Hazard Mitigation Planning Overview

What is hazard mitigation?

Hazard mitigation is any action we can take now to reduce the **impact** of future disasters.

Hazard Mitigation Planning Overview

Why is mitigation important?

- Reduce predictable danger to people and property
- Maintain continuity of operations
- Save money in the long term



Hazard Mitigation Planning Overview

What are some examples of hazard mitigation?

- Elevating or demolishing structures that flood frequently
- Strengthening or burying power lines
- Increasing the size of culverts
- Reinforcing buildings to withstand earthquakes or hurricanes
- Installing generators at critical facilities
- Removing vegetation or creating defensible space buildings to reduce wildfire damage

Hazard Mitigation Planning Overview

What does a hazard mitigation plan do?

- Profiles the community and its key assets and infrastructure
- Describes hazard-related risks that the community faces
- Maps where risks and critical facilities overlap
- Identifies and prioritizes actions the community can take to reduce identified risks
- When FEMA-approved, maintains eligibility for federal mitigation grant funds.

Hazards in Fresno County

20 Profiled Hazards

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- Severe Weather: Fog
- Severe Weather: Heavy Rain, Thunderstorms, Hail, Lightning, Wind
- Severe Weather: Tornado
- Severe Weather: Winter Storm
- Volcano
- Wildfire



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MITIGATION STRATEGY

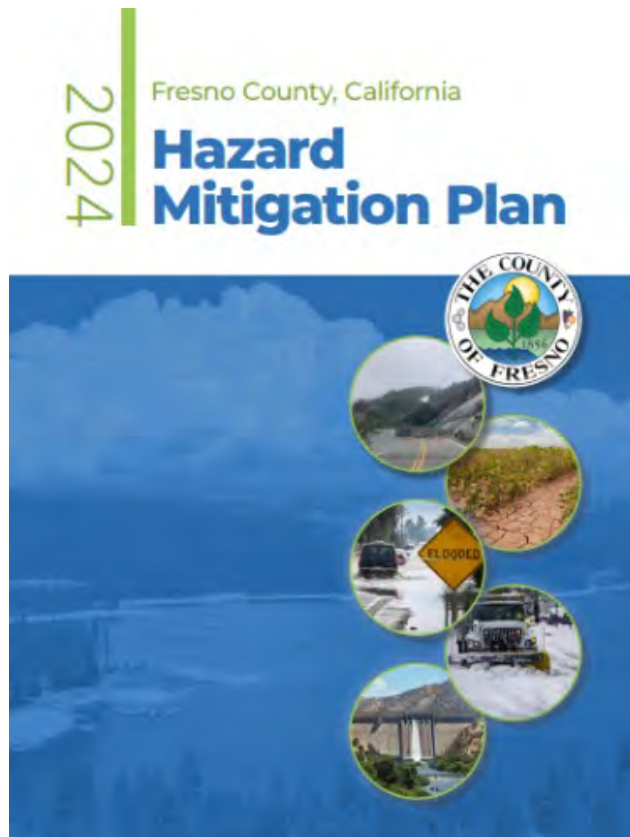
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Mitigation Strategy

A Note on Mitigation Actions

- The Hazard Mitigation Plan identifies *potential actions* that the county and cities may choose to pursue when funding becomes available
- Fresno County is not committing to implementing every action mentioned in the plan



Mitigation Strategy

Hazard Mitigation Goals

The plan establishes six overarching goals:

1. Provide Protection for People's Lives from Hazards
2. Improve All Communities' Resilience and Capabilities to Mitigate Hazards and Reduce Exposure to Hazard-Related Losses
3. Improve Community and Agency Awareness about Hazards and Associated Vulnerabilities that Threaten Fresno County Planning Area Communities

Mitigation Strategy

Hazard Mitigation Goals

The plan establishes six overarching goals:

4. Provide Protection for Critical Facilities, Utilities, and Services from Hazard Impacts
5. Maintain Coordination of Disaster Planning
6. Maintain/Provide for FEMA Eligibility and Work to Position Jurisdictions for Grant Funding

Mitigation Strategy

Hazard Mitigation Actions

The plan proposes a wide variety of hazard mitigation actions, including:

- Public education and outreach campaigns
- Assessing the vulnerability of and strengthening buildings/infrastructure
- Purchasing generators
- Reducing wildfire fuel sources
- Drainage and flood control projects



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OPPORTUNITY FOR INPUT

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Opportunity for Input

Public Comment Period

- The Hazard Mitigation Plan is now available for the public to review and comment!
- Scan this QR code for a link to the draft plan and the feedback survey:
- The plan is available for comment through **May 17**



Opportunity for Input

Community Feedback

- What mitigation actions would you like to see your community prioritize in the updated plan?
- Do you have any questions for the planning team or the County?





Thank you for your participation!





County of Fresno

1d

Public Comment Meeting will be held on Friday, May 3, 2024!

To join via teams/zoom please use

Meeting ID: 239 305 371 183

Passcode: wkEVT8

To peruse the Hazard Mitigation Plan: bit.ly/3JHRr9q

Reunion para el Publico se llevara acabo este viernes 3 de mayo 2024. Para entrar a esta reunion por zoom utilice las siguientes credenciales:

Meeting ID: 239 305 371 183

Passcode: wkEVT8

Public Comment Meeting



What is hazard mitigation planning?

Hazard mitigation planning reduces loss of life and property by minimizing the impact of disasters. It begins with identifying natural disaster risks and vulnerabilities that are common in the area. After identifying these risks, mitigation plans develop long-term strategies for protecting people and property from similar events. Mitigation plans are key to breaking the cycle of disaster damage and reconstruction.

Friday
May 3,
2024

5:30 PM

EMS Training Facility
5091 N. Fresno St.
Fresno, CA 93710

Reunión para el Público



¿Qué es la planificación de mitigación de riesgos?

La planificación de la mitigación de riesgos reduce la pérdida de vidas y propiedades al minimizar el impacto de los desastres. Comienza con la identificación de los riesgos y vulnerabilidades de desastres naturales que son comunes en el área. Después de identificar estos riesgos, los planes de mitigación desarrollan estrategias a largo plazo para proteger a las personas y la propiedad de eventos similares. Los planes de mitigación son clave para romper el ciclo de daños causados por desastres y reconstrucción.

Viernes
3 de
mayo
2024

5:30 PM

EMS Training Facility
5091 N Fresno St.
Fresno, CA 93710

County of Fresno

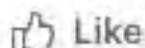
Government Organization

Send message



4

1 share



Like



Comment

Public Comment Meeting



What is hazard mitigation planning?

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EMS Training Facility
5091 N. Fresno St.
Fresno, CA 93710

**Download the
draft 2024
Fresno County
HMP by
scanning the QR
code**



or here:
bit.ly/3JHRr9q

Reunión para el Público



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**Viernes
3 de
mayo
2024**

5:30 PM

**EMS Training Facility
5091 N Fresno St.
Fresno, CA 93710**

**Descargue el
borrador del
HMP del
condado de
Fresno 2024
escaneando el
código QR**



**o lo encuentra
aquí:**

bit.ly/3JHRr9q

8 – AFN Committee Meeting

AFN - Emergency Planning and Preparedness Committee
Wednesday, February 07, 2024
 Fresno California

NAME	Initials	TITLE	AGENCY	County	Phone	EMAIL
Naemi Wooten	nkus	Staff Analyst	FC PHER	Fresno	600-3009	mwooden@fresnocounty.gov
Serald Meadows	JM	Metereologist	NCS	Central Valley	381-0957	Serald.Meadows@fresnocounty.gov
David Davis	D	Emergency Mgmt Spec.	OES	Fresno	240-3335	ddavis@fresnocounty.gov
Jennifer Webb	JW	Administrative Manager	FMAAA	Fresno/Madera	313-5593	jwebb@fmaaa.org
Ameth Rogers	MR	Emergency Operations Manager	CVRC	Central Valley	559-5588814	Ar Rogers@cvrc.org
Nicoia Foster	NF	Social Work Supervisor	IHSS	Fresno	600-5408	nfoster@fresnocounty.gov
Joshua Bogdanov	JB	Safety + Training Manager	Fresno EOC Transit Syst	Fresno	905-6889	Joshua.Bogdanov@fresno2020.org
Susan Coulter	SC	Educational Svcs Director	DIHSC	Fresno	421-9492	susan@dhsc.org
Daniel Colbert	DC	Safety & Security Officer	FA-X	Fresno	250-8583	Daniel.Colbert@fresno.gov
Ellicena Duncan	ED	Sr State Analyst	DSS	Fresno	600-197c	ellicena@fresnocounty.gov
Nu Mao	NT	Staff Analyst	DSS	Fresno	600-1972	nuhao@fresnocounty.gov
Amy Ybarra	AY	Health ID. Specialist	MCDPH	Madera	395-5524	amy.ybarra@madernacounty.com
Ilanni S.	IS	SACD VOL	SACD	Fresno	559-392-745	campbell@volunteer
Delia Gonzalez	DC	Community Outreach Director	Central Valley Children's Services Network	Fresno	559-286-0468	DeliaG@cvcsn.org

AFN - Emergency Planning and Preparedness Committee
Wednesday, February 07, 2024
 Fresno California

NAME	Initials	TITLE	AGENCY	County	Phone	EMAIL
Terri Weigand	TW	Emergency Manager	Fresno County BS	Fresno	559.284.2332	weigand@fresno-county.ca.gov
John MADRIZ	JM	PHERP	PUBLIC HEALTH	Fresno	559-602-3062	imadriz@fresno-county.ca.gov
Jamie Richard	JR	HSI Interpreter	DHSC	Fresno		
Carne McLauri	CM	Admin Spec	Tulare Co HHS - Human Svcs	Tulare	993.8748	carne.mclauri@tularecounty.ca.gov
Carla Colazzone	CC		FID	Fresno	601-23328	Carla.Colazzone@fresno-county.ca.gov
Melinda Gormanik	MG	Director of Financial Services	Fresno Public Util. Div.	Fresno	559-433-2249	melinda.gormanik@fresno.edu
TANDEK Mitchell	TM	Director of Emergency Management	Sierra RCD	Fresno	977-9447	emitchell@sierrarcd.com
Felix Castro	FC	Project Analyst (Lunch)	KMS/NOA	Harford	584-0583	Felix.Castro@noa.gov
Daniel Schmidt	DS	Project Coordinator	DFH	Fresno	600-3149	d.schmidt@fresnocounty.gov

Wednesday, February 07, 2024

[illegible]

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FRESNO COUNTY HAZARD MITIGATION PLAN UPDATE

Access and Functional Needs (AFN) Emergency Planning and Preparedness Committee

FEBRUARY 7, 2024

wittobriens.com



Hazards in Fresno County

20 Profiled Hazards

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- Avalanche
- Dam Failure
- Drought
- Earthquake
- Flood
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- Human Health Hazards: West Nile Virus
- Landslide
- Soil Hazards: Erosion
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- Wildfire



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- Are there any other hazards that you would like to see profiled in the updated plan?
- Do you have any questions?

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response

Thank you for your participation!

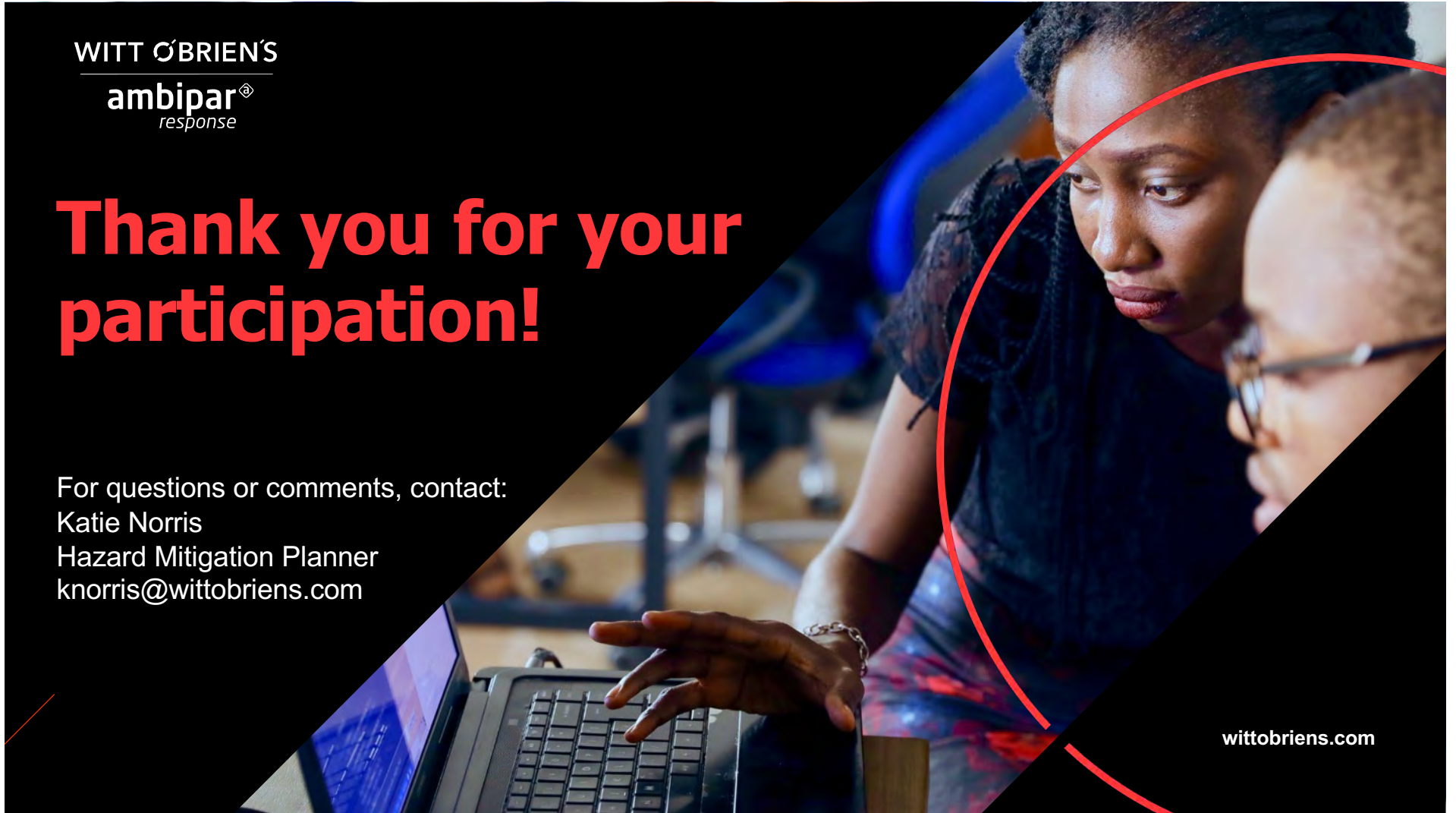
For questions or comments, contact:

Katie Norris

Hazard Mitigation Planner

knorris@wittobriens.com

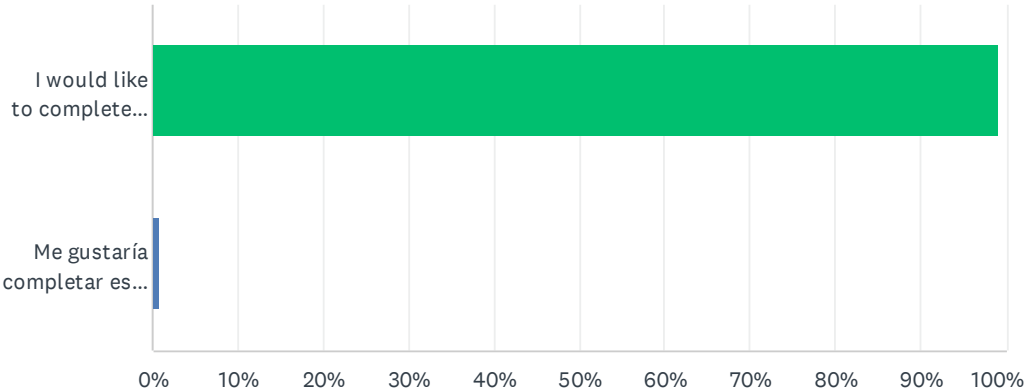
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9 – Surveys

Q1 Please select one of the following options Por favor, seleccione una de las siguientes opciones

Answered: 1,109 Skipped: 0

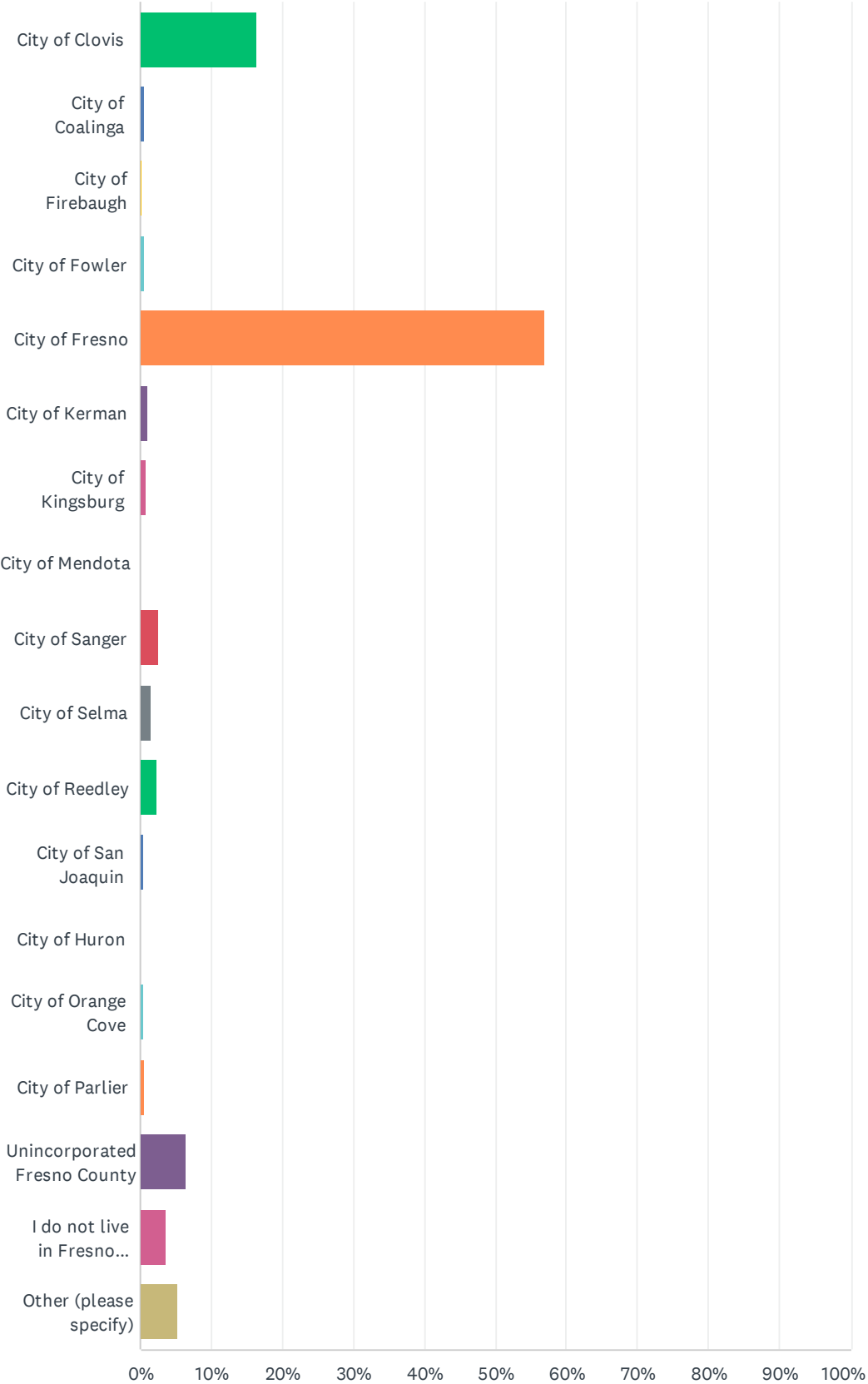


ANSWER CHOICES	RESPONSES	
I would like to complete this survey in English	99.19%	1,100
Me gustaría completar esta encuesta en español.	0.81%	9
TOTAL		1,109

Q2 What community do you currently live in?

Answered: 1,082 Skipped: 27

Fresno County Hazard Mitigation Plan - Public Opinion Survey

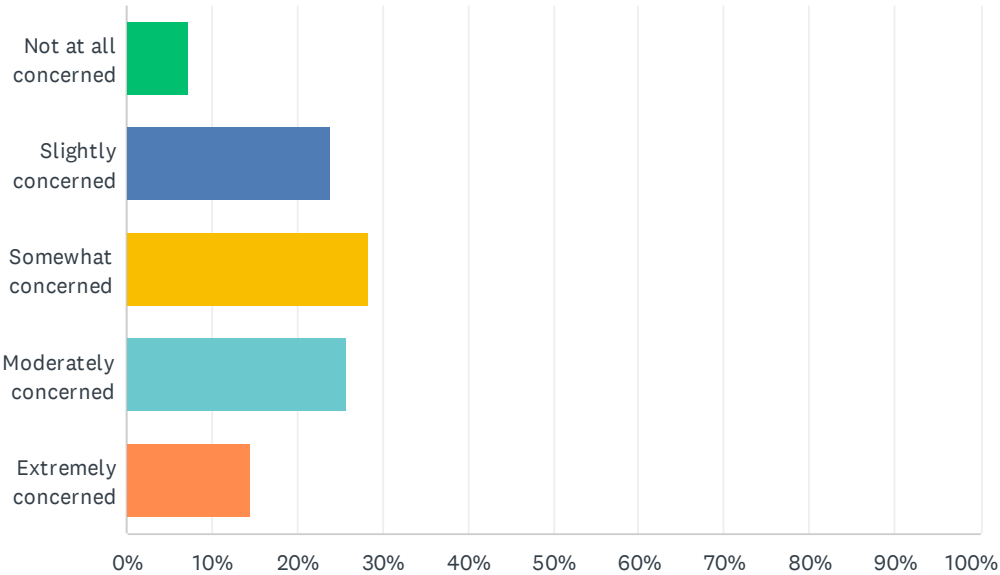


Fresno County Hazard Mitigation Plan - Public Opinion Survey

ANSWER CHOICES	RESPONSES	
City of Clovis	16.45%	178
City of Coalinga	0.65%	7
City of Firebaugh	0.18%	2
City of Fowler	0.74%	8
City of Fresno	57.02%	617
City of Kerman	1.02%	11
City of Kingsburg	0.83%	9
City of Mendota	0.09%	1
City of Sanger	2.59%	28
City of Selma	1.39%	15
City of Reedley	2.31%	25
City of San Joaquin	0.37%	4
City of Huron	0.00%	0
City of Orange Cove	0.37%	4
City of Parlier	0.65%	7
Unincorporated Fresno County	6.47%	70
I do not live in Fresno County	3.60%	39
Other (please specify)	5.27%	57
TOTAL		1,082

Q3 Natural hazards are natural phenomenon that might have a negative effect on humans and other animals, or the environment (like flood, fire, drought, or earthquake). Generally speaking, how concerned are you about Fresno County being impacted by a natural disaster?

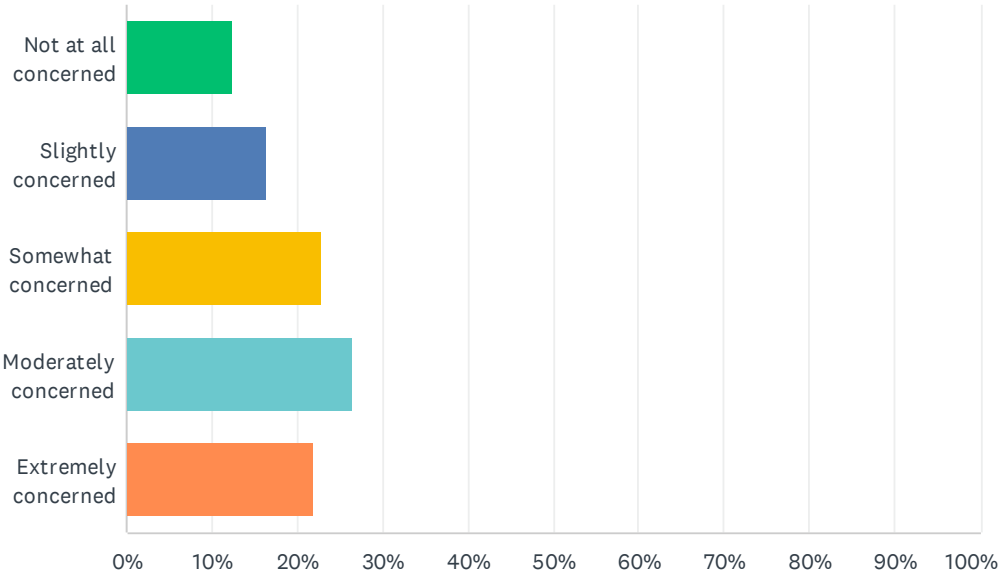
Answered: 1,035 Skipped: 74



ANSWER CHOICES	RESPONSES	
Not at all concerned	7.34%	76
Slightly concerned	23.96%	248
Somewhat concerned	28.31%	293
Moderately concerned	25.80%	267
Extremely concerned	14.59%	151
TOTAL		1,035

Q4 How concerned are you about natural hazard impacts from climate change within Fresno County?

Answered: 1,029 Skipped: 80

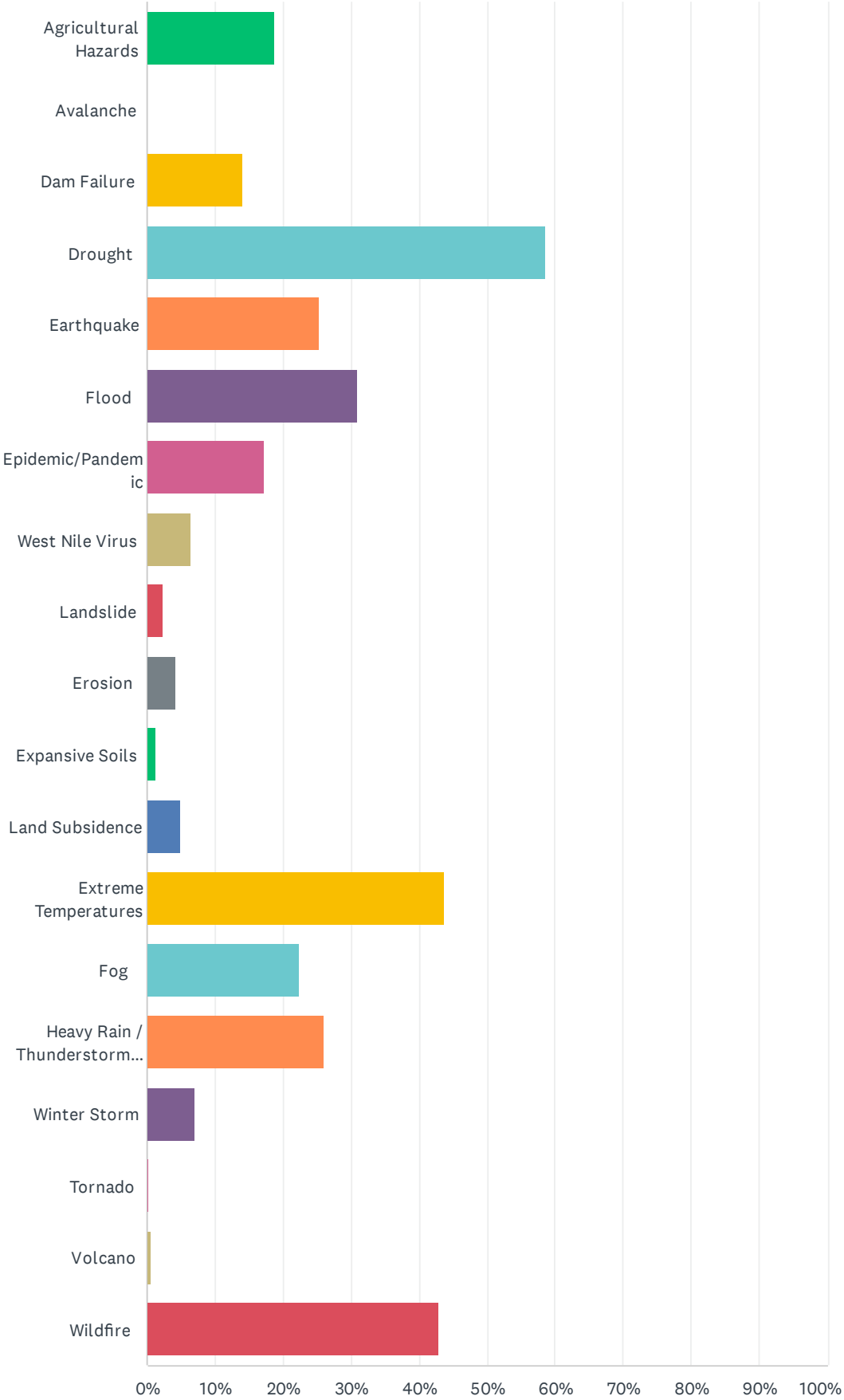


ANSWER CHOICES	RESPONSES	
Not at all concerned	12.34%	127
Slightly concerned	16.33%	168
Somewhat concerned	22.74%	234
Moderately concerned	26.53%	273
Extremely concerned	22.06%	227
TOTAL		1,029

Q5 Please select the top three (3) natural hazards that you think present the greatest threat to Fresno County. Please select only 3.

Answered: 1,021 Skipped: 88

Fresno County Hazard Mitigation Plan - Public Opinion Survey

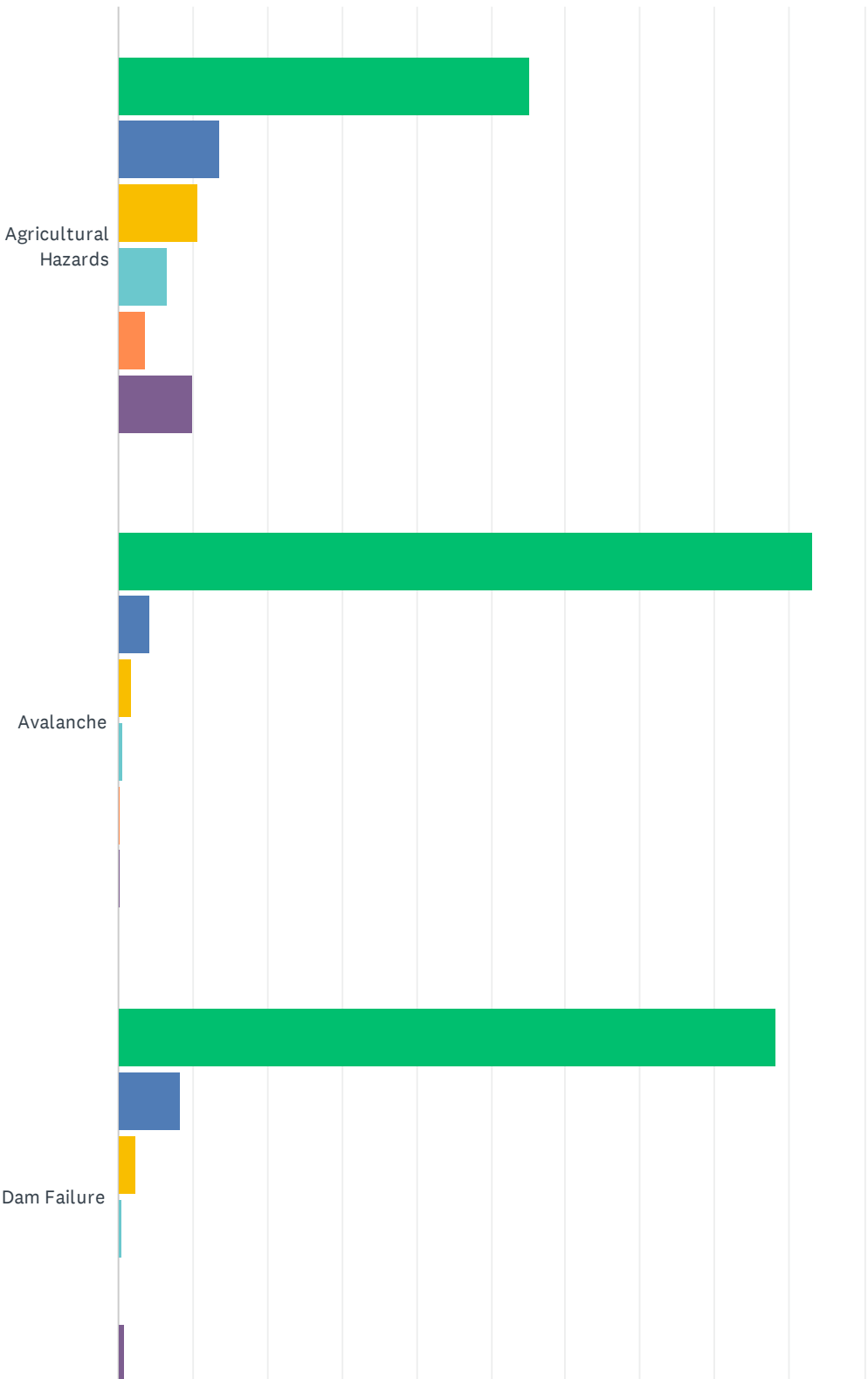


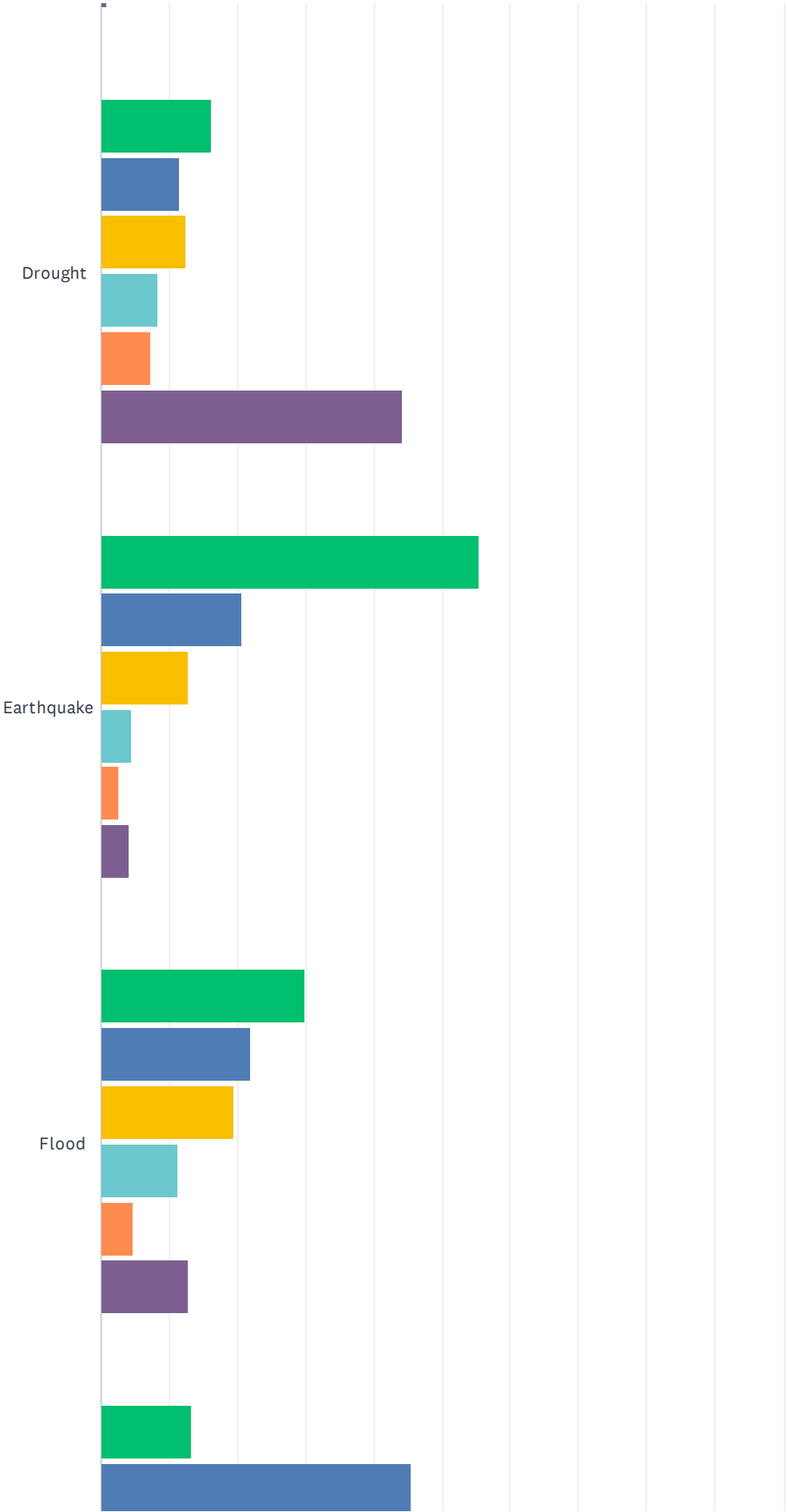
Fresno County Hazard Mitigation Plan - Public Opinion Survey

ANSWER CHOICES	RESPONSES	
Agricultural Hazards	18.71%	191
Avalanche	0.00%	0
Dam Failure	14.10%	144
Drought	58.57%	598
Earthquake	25.27%	258
Flood	30.85%	315
Epidemic/Pandemic	17.24%	176
West Nile Virus	6.37%	65
Landslide	2.25%	23
Erosion	4.21%	43
Expansive Soils	1.37%	14
Land Subsidence	4.90%	50
Extreme Temperatures	43.68%	446
Fog	22.33%	228
Heavy Rain / Thunderstorm / Hail / Lightning / Wind	25.95%	265
Winter Storm	7.05%	72
Tornado	0.20%	2
Volcano	0.59%	6
Wildfire	42.90%	438
Total Respondents: 1,021		

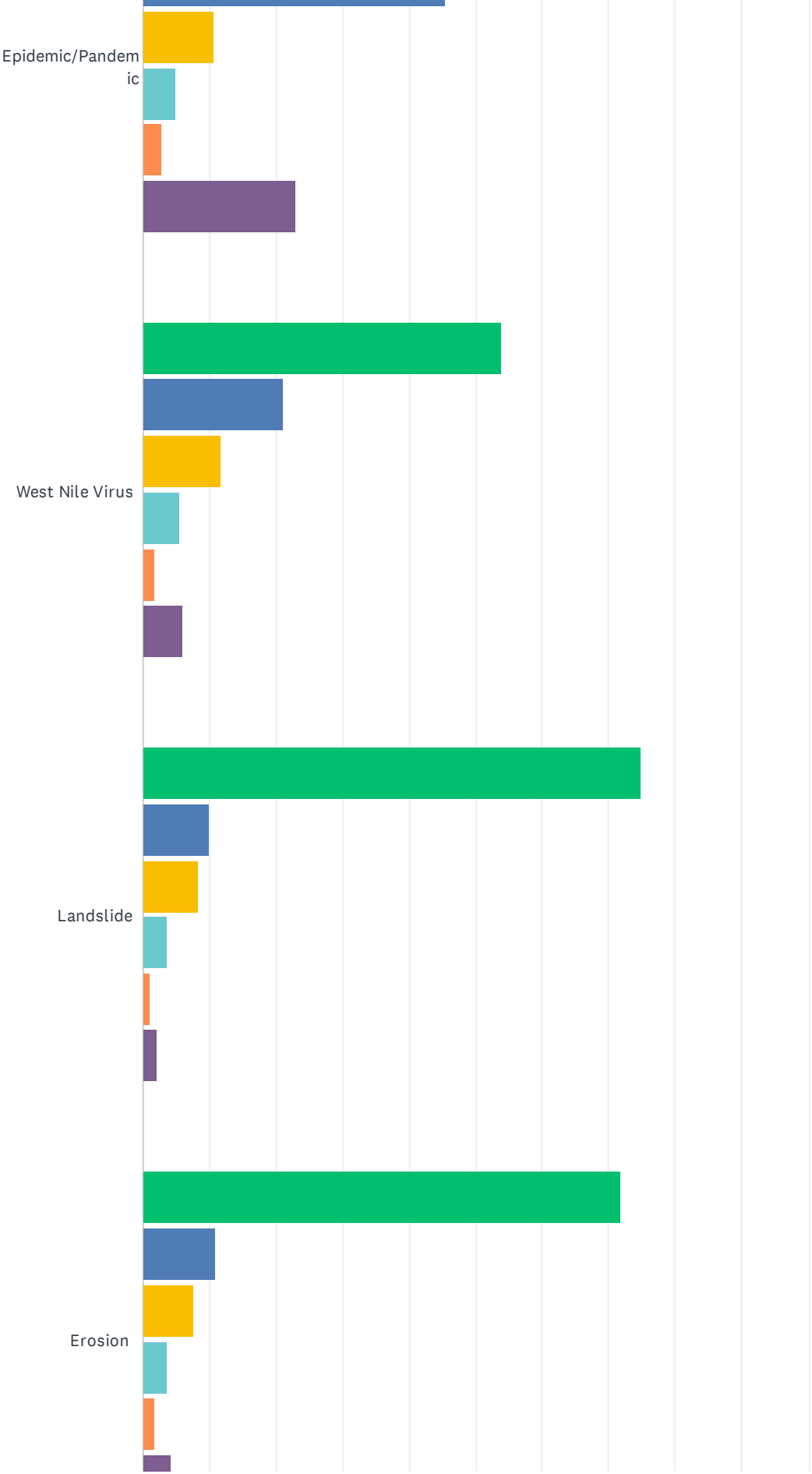
Q6 How many times do you recall the following hazards causing harm, endangering lives, or damaging property at your home or in your community?

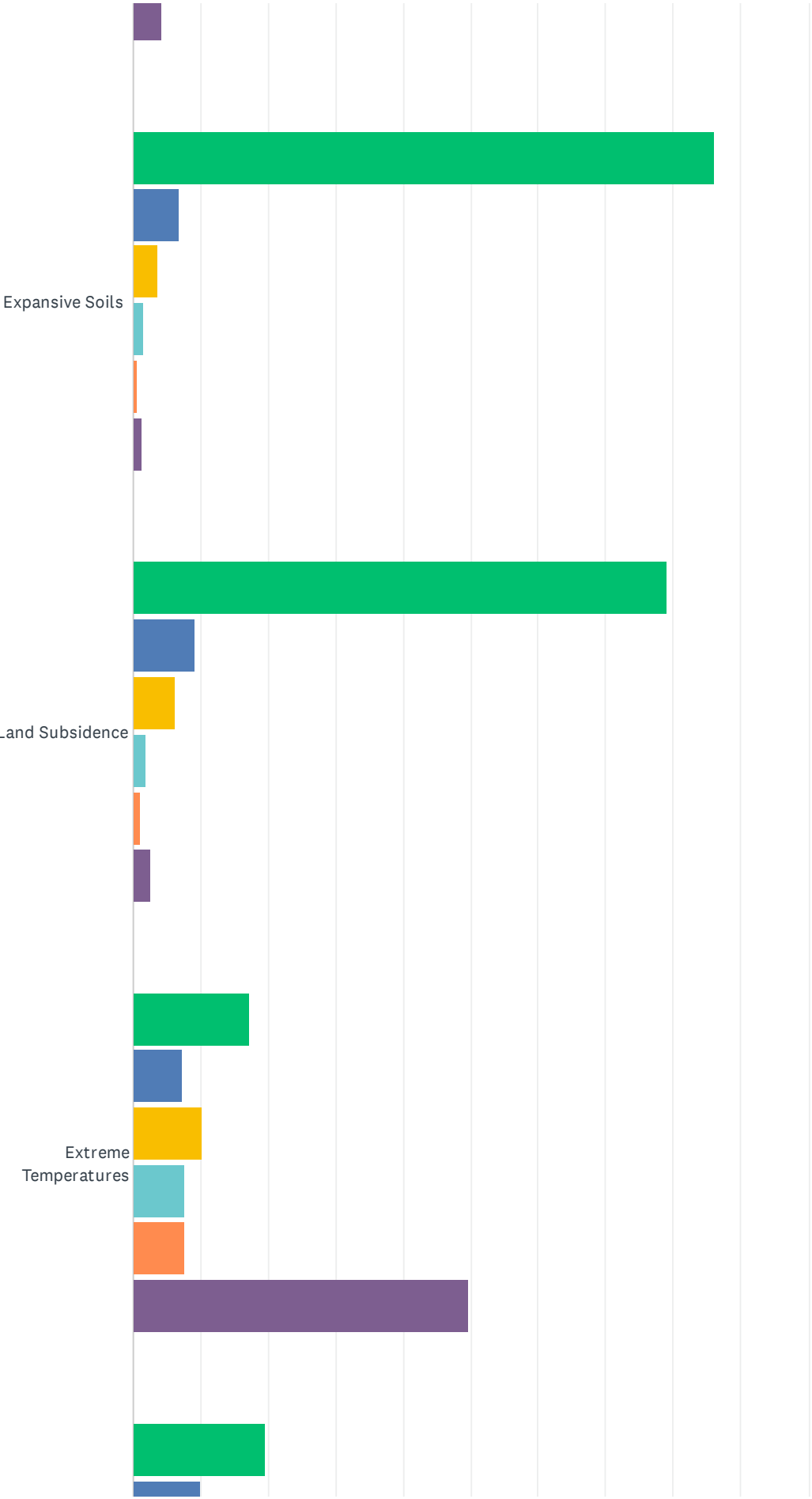
Answered: 942 Skipped: 167



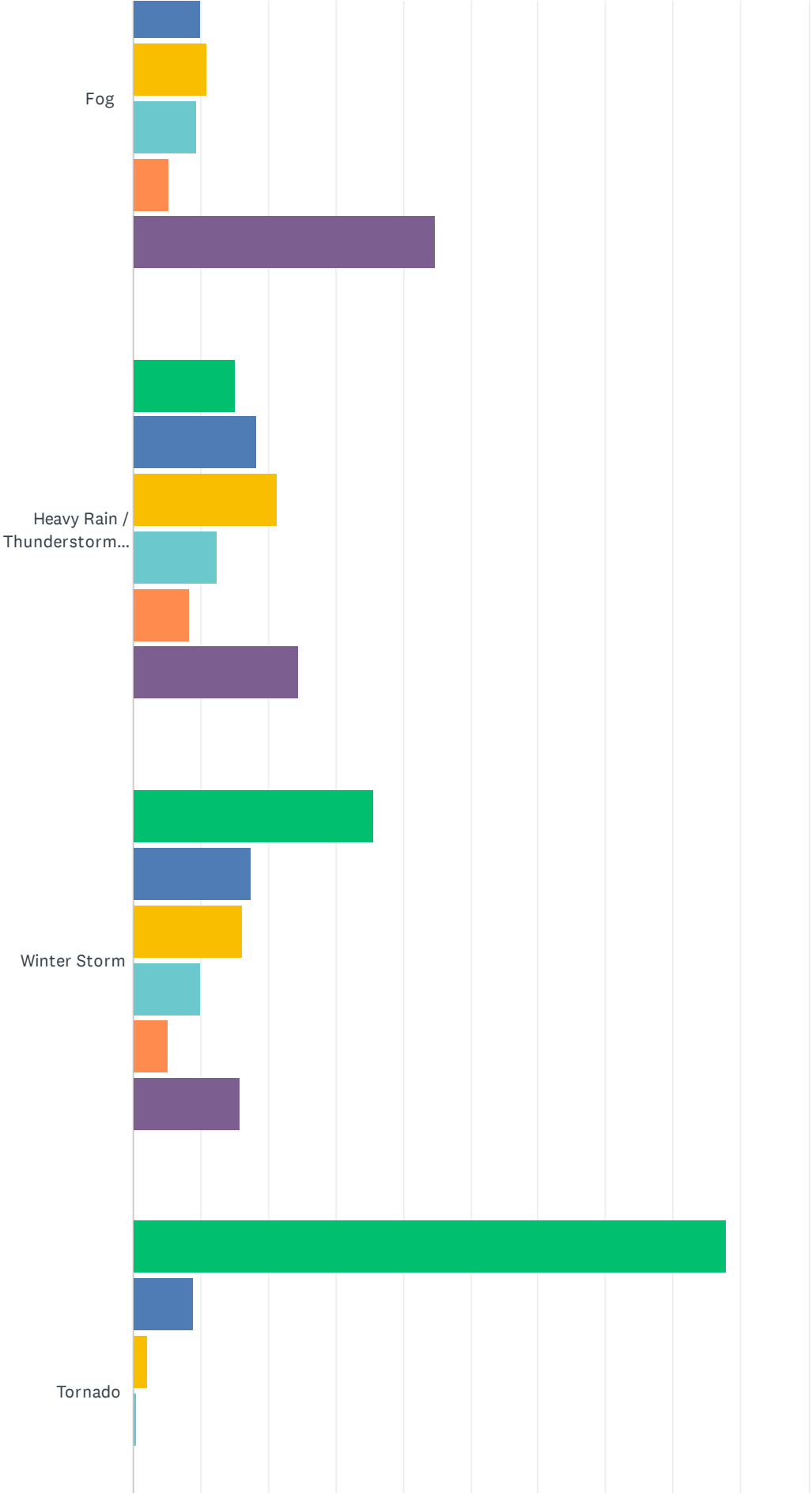


Fresno County Hazard Mitigation Plan - Public Opinion Survey

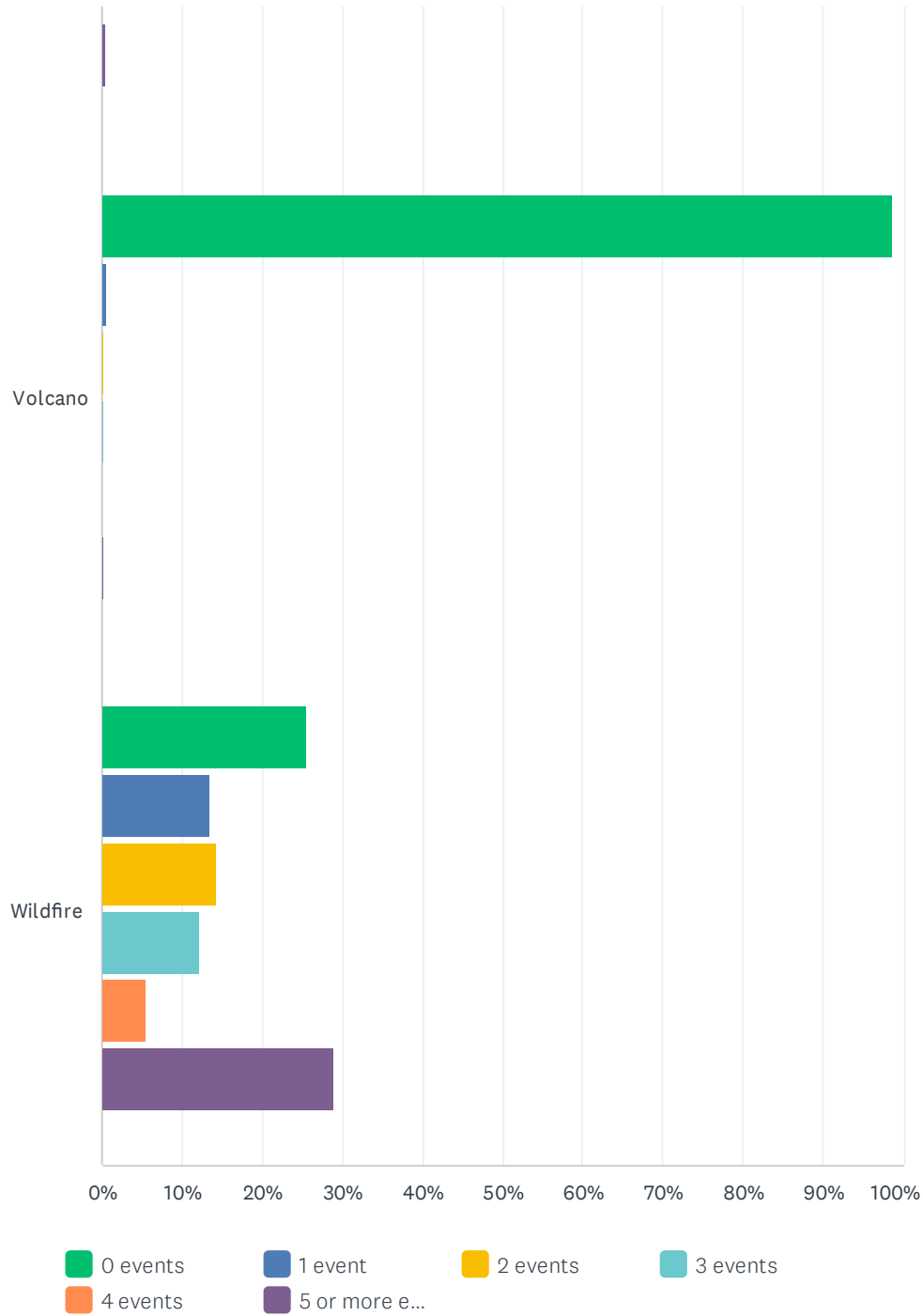




Fresno County Hazard Mitigation Plan - Public Opinion Survey



Fresno County Hazard Mitigation Plan - Public Opinion Survey

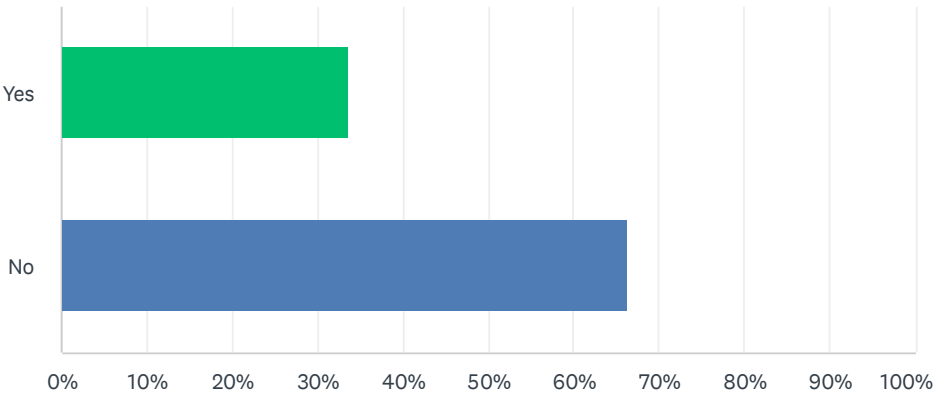


Fresno County Hazard Mitigation Plan - Public Opinion Survey

	0 EVENTS	1 EVENT	2 EVENTS	3 EVENTS	4 EVENTS	5 OR MORE EVENTS	TOTAL	WEIGHTED AVERAGE
Agricultural Hazards	55.20% 462	13.74% 115	10.75% 90	6.69% 56	3.58% 30	10.04% 84	837	2.20
Avalanche	93.27% 790	4.25% 36	1.65% 14	0.59% 5	0.12% 1	0.12% 1	847	1.10
Dam Failure	88.21% 748	8.25% 70	2.24% 19	0.47% 4	0.00% 0	0.83% 7	848	1.18
Drought	16.29% 145	11.57% 103	12.36% 110	8.31% 74	7.30% 65	44.16% 393	890	4.11
Earthquake	55.54% 481	20.67% 179	12.70% 110	4.39% 38	2.66% 23	4.04% 35	866	1.90
Flood	29.76% 264	21.87% 194	19.50% 173	11.39% 101	4.62% 41	12.85% 114	887	2.78
Epidemic/Pandemic	13.15% 116	45.46% 401	10.66% 94	4.88% 43	2.83% 25	23.02% 203	882	3.08
West Nile Virus	53.86% 453	21.17% 178	11.65% 98	5.47% 46	1.78% 15	6.06% 51	841	1.98
Landslide	74.76% 625	10.05% 84	8.25% 69	3.71% 31	1.08% 9	2.15% 18	836	1.53
Erosion	71.95% 608	10.77% 91	7.69% 65	3.67% 31	1.66% 14	4.26% 36	845	1.65
Expansive Soils	86.23% 714	6.76% 56	3.62% 30	1.45% 12	0.60% 5	1.33% 11	828	1.27
Land Subsidence	79.11% 659	9.12% 76	6.12% 51	1.92% 16	1.08% 9	2.64% 22	833	1.45
Extreme Temperatures	17.26% 154	7.29% 65	10.31% 92	7.74% 69	7.62% 68	49.78% 444	892	4.30
Fog	19.59% 173	10.08% 89	10.87% 96	9.29% 82	5.44% 48	44.73% 395	883	4.05
Heavy Rain / Thunderstorm / Hail / Lightning / Wind	15.07% 135	18.42% 165	21.32% 191	12.39% 111	8.26% 74	24.55% 220	896	3.54
Winter Storm	35.63% 305	17.52% 150	16.12% 138	9.93% 85	5.02% 43	15.77% 135	856	2.79
Tornado	87.86% 738	9.05% 76	2.14% 18	0.48% 4	0.00% 0	0.48% 4	840	1.17
Volcano	98.70% 833	0.71% 6	0.12% 1	0.24% 2	0.00% 0	0.24% 2	844	1.03
Wildfire	25.59% 228	13.47% 120	14.25% 127	12.12% 108	5.50% 49	29.07% 259	891	3.46

Q7 Have you taken any actions to make your home, business, or neighborhood more resilient to natural hazards?

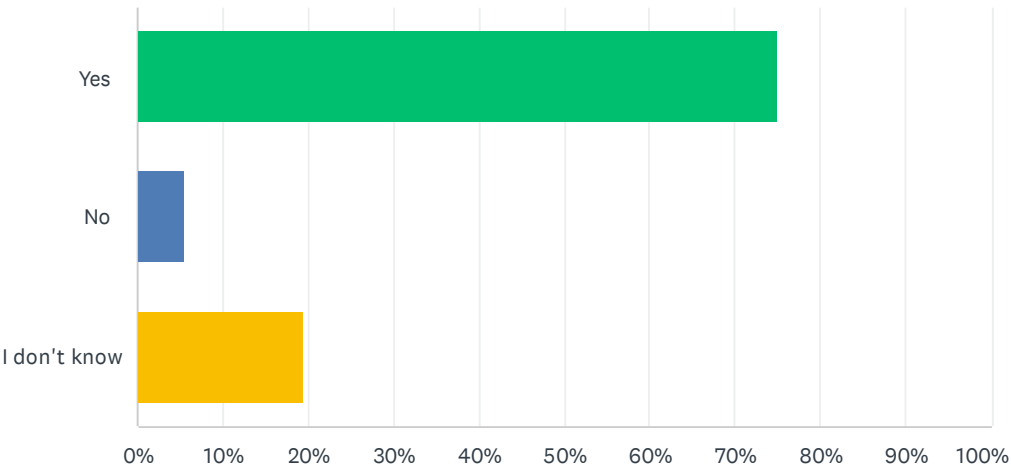
Answered: 942 Skipped: 167



ANSWER CHOICES		RESPONSES	
Yes		33.65%	317
No		66.35%	625
TOTAL			942

Q8 Would incentives such as insurance discounts, property tax breaks, or low-interest loans motivate you to take additional steps to protect your home or business from natural disasters?

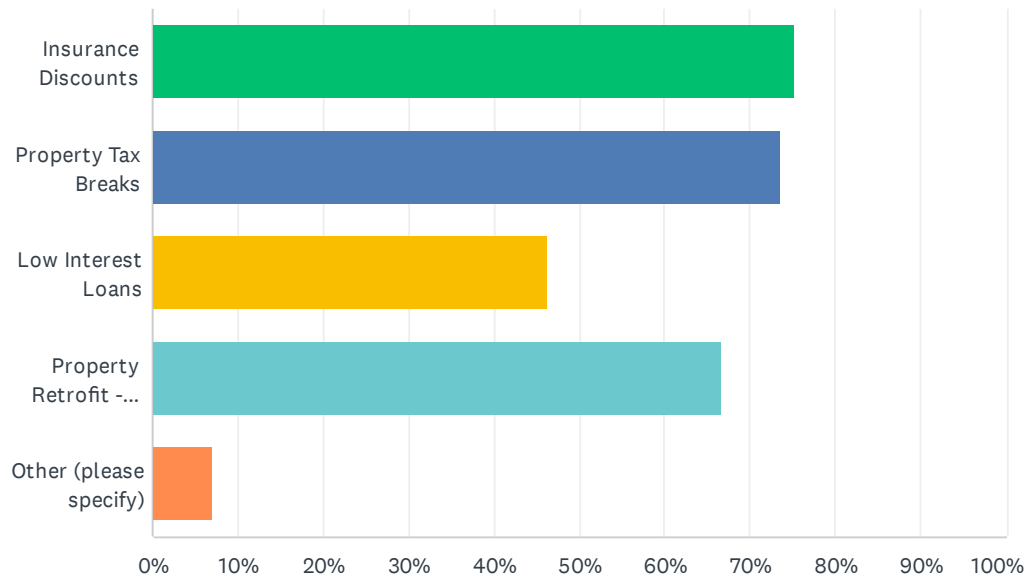
Answered: 926 Skipped: 183



ANSWER CHOICES	RESPONSES	
Yes	75.05%	695
No	5.51%	51
I don't know	19.44%	180
TOTAL		926

Q9 What kind of incentives would you like to see offered?

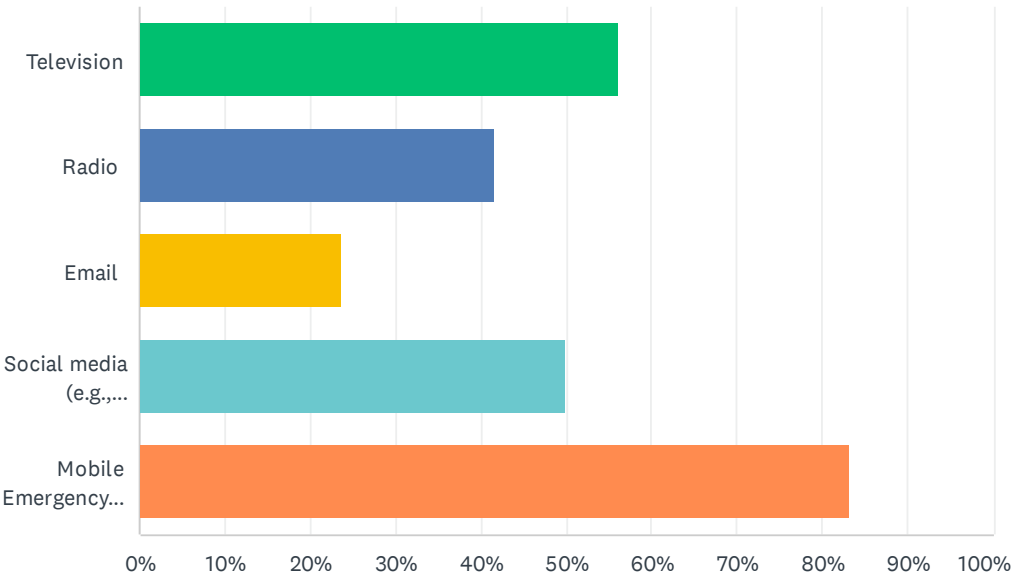
Answered: 927 Skipped: 182



ANSWER CHOICES	RESPONSES	
Insurance Discounts	75.19%	697
Property Tax Breaks	73.46%	681
Low Interest Loans	46.17%	428
Property Retrofit - projects where a portion of the cost is supplied by the city, county, or grant funding.	66.77%	619
Other (please specify)	7.01%	65
Total Respondents: 927		

Q10 How do you receive warnings regarding severe weather events?
Please check all that apply.

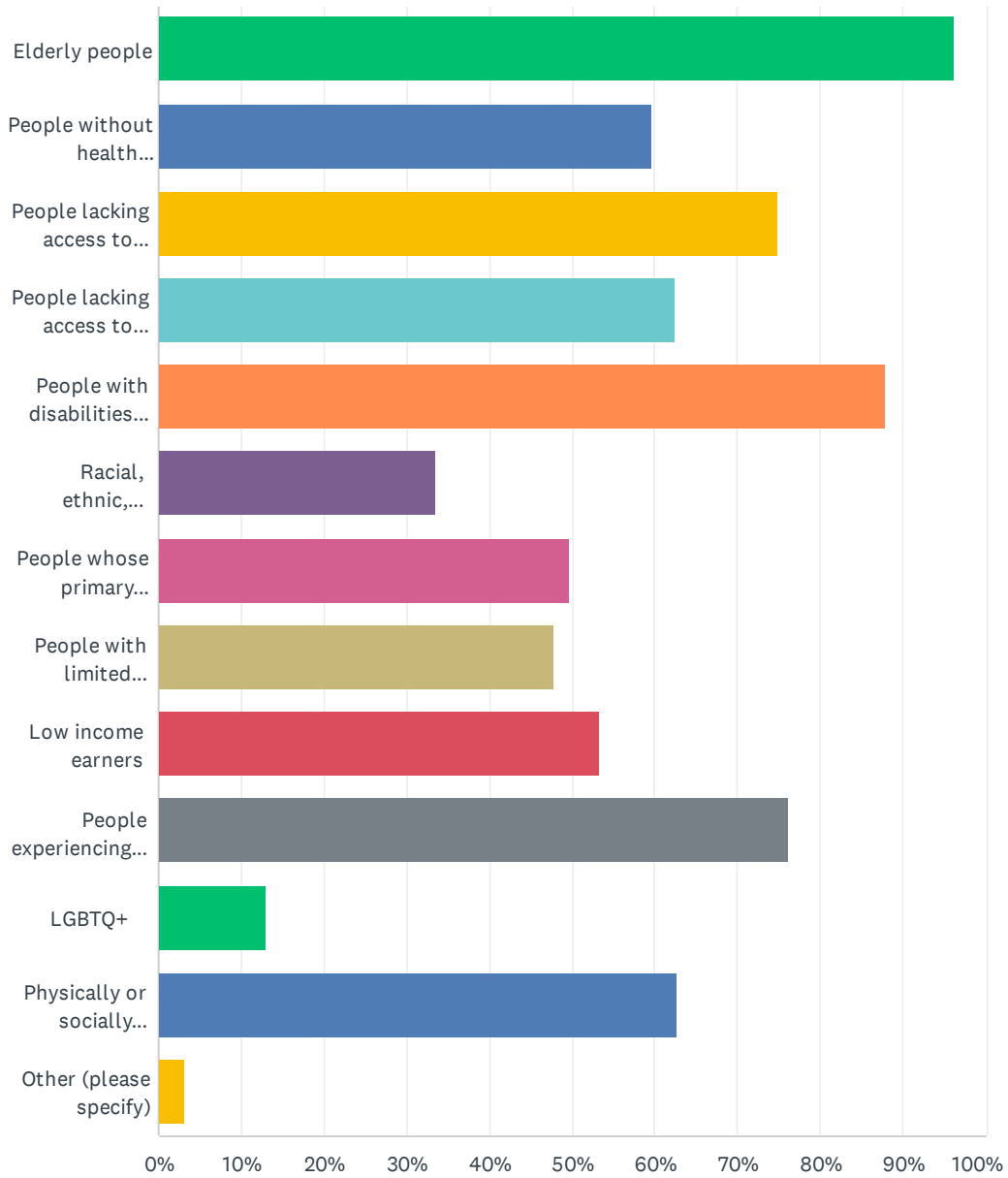
Answered: 939 Skipped: 170



ANSWER CHOICES	RESPONSES	
Television	56.02%	526
Radio	41.64%	391
Email	23.75%	223
Social media (e.g., Facebook, Twitter, etc.)	49.84%	468
Mobile Emergency Alerts	83.07%	780
Total Respondents: 939		

Q11 Do you believe any of the following populations would be at increased risk of any of the hazards mentioned so far?

Answered: 912 Skipped: 197

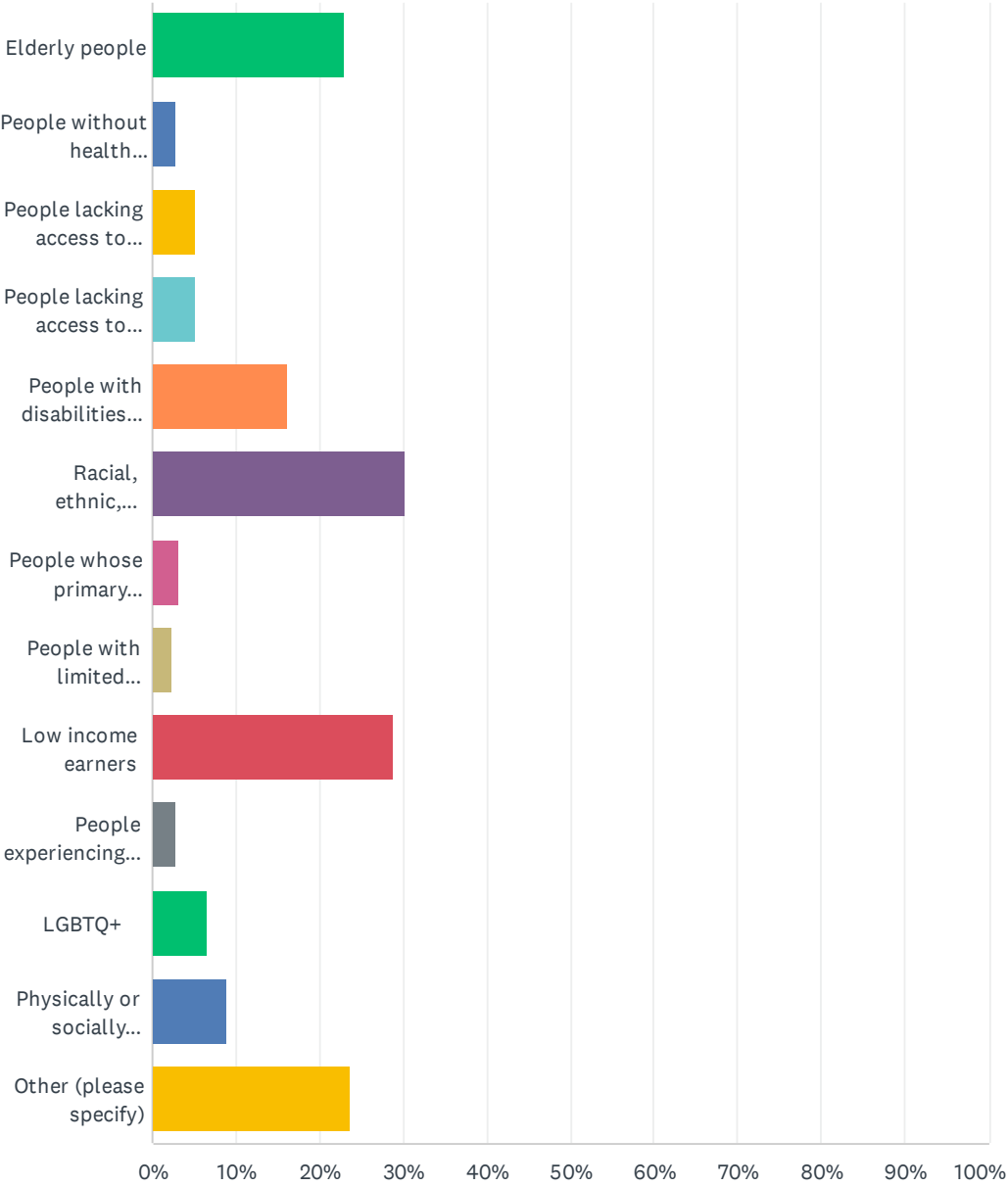


Fresno County Hazard Mitigation Plan - Public Opinion Survey

ANSWER CHOICES	RESPONSES	
Elderly people	96.16%	877
People without health insurance	59.76%	545
People lacking access to transportation	74.78%	682
People lacking access to technology or with limited technological proficiency	62.39%	569
People with disabilities or functional needs	87.83%	801
Racial, ethnic, cultural, or religious minorities	33.55%	306
People whose primary language is not English	49.67%	453
People with limited literacy	47.70%	435
Low income earners	53.29%	486
People experiencing homelessness	76.10%	694
LGBTQ+	12.94%	118
Physically or socially isolated individuals	62.61%	571
Other (please specify)	3.29%	30
Total Respondents: 912		

Q12 Would you describe yourself as a member of any of the following vulnerable populations?

Answered: 630 Skipped: 479



Fresno County Hazard Mitigation Plan - Public Opinion Survey

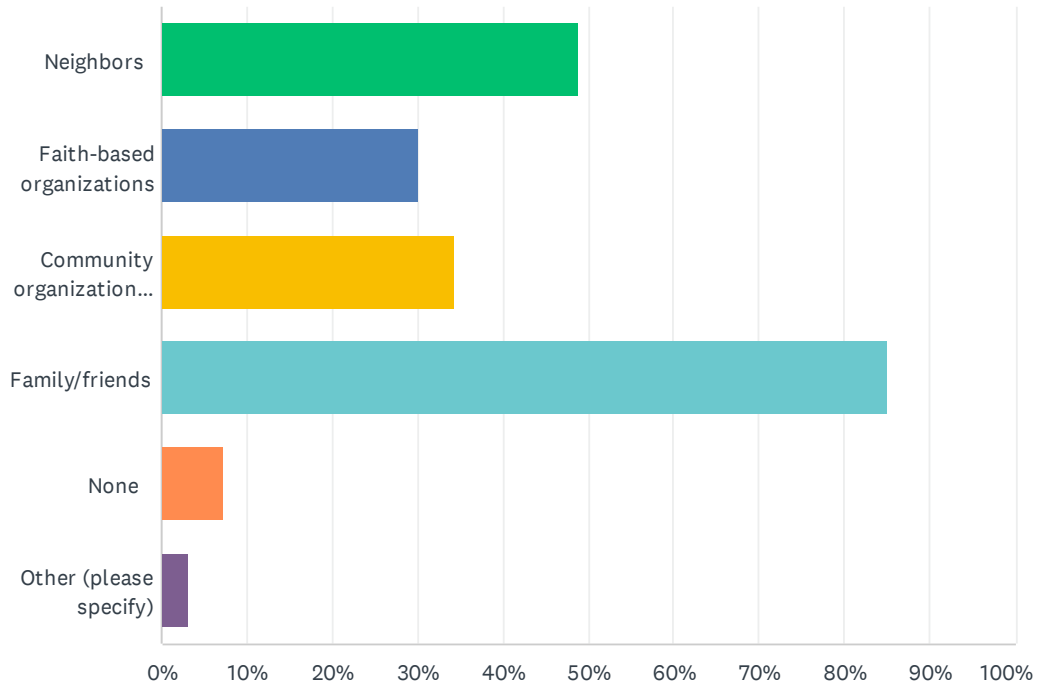
ANSWER CHOICES	RESPONSES	
Elderly people	23.02%	145
People without health insurance	2.86%	18
People lacking access to transportation	5.08%	32
People lacking access to technology or with limited technological proficiency	5.08%	32
People with disabilities or functional needs	16.19%	102
Racial, ethnic, cultural, or religious minorities	30.32%	191
People whose primary language is not English	3.17%	20
People with limited literacy	2.38%	15
Low income earners	28.89%	182
People experiencing homelessness	2.86%	18
LGBTQ+	6.67%	42
Physically or socially isolated individuals	8.89%	56
Other (please specify)	23.65%	149
Total Respondents: 630		

Q13 Could Fresno County provide additional support for vulnerable populations to be better prepared for hazards? If so, how?

Answered: 498 Skipped: 611

Q14 In the event of an emergency, would you feel supported by any of the following?

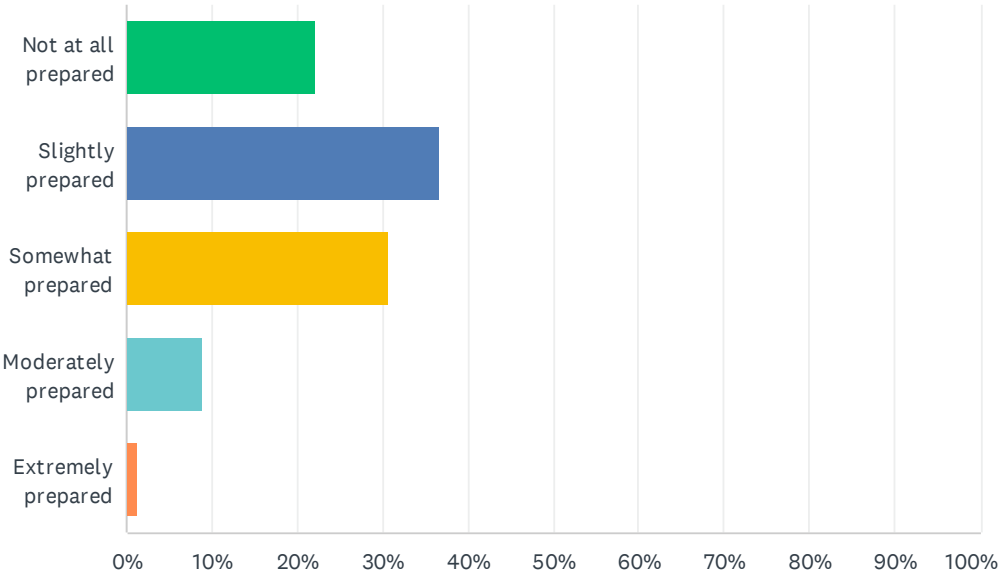
Answered: 894 Skipped: 215



ANSWER CHOICES	RESPONSES	
Neighbors	48.77%	436
Faith-based organizations	30.09%	269
Community organizations/centers	34.23%	306
Family/friends	85.01%	760
None	7.16%	64
Other (please specify)	3.13%	28
Total Respondents: 894		

Q15 How well prepared do you think your community is for a natural disaster?

Answered: 911 Skipped: 198



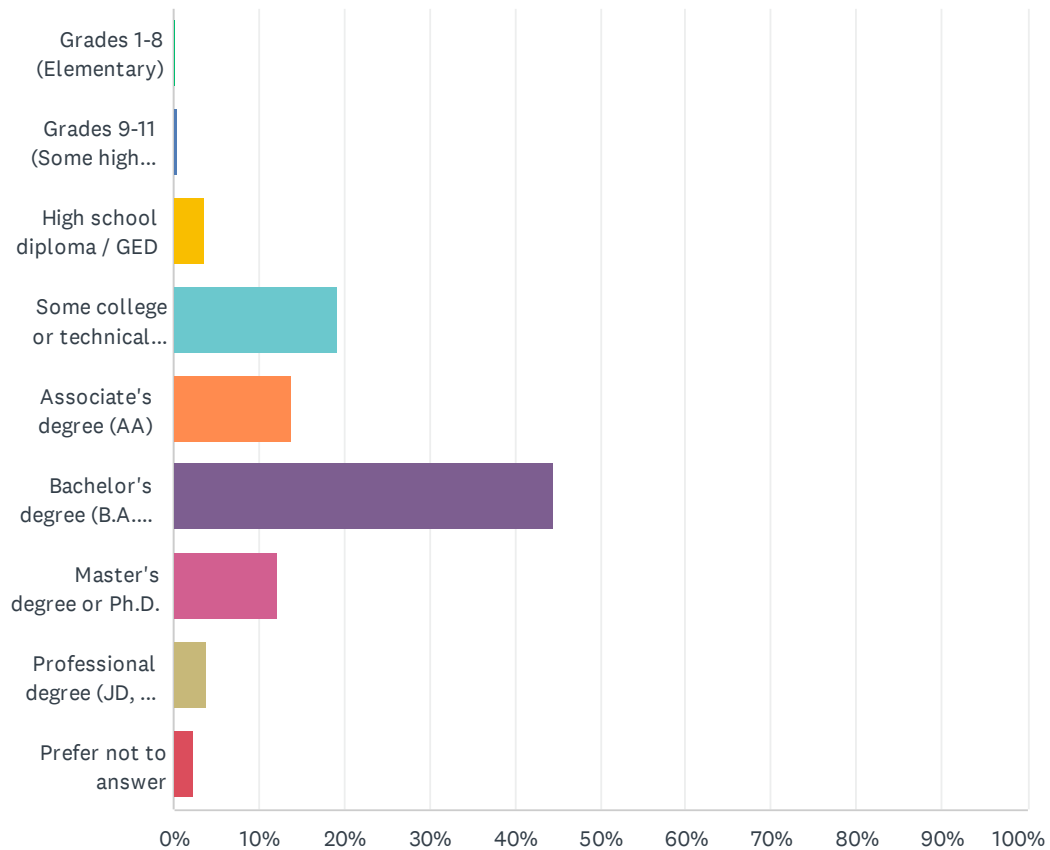
ANSWER CHOICES	RESPONSES	
Not at all prepared	22.17%	202
Slightly prepared	36.77%	335
Somewhat prepared	30.74%	280
Moderately prepared	9.00%	82
Extremely prepared	1.32%	12
TOTAL		911

Q16 Do you have any ideas or thoughts you would like to share about risk reduction, resiliency, or vulnerability to natural disasters? Please describe.

Answered: 279 Skipped: 830

Q17 What is the highest level of education you have attained?

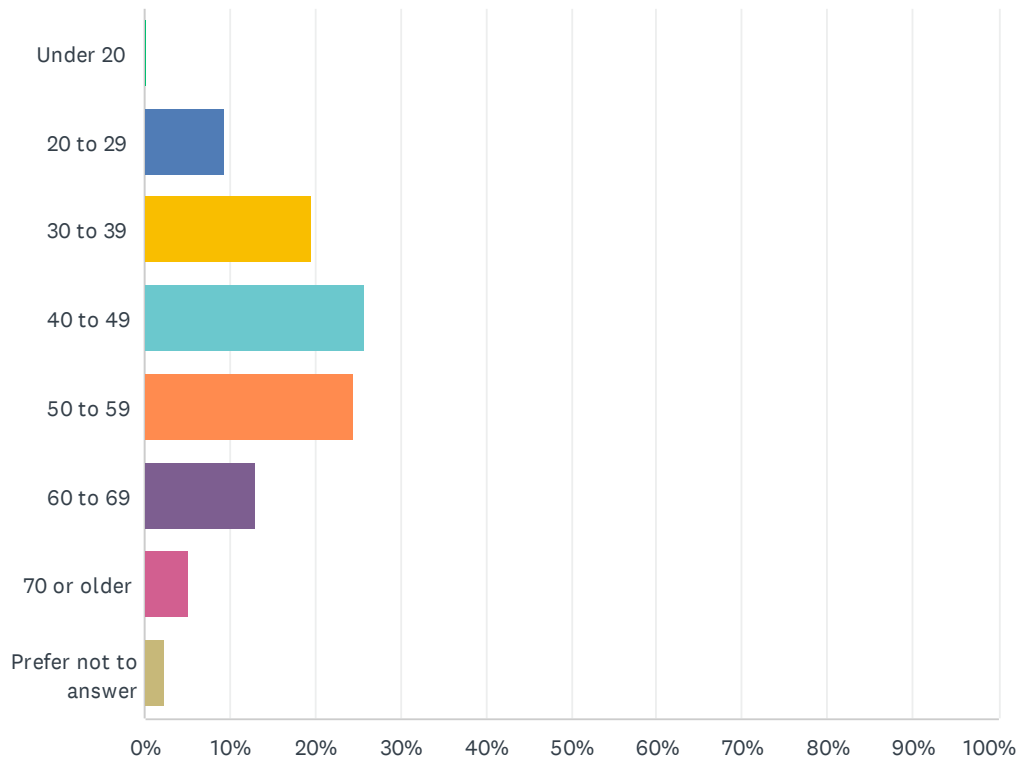
Answered: 893 Skipped: 216



ANSWER CHOICES	RESPONSES	
Grades 1-8 (Elementary)	0.22%	2
Grades 9-11 (Some high school)	0.34%	3
High school diploma / GED	3.58%	32
Some college or technical school	19.26%	172
Associate's degree (AA)	13.89%	124
Bachelor's degree (B.A. or B.S.)	44.46%	397
Master's degree or Ph.D.	12.21%	109
Professional degree (JD, MD, MBA)	3.81%	34
Prefer not to answer	2.24%	20
TOTAL		893

Q18 What is your age?

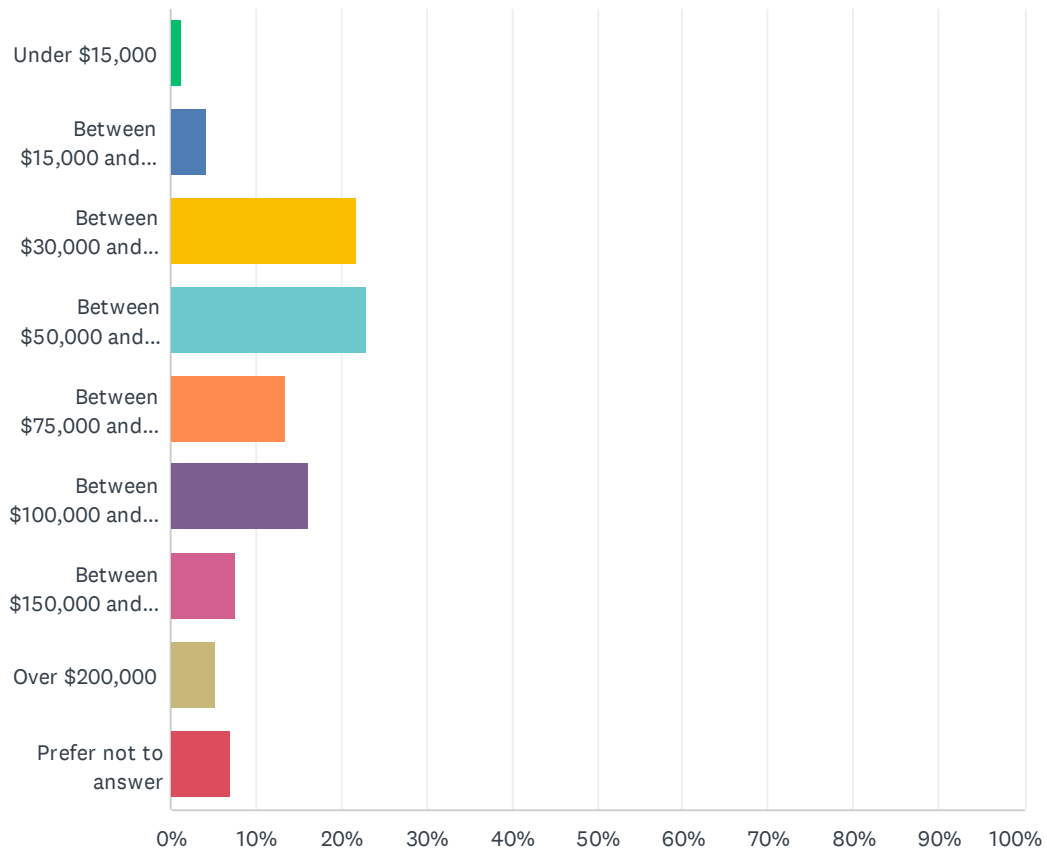
Answered: 893 Skipped: 216



ANSWER CHOICES	RESPONSES	
Under 20	0.22%	2
20 to 29	9.29%	83
30 to 39	19.71%	176
40 to 49	25.76%	230
50 to 59	24.52%	219
60 to 69	13.10%	117
70 or older	5.04%	45
Prefer not to answer	2.35%	21
TOTAL		893

Q19 What is your average annual household income? (Before taxes)

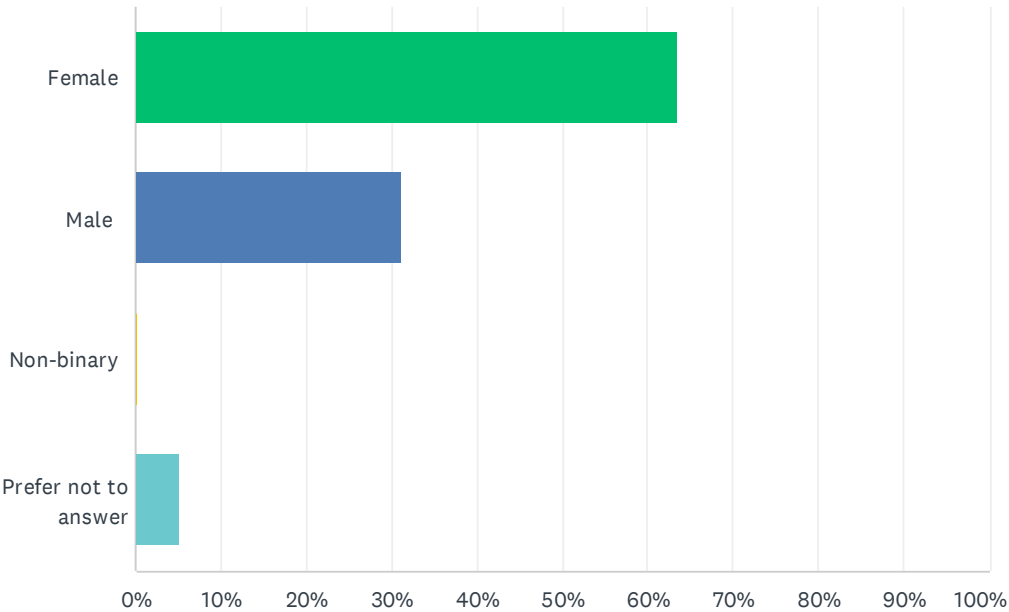
Answered: 897 Skipped: 212



ANSWER CHOICES	RESPONSES	
Under \$15,000	1.23%	11
Between \$15,000 and \$29,999	4.24%	38
Between \$30,000 and \$49,999	21.74%	195
Between \$50,000 and \$74,999	23.08%	207
Between \$75,000 and \$99,999	13.38%	120
Between \$100,000 and \$149,999	16.16%	145
Between \$150,000 and \$200,000	7.69%	69
Over \$200,000	5.35%	48
Prefer not to answer	7.13%	64
TOTAL		897

Q20 How would you describe your gender?

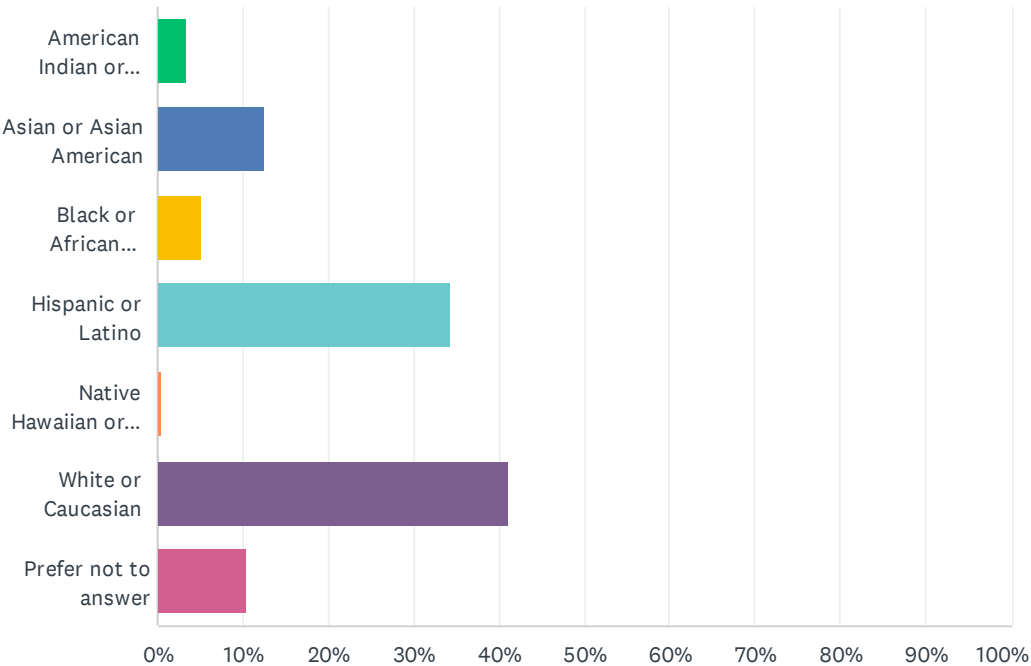
Answered: 894 Skipped: 215



ANSWER CHOICES	RESPONSES	
Female	63.53%	568
Male	31.10%	278
Non-binary	0.22%	2
Prefer not to answer	5.15%	46
TOTAL		894

Q21 How would you describe your race? You may select more than one.

Answered: 883 Skipped: 226

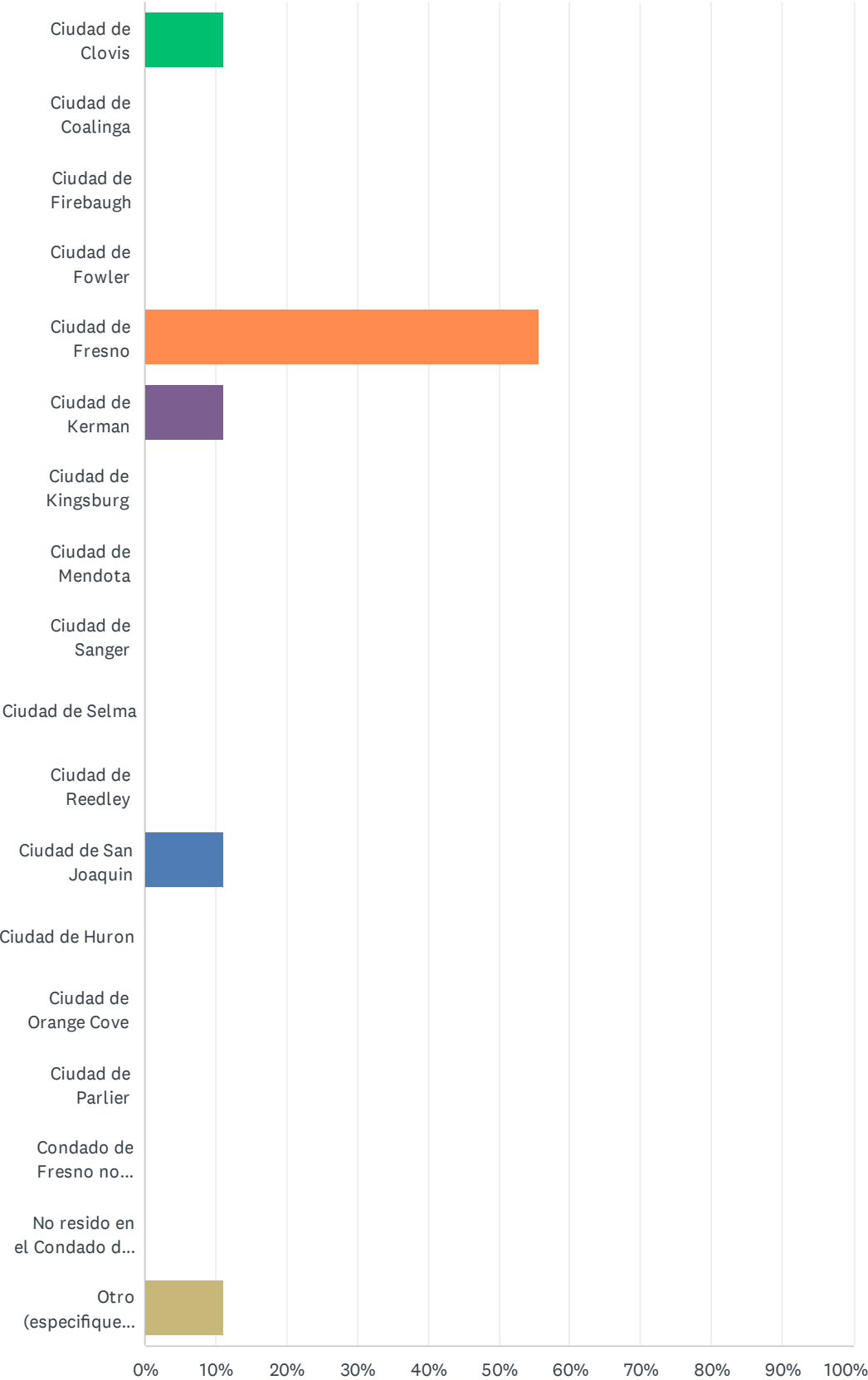


ANSWER CHOICES	RESPONSES	
American Indian or Alaska Native	3.40%	30
Asian or Asian American	12.68%	112
Black or African American	5.21%	46
Hispanic or Latino	34.43%	304
Native Hawaiian or other Pacific Islander	0.45%	4
White or Caucasian	41.11%	363
Prefer not to answer	10.53%	93
Total Respondents: 883		

Q22 ¿En qué comunidad usted vive actualmente?

Answered: 9 Skipped: 1,100

Fresno County Hazard Mitigation Plan - Public Opinion Survey

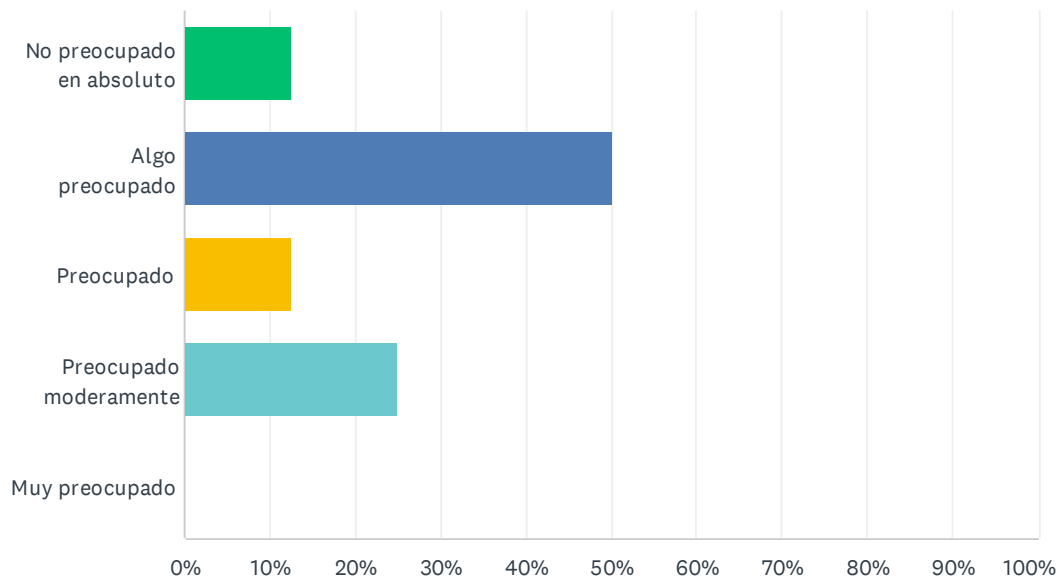


Fresno County Hazard Mitigation Plan - Public Opinion Survey

ANSWER CHOICES	RESPONSES	
Ciudad de Clovis	11.11%	1
Ciudad de Coalinga	0.00%	0
Ciudad de Firebaugh	0.00%	0
Ciudad de Fowler	0.00%	0
Ciudad de Fresno	55.56%	5
Ciudad de Kerman	11.11%	1
Ciudad de Kingsburg	0.00%	0
Ciudad de Mendota	0.00%	0
Ciudad de Sanger	0.00%	0
Ciudad de Selma	0.00%	0
Ciudad de Reedley	0.00%	0
Ciudad de San Joaquin	11.11%	1
Ciudad de Huron	0.00%	0
Ciudad de Orange Cove	0.00%	0
Ciudad de Parlier	0.00%	0
Condado de Fresno no incorporado	0.00%	0
No resido en el Condado de Fresno	0.00%	0
Otro (especifique, por favor)	11.11%	1
TOTAL		9

Q23 Peligros naturales son fenómenos naturales que podrían tener un impacto negativo en los humanos, otros animales, o el medioambiente (la inundación, el incendio, la sequía, o el terremoto). ¿En términos generales, cuán preocupado(a) está usted acerca del condado de Fresno se está afectado por un peligro natural?

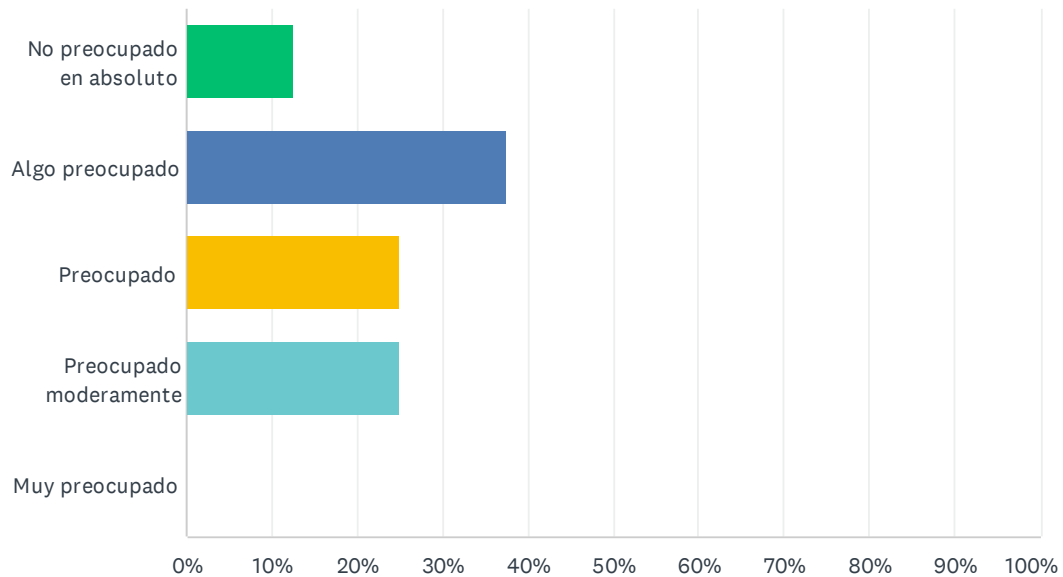
Answered: 8 Skipped: 1,101



ANSWER CHOICES	RESPONSES	
No preocupado en absoluto	12.50%	1
Algo preocupado	50.00%	4
Preocupado	12.50%	1
Preocupado moderadamente	25.00%	2
Muy preocupado	0.00%	0
TOTAL		8

Q24 ¿Cuán preocupado(a) está usted acerca de los impactos de los peligros naturales debido al cambio climático del condado de Fresno?

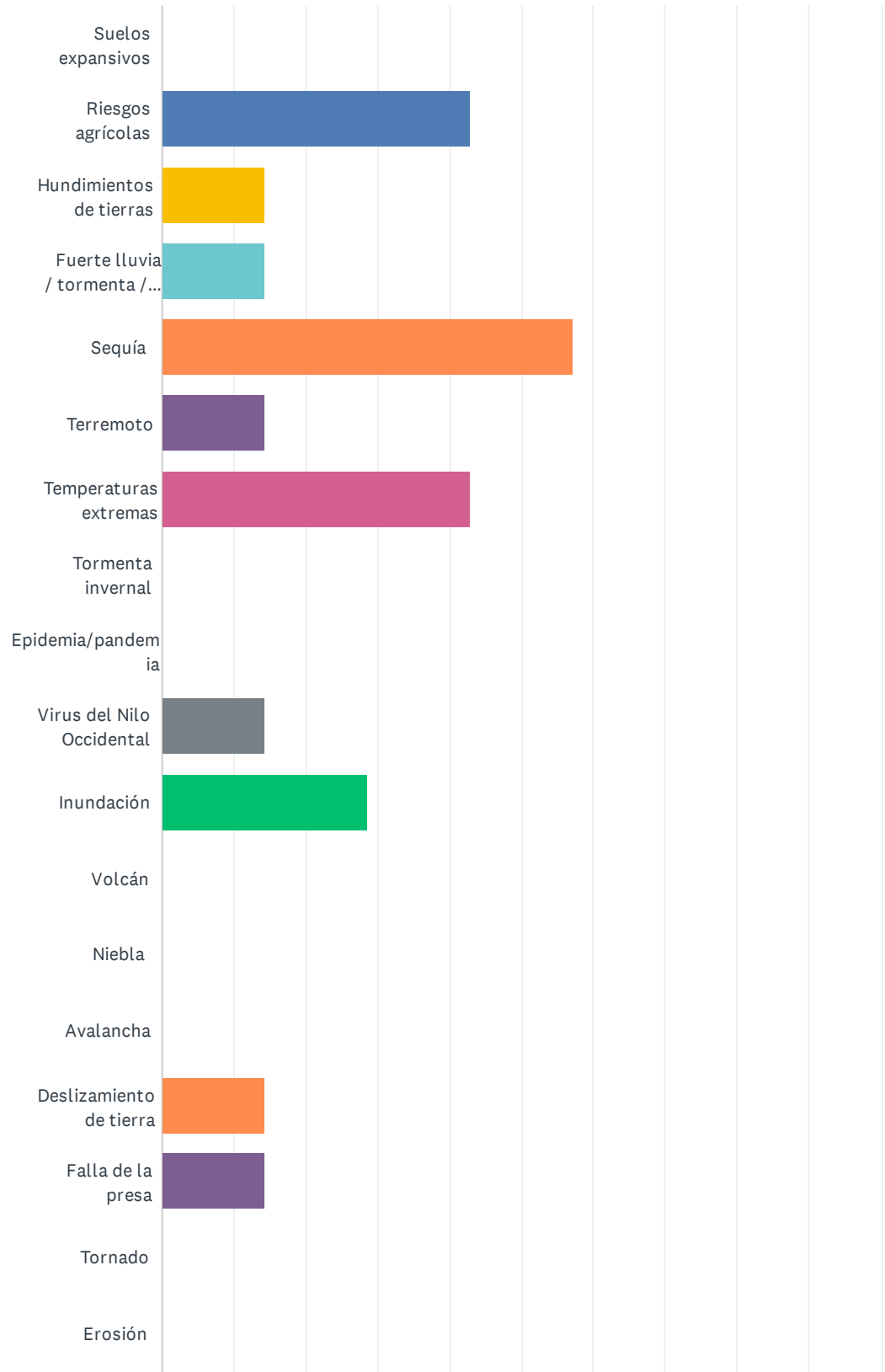
Answered: 8 Skipped: 1,101



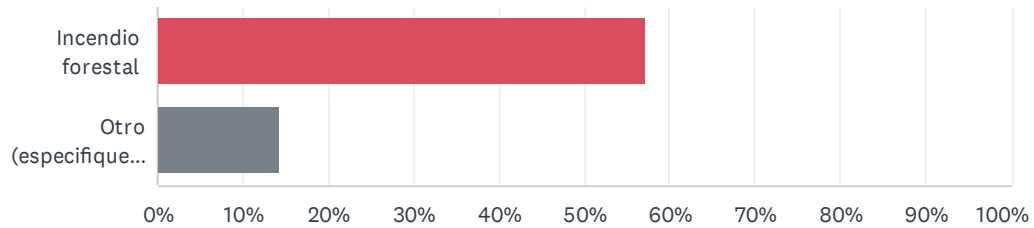
ANSWER CHOICES	RESPONSES	
No preocupado en absoluto	12.50%	1
Algo preocupado	37.50%	3
Preocupado	25.00%	2
Preocupado moderadamente	25.00%	2
Muy preocupado	0.00%	0
TOTAL		8

Q25 Seleccione los tres (3) primeros peligros naturales que considera que representan la amenaza mejor al condado de Fresno. Seleccione sólo 3.

Answered: 7 Skipped: 1,102



Fresno County Hazard Mitigation Plan - Public Opinion Survey

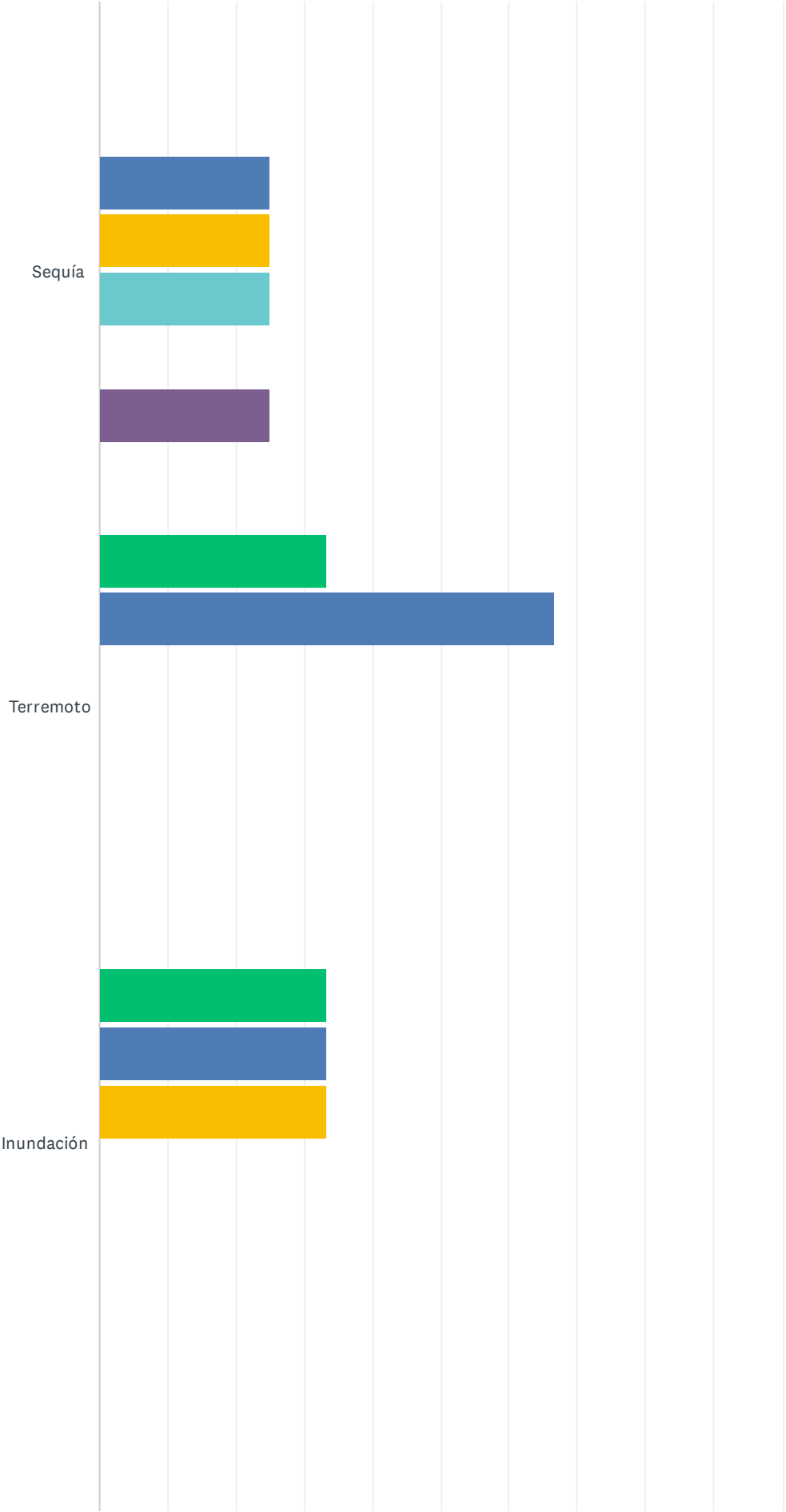


ANSWER CHOICES	RESPONSES	
Suelos expansivos	0.00%	0
Riesgos agrícolas	42.86%	3
Hundimientos de tierras	14.29%	1
Fuerte lluvia / tormenta / granizo / rayo / viento	14.29%	1
Sequía	57.14%	4
Terremoto	14.29%	1
Temperaturas extremas	42.86%	3
Tormenta invernal	0.00%	0
Epidemia/pandemia	0.00%	0
Virus del Nilo Occidental	14.29%	1
Inundación	28.57%	2
Volcán	0.00%	0
Niebla	0.00%	0
Avalancha	0.00%	0
Deslizamiento de tierra	14.29%	1
Falla de la presa	14.29%	1
Tornado	0.00%	0
Erosión	0.00%	0
Incendio forestal	57.14%	4
Otro (especifique, por favor)	14.29%	1
Total Respondents: 7		

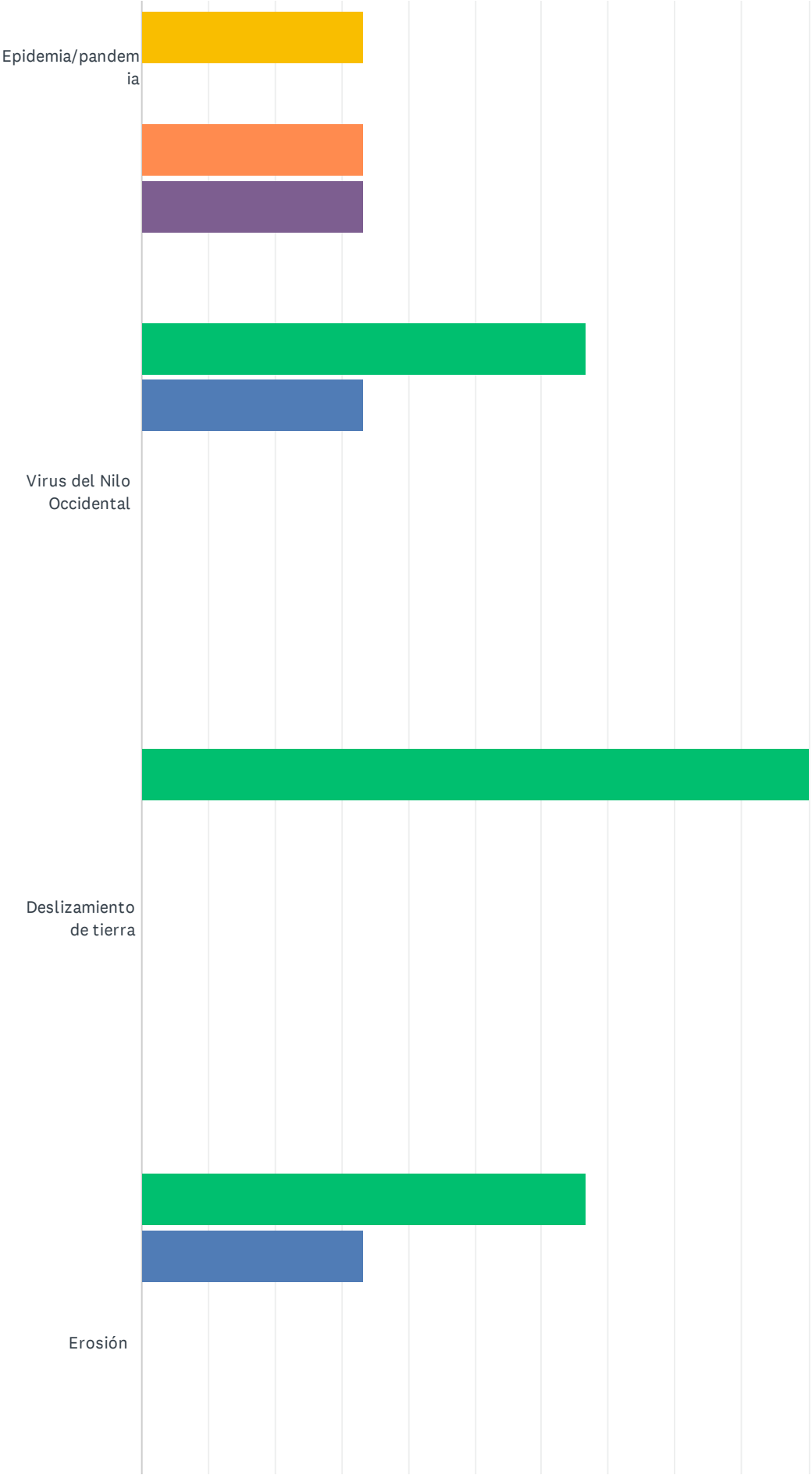
Q26 ¿Cuántas veces puede recordar en que los siguientes riesgos causaron daño, pusieron en peligro la vida de personas, o causaron daños a propiedades en su casa o en su comunidad?

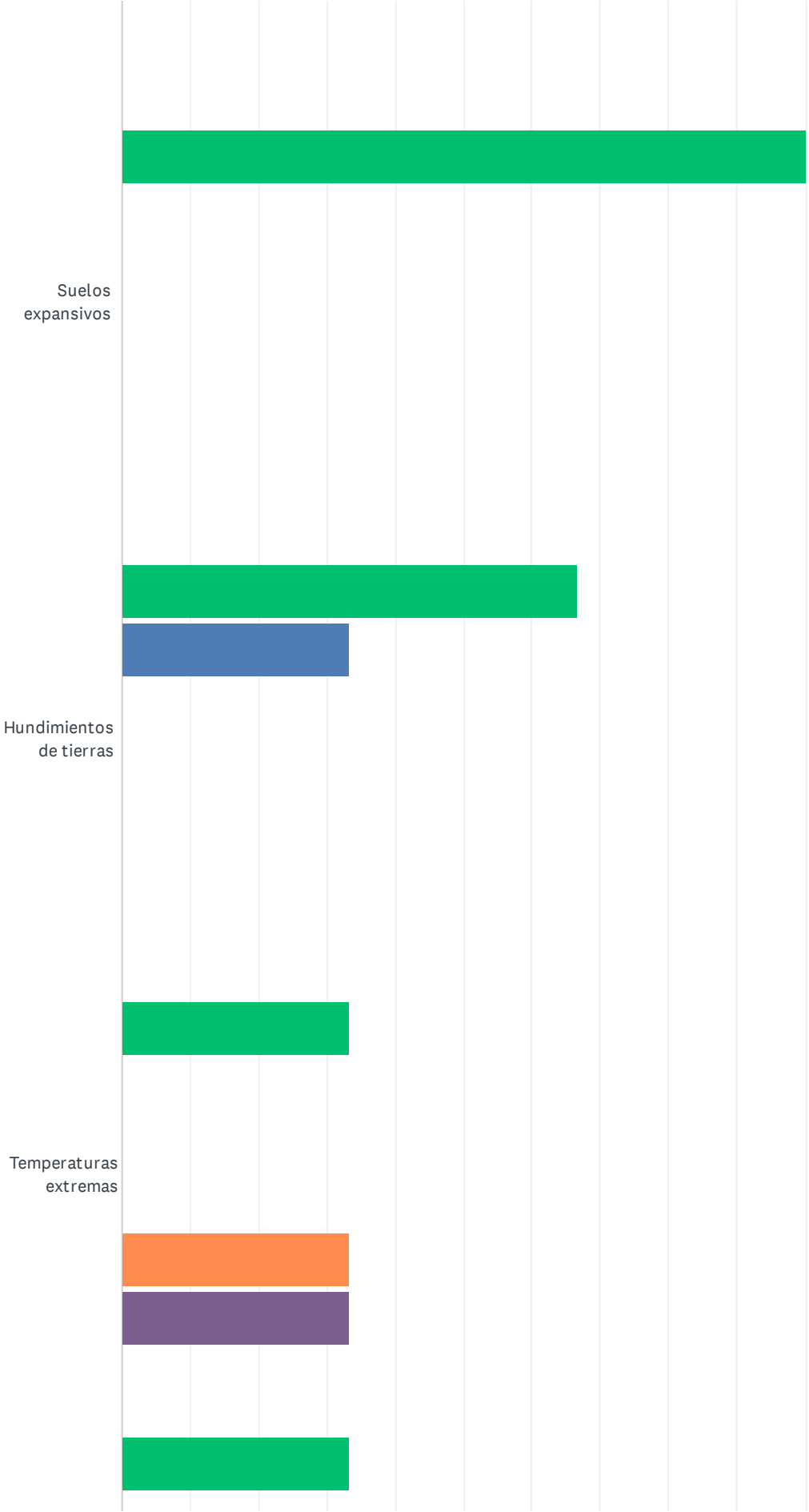
Answered: 4 Skipped: 1,105

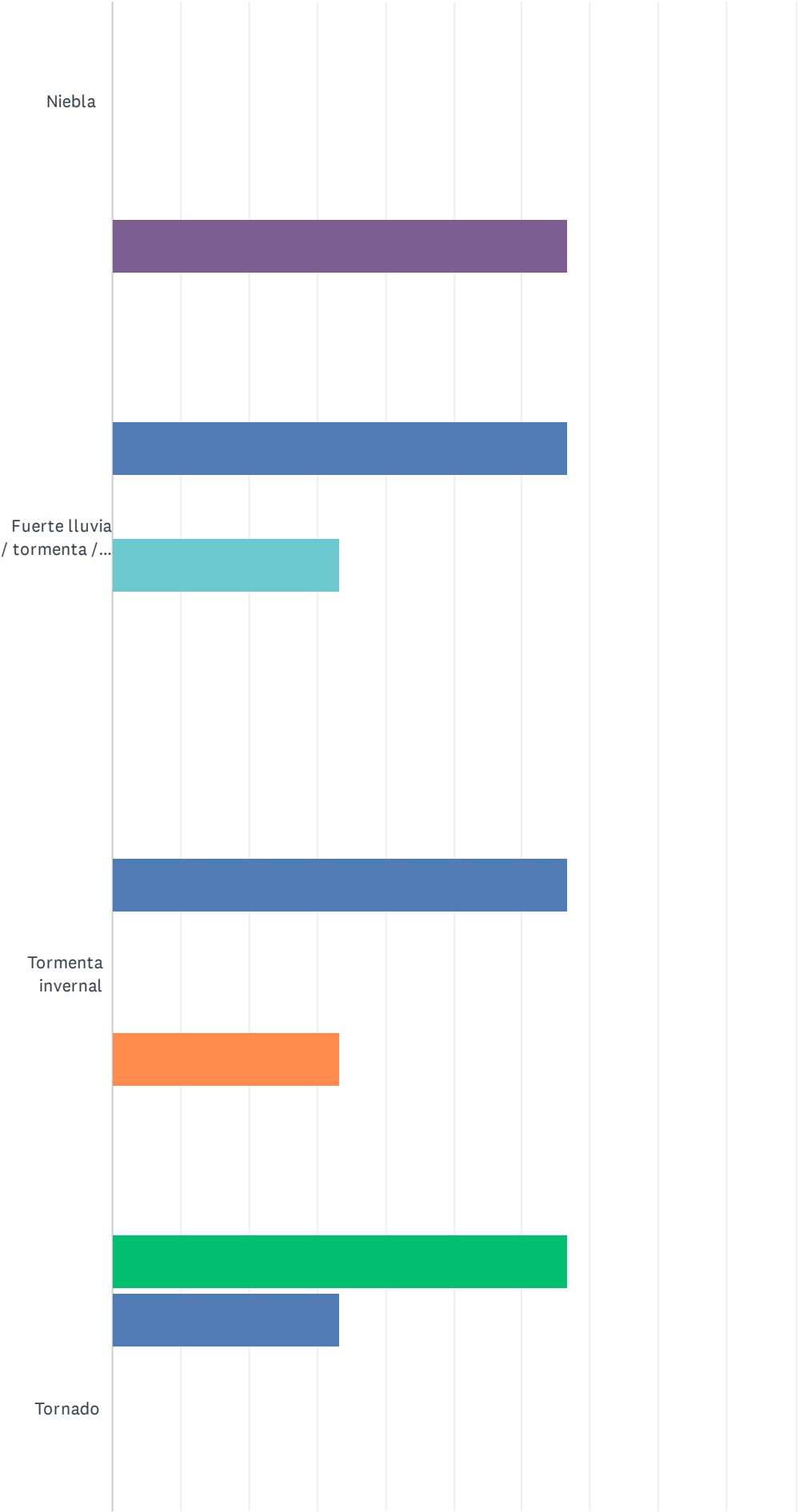




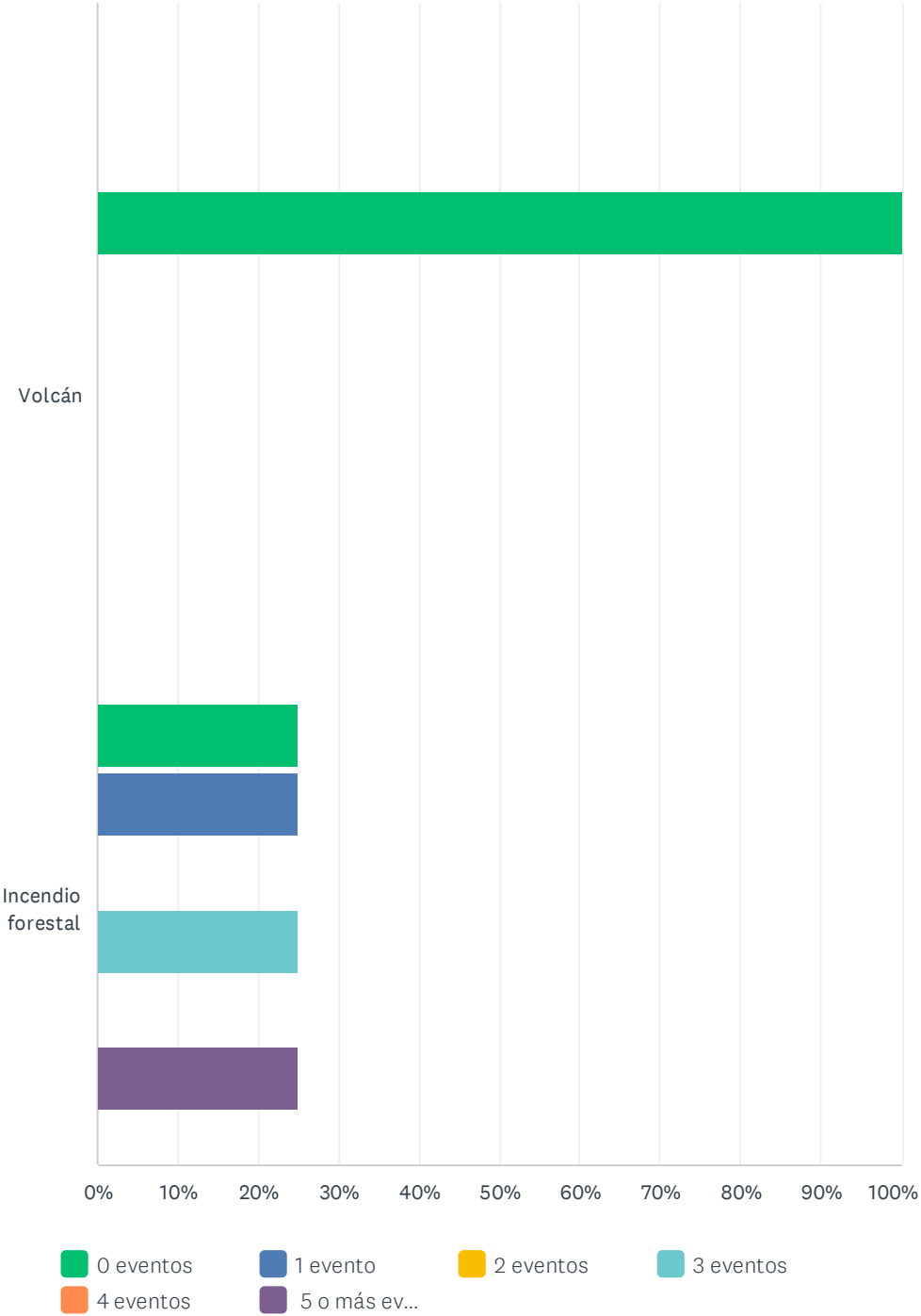
Fresno County Hazard Mitigation Plan - Public Opinion Survey







Fresno County Hazard Mitigation Plan - Public Opinion Survey

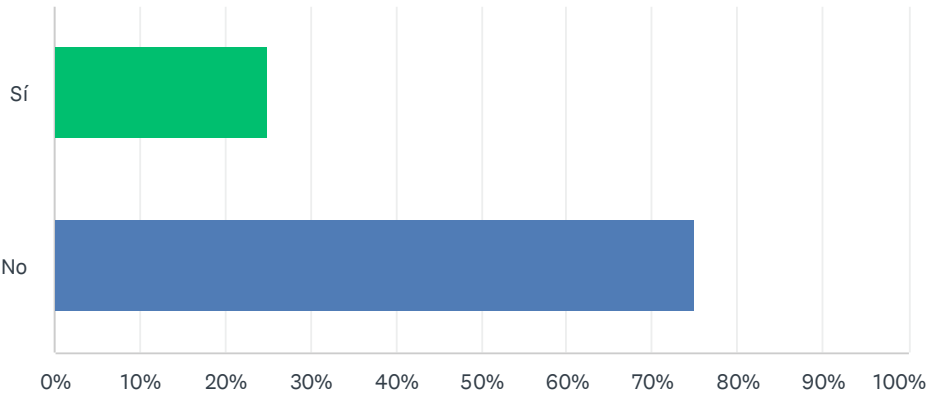


Fresno County Hazard Mitigation Plan - Public Opinion Survey

	0 EVENTOS	1 EVENTO	2 EVENTOS	3 EVENTOS	4 EVENTOS	5 O MÁS EVENTOS	TOTAL	WEIGHTED AVERAGE
Riesgos agrícolas	33.33% 1	33.33% 1	33.33% 1	0.00% 0	0.00% 0	0.00% 0	3	2.00
Avalancha	100.00% 3	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.00
Falla de la presa	100.00% 3	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.00
Sequía	0.00% 0	25.00% 1	25.00% 1	25.00% 1	0.00% 0	25.00% 1	4	3.75
Terremoto	33.33% 1	66.67% 2	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.67
Inundación	33.33% 1	33.33% 1	33.33% 1	0.00% 0	0.00% 0	0.00% 0	3	2.00
Epidemia/pandemia	0.00% 0	0.00% 0	33.33% 1	0.00% 0	33.33% 1	33.33% 1	3	4.67
Virus del Nilo Occidental	66.67% 2	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.33
Deslizamiento de tierra	100.00% 3	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.00
Erosión	66.67% 2	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.33
Suelos expansivos	100.00% 3	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.00
Hundimientos de tierras	66.67% 2	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.33
Temperaturas extremas	33.33% 1	0.00% 0	0.00% 0	0.00% 0	33.33% 1	33.33% 1	3	4.00
Niebla	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	66.67% 2	3	4.33
Fuerte lluvia / tormenta / granizo / rayo / viento	0.00% 0	66.67% 2	0.00% 0	33.33% 1	0.00% 0	0.00% 0	3	2.67
Tormenta invernal	0.00% 0	66.67% 2	0.00% 0	0.00% 0	33.33% 1	0.00% 0	3	3.00
Tornado	66.67% 2	33.33% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.33
Volcán	100.00% 3	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	3	1.00
Incendio forestal	25.00% 1	25.00% 1	0.00% 0	25.00% 1	0.00% 0	25.00% 1	4	3.25

Q27 ¿Ha tomado cualquier acción para hacer su casa, el negocio, o la comunidad más resistente a peligros?

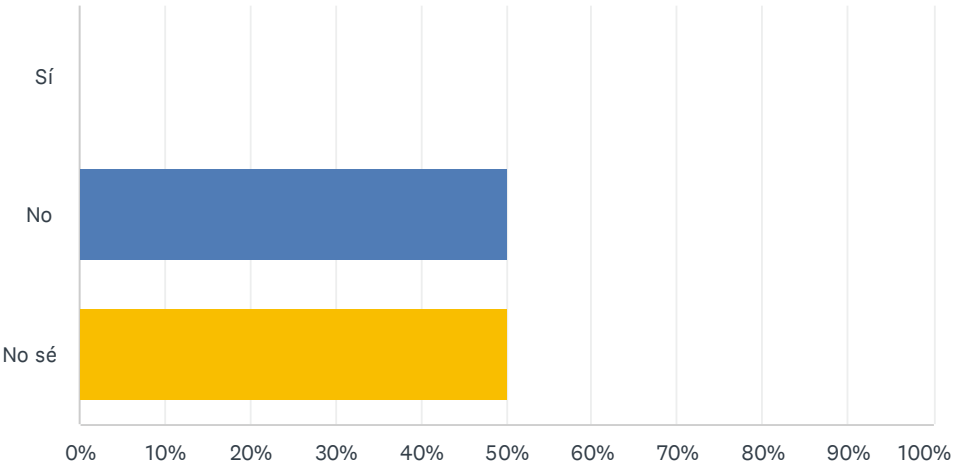
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Sí	25.00%	1
No	75.00%	3
TOTAL		4

Q28 ¿Si recibió incentivos como los descuentos de seguro, descuentos de los impuestos sobre la propiedad, o préstamos con bajo interés, estaría motivado a tomar medidas adicionales para proteger su casa o negocio de los desastres naturales?

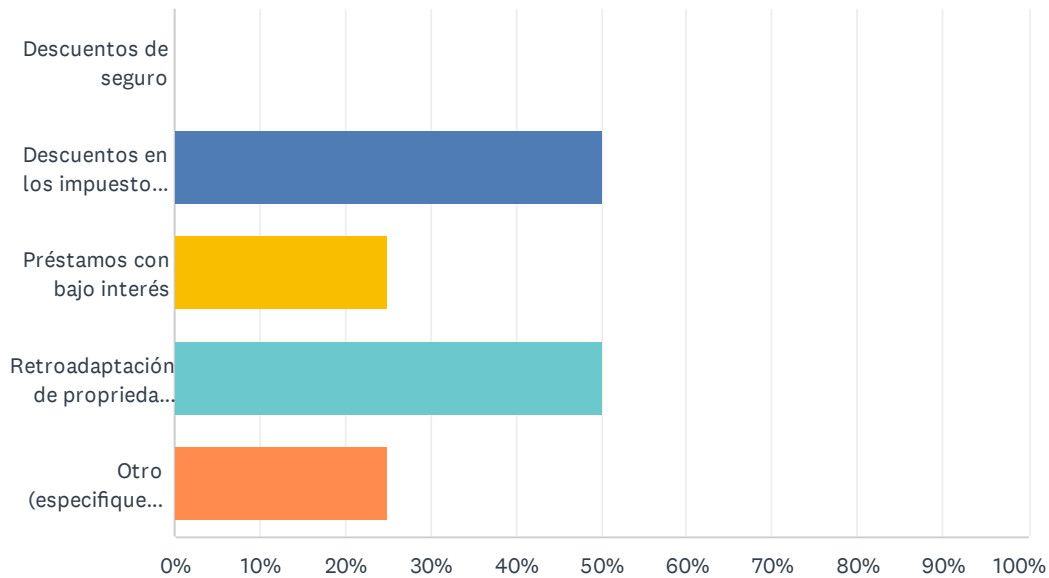
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Sí	0.00%	0
No	50.00%	2
No sé	50.00%	2
TOTAL		4

Q29 ¿Qué tipo de incentivos a usted le gustaría que se ofrezcan?

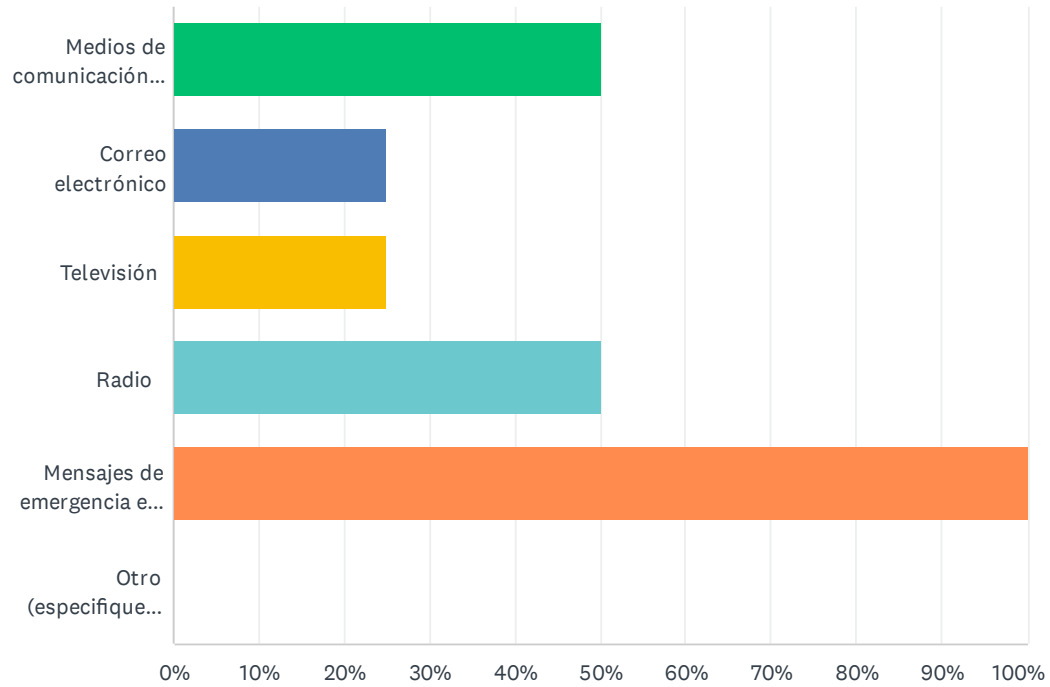
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Descuentos de seguro	0.00%	0
Descuentos en los impuestos sobre la propiedad	50.00%	2
Préstamos con bajo interés	25.00%	1
Retroadaptación de propiedad o los proyectos en los que una porción del coste es suministrada por la ciudad, en condado, o financiación en forma de subvenciones	50.00%	2
Otro (especifique, por favor)	25.00%	1
Total Respondents: 4		

Q30 ¿Cómo recibe los avisos sobre fenómenos meteorológicos intensos? Por favor, marque todo lo que corresponda.

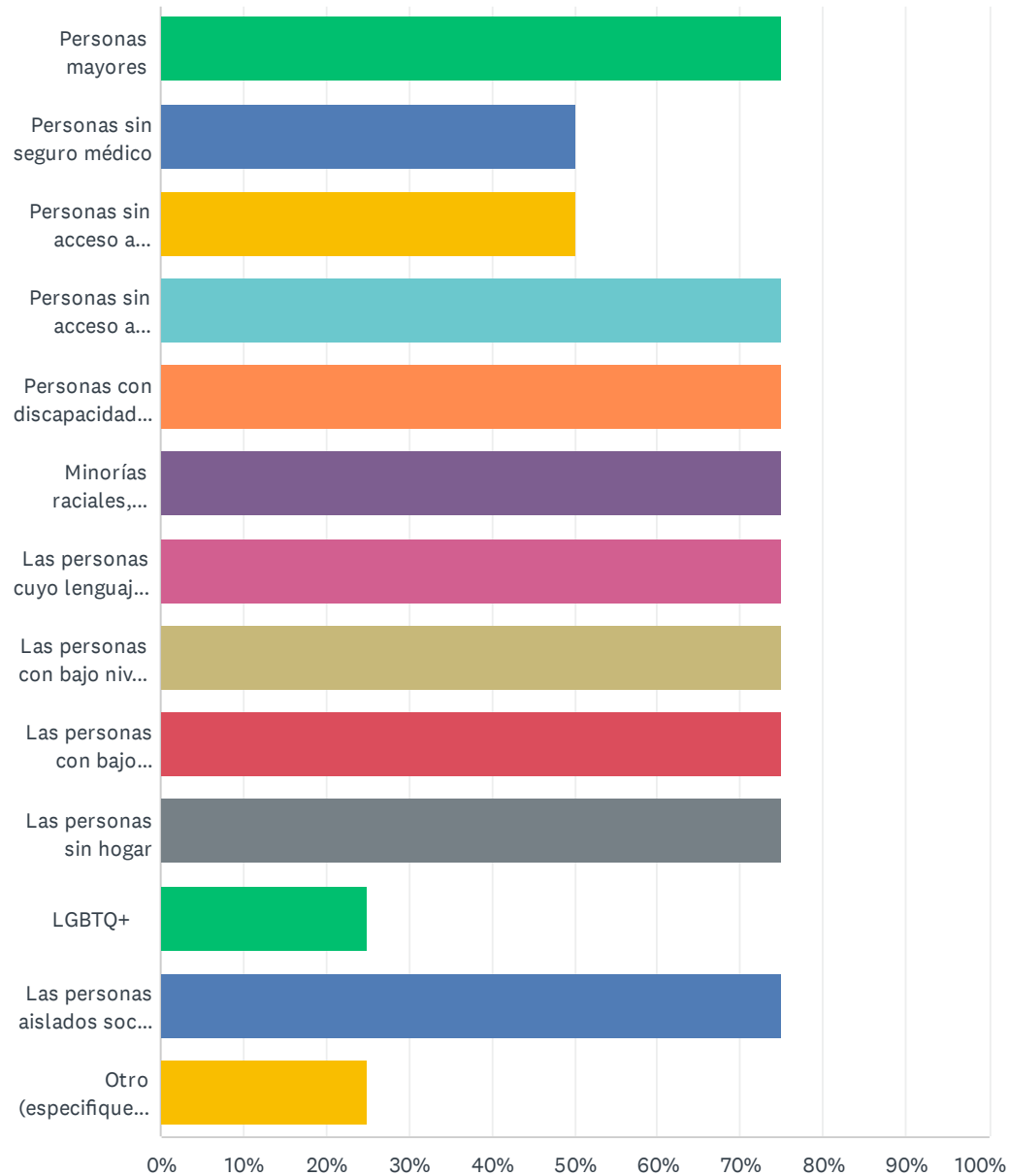
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Medios de comunicación social (Facebook, Twitter)	50.00%	2
Correo electrónico	25.00%	1
Televisión	25.00%	1
Radio	50.00%	2
Mensajes de emergencia en teléfono móvil	100.00%	4
Otro (especifique, por favor)	0.00%	0
Total Respondents: 4		

Q31 ¿Cree que alguna de las poblaciones a seguir está en mayor riesgo de los riesgos mencionados?

Answered: 4 Skipped: 1,105

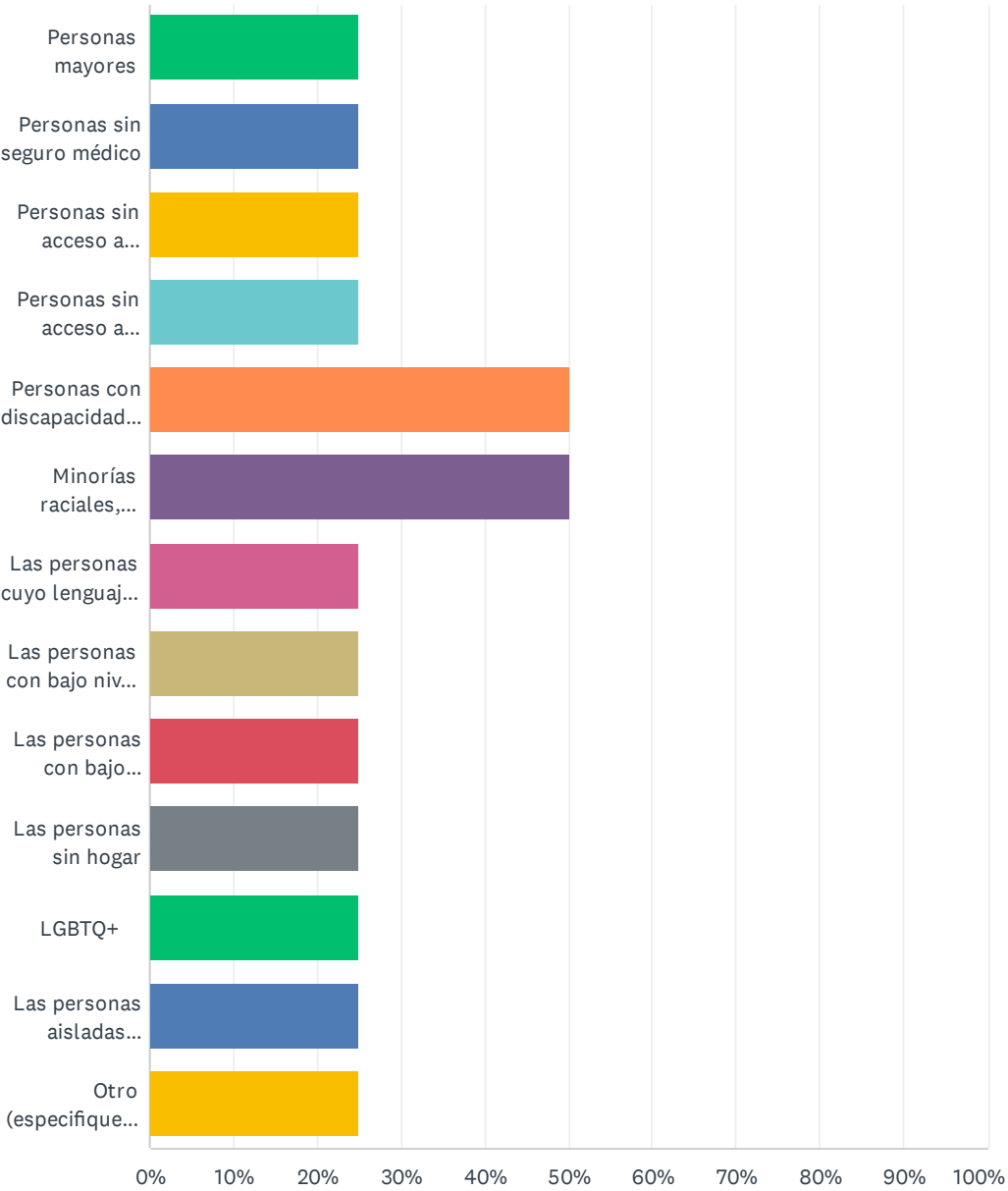


Fresno County Hazard Mitigation Plan - Public Opinion Survey

ANSWER CHOICES	RESPONSES	
Personas mayores	75.00%	3
Personas sin seguro médico	50.00%	2
Personas sin acceso a transportación	50.00%	2
Personas sin acceso a tecnología o con limitado rendimiento en la tecnología	75.00%	3
Personas con discapacidad o necesidades funcionales	75.00%	3
Minorías raciales, étnicas, o religiosas	75.00%	3
Las personas cuyo lenguaje primario no es el inglés	75.00%	3
Las personas con bajo nivel de la alfabetización	75.00%	3
Las personas con bajo ingresos	75.00%	3
Las personas sin hogar	75.00%	3
LGBTQ+	25.00%	1
Las personas aislados social y físicamente	75.00%	3
Otro (especifique, por favor)	25.00%	1
Total Respondents: 4		

Q32 ¿Se puede describirle como miembro de alguna de las siguientes poblaciones vulnerables?

Answered: 4 Skipped: 1,105



Fresno County Hazard Mitigation Plan - Public Opinion Survey

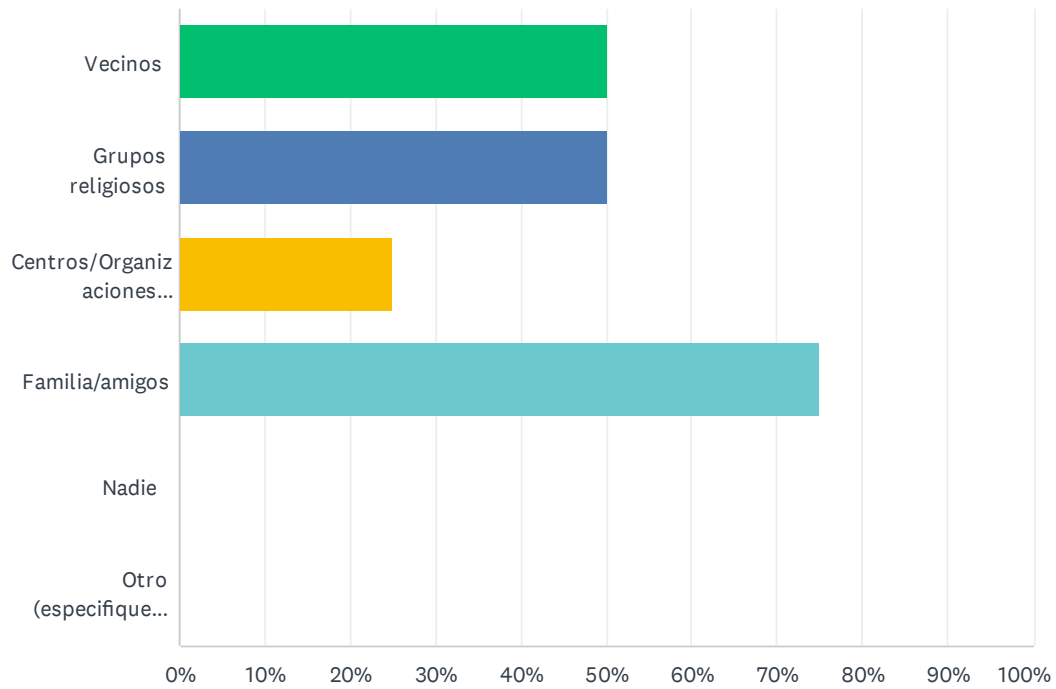
ANSWER CHOICES	RESPONSES	
Personas mayores	25.00%	1
Personas sin seguro médico	25.00%	1
Personas sin acceso a transportación	25.00%	1
Personas sin acceso a tecnología o con limitado rendimiento en la tecnología	25.00%	1
Personas con discapacidad o necesidades funcionales	50.00%	2
Minorías raciales, étnicas, o religiosas	50.00%	2
Las personas cuyo lenguaje primario no es el inglés	25.00%	1
Las personas con bajo nivel de la alfabetización	25.00%	1
Las personas con bajo ingresos	25.00%	1
Las personas sin hogar	25.00%	1
LGBTQ+	25.00%	1
Las personas aisladas socialmente y físicamente	25.00%	1
Otro (especifique, por favor)	25.00%	1
Total Respondents: 4		

Q33 ¿Puede el condado de Fresno proporcionar apoyo adicional a las poblaciones vulnerables para que ellos están mejor preparados para los riesgos? ¿En caso afirmativo, cómo?

Answered: 2 Skipped: 1,107

Q34 ¿En caso de urgencia, se hubiera sentido apoyado por alguna de los grupos siguientes?

Answered: 4 Skipped: 1,105



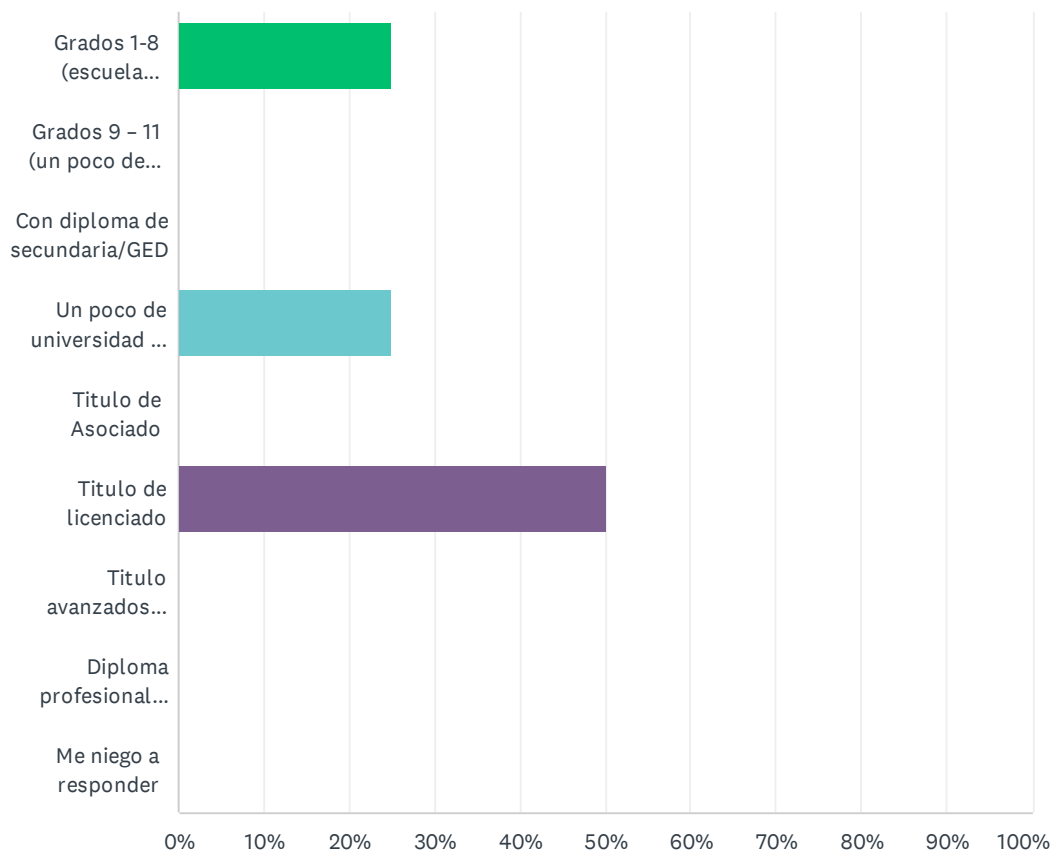
ANSWER CHOICES	RESPONSES	
Vecinos	50.00%	2
Grupos religiosos	50.00%	2
Centros/Organizaciones comunitarias	25.00%	1
Familia/amigos	75.00%	3
Nadie	0.00%	0
Otro (especifique, por favor)	0.00%	0
Total Respondents: 4		

Q35 ¿Tiene cualquier ideas o pensamientos que quería compartir sobre la reducción de riesgos, la resiliencia, o la vulnerabilidad a los desastres naturales? Por favor, describa.

Answered: 2 Skipped: 1,107

Q36 ¿Cuál es el nivel de educación más alto que usted ha completado?

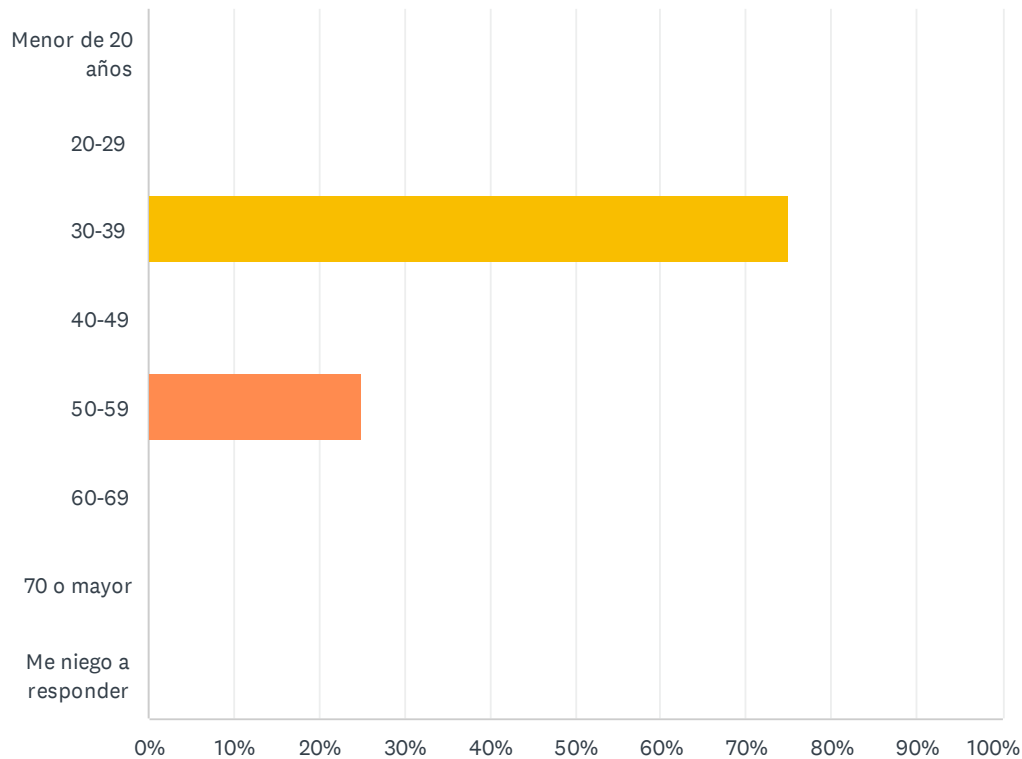
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Grados 1-8 (escuela primaria)	25.00%	1
Grados 9 – 11 (un poco de secundaria)	0.00%	0
Con diploma de secundaria/GED	0.00%	0
Un poco de universidad o escuela técnica	25.00%	1
Título de Asociado	0.00%	0
Título de licenciado	50.00%	2
Título avanzados (Doctorados, etc.)	0.00%	0
Diploma profesional (Licenciado en derecho, título médico, MBA)	0.00%	0
Me niego a responder	0.00%	0
TOTAL		4

Q37 Por favor, indique su grupo de edad.

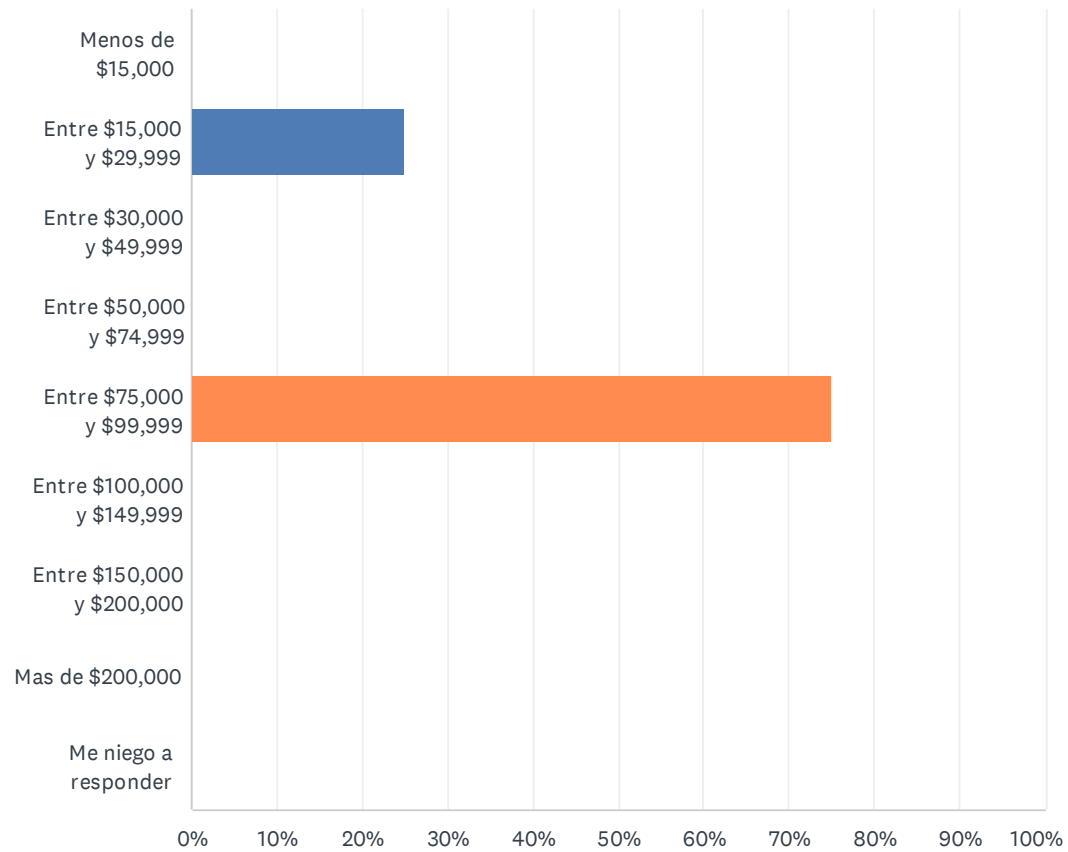
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Menor de 20 años	0.00%	0
20-29	0.00%	0
30-39	75.00%	3
40-49	0.00%	0
50-59	25.00%	1
60-69	0.00%	0
70 o mayor	0.00%	0
Me niego a responder	0.00%	0
TOTAL		4

Q38 ¿Cuál es su ingreso familiar anual (bruto)?

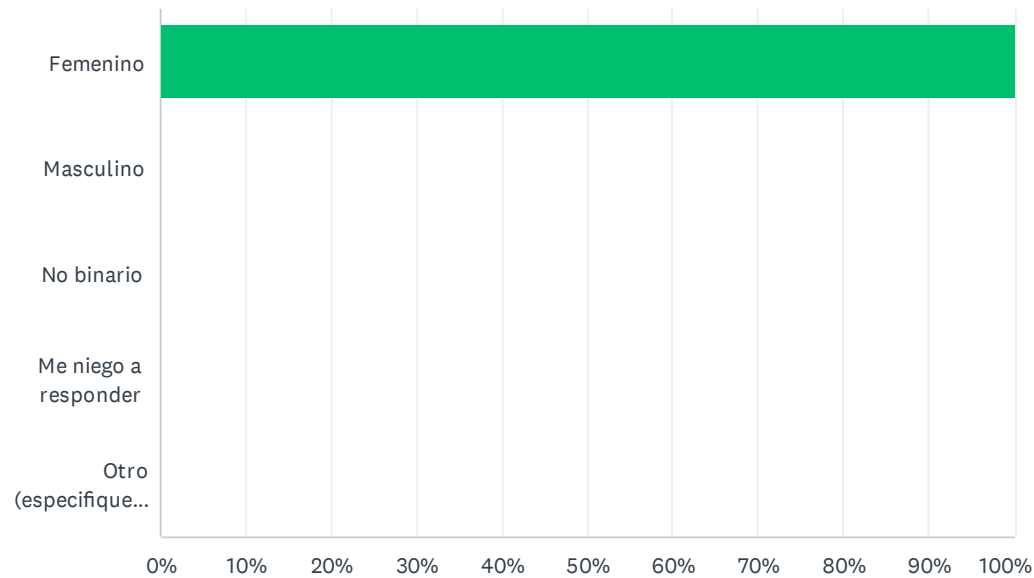
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Menos de \$15,000	0.00%	0
Entre \$15,000 y \$29,999	25.00%	1
Entre \$30,000 y \$49,999	0.00%	0
Entre \$50,000 y \$74,999	0.00%	0
Entre \$75,000 y \$99,999	75.00%	3
Entre \$100,000 y \$149,999	0.00%	0
Entre \$150,000 y \$200,000	0.00%	0
Mas de \$200,000	0.00%	0
Me niego a responder	0.00%	0
TOTAL		4

Q39 ¿Cómo describe su género?

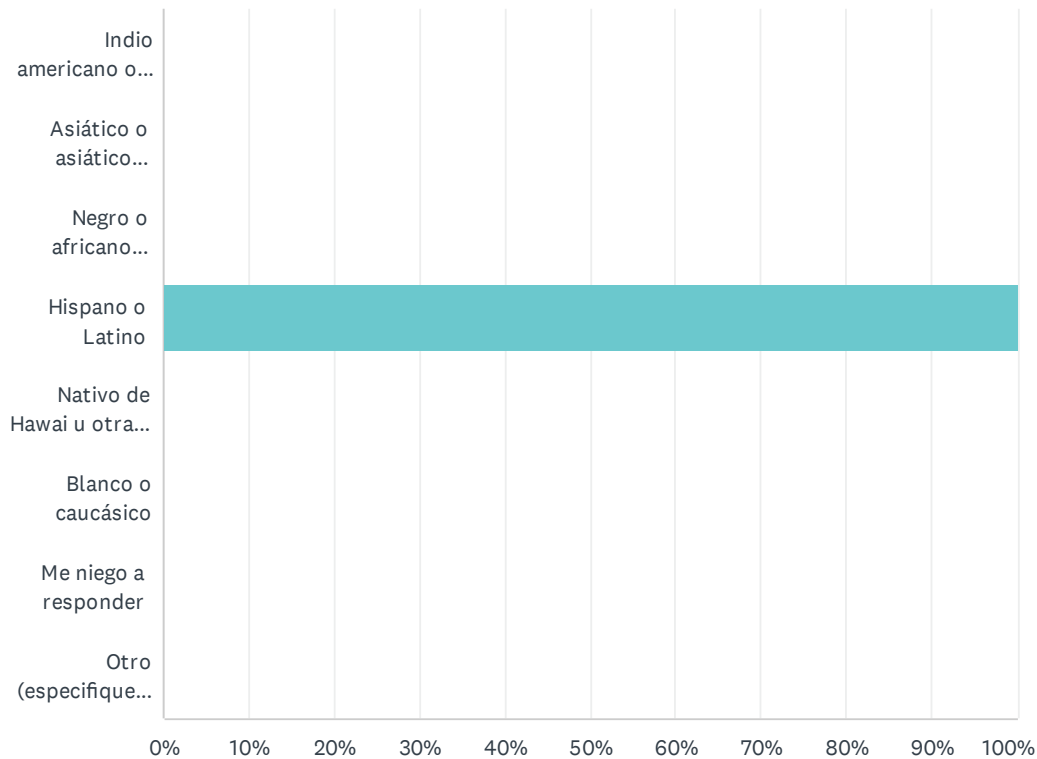
Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Femenino	100.00%	4
Masculino	0.00%	0
No binario	0.00%	0
Me niego a responder	0.00%	0
Otro (especifique, por favor)	0.00%	0
TOTAL		4

Q40 ¿Cómo describe su raza? Por favor, marque todo lo que corresponda.

Answered: 4 Skipped: 1,105



ANSWER CHOICES	RESPONSES	
Indio americano o nativo de Alaska	0.00%	0
Asiático o asiático americano	0.00%	0
Negro o africano americano	0.00%	0
Hispano o Latino	100.00%	4
Nativo de Hawai u otras Islas del Pacífico	0.00%	0
Blanco o caucásico	0.00%	0
Me niego a responder	0.00%	0
Otro (especifique, por favor)	0.00%	0
Total Respondents: 4		

9b – Public Survey – Fox 26 News Appearance:

<https://kmpfh.com/great-day/fresno-county-hazard-mitigation-plan-survey>

Fresno County Hazard Mitigation Plan Survey

by Stephen Hawkins | Tue, January 23rd 2024 at 11:30 AM



Emergency Manager for the Fresno County Office of Emergency Services, Terri Mejorado, visited Great Day to encourage our viewers to complete a survey that will help the county create a new Hazard Mitigation Plan.



FRESNO, Calif. (FOX26) — Emergency Manager for the Fresno County Office of Emergency Services, Terri Mejorado, visited Great Day to encourage our viewers to complete a survey that will help the county create a new Hazard Mitigation Plan.

MEDIA RELEASE

PAUL NERLAND | COUNTY ADMINISTRATIVE OFFICER



SONJA DOSTI | PUBLIC INFORMATION OFFICER

PHONE: 559 | 600-1224

EMAIL: sdosti@fresnocountyca.gov

JANUARY 10, 2024

THE COUNTY OF FRESNO SEEKS COMMUNITY INPUT AS IT UPDATES ITS HAZARD MITIGATION PLAN

FRESNO, CA – Fresno County is in the process of updating its Hazard Mitigation Plan which assesses the risks the County faces from a variety of hazards and identifies the ways to reduce them.

Community input is a key component in the development of a robust Hazard Mitigation Plan. The survey will ask residents how disasters have affected them.

The survey link enables residents to read and answer the questions in English or Spanish and to inform the County what they would like to see in the updated plan.

The deadline to complete the survey is January 30, 2024. The survey link (in both English and Spanish): <https://www.surveymonkey.com/r/L9FCVKK>

To schedule media interviews with Emergency Manager Terri Mejorado, please contact the Public Health Media team at 559-974-2302 or publichealthmedia@fresnocountyca.gov.

COMMUNITY INPUT NEEDED!



HAZARD MITIGATION PLAN SURVEY

Community input is needed as Fresno County updates its Hazard Mitigation Plan. The survey will ask residents how disasters have affected them and what they would like to see in the updated plan.

The deadline to complete the survey is 1/30/24.

Use the link below or scan QR code to access
survey in English or Spanish:
<https://www.surveymonkey.com/r/L9FCVKK>



Se necesita comentario público



Encuesta de Mitigación de riesgos

Se necesita la opinión de la comunidad porque el Condado de Fresno está actualizando su Plan de Mitigación de Riesgos. La encuesta preguntará a los residentes cómo los han afectado los desastres y qué les gustaría ver en el plan actualizado.

La fecha límite para completar la encuesta es el 30/01/24

**Utilice el enlace a continuación o escanee el
código QR para acceder a la encuesta:**

<https://www.surveymonkey.com/r/L9FCVKK>



Subject: [EXTERNAL] FW: Fresno County Community Meeting - RECAP 1/18
Date: Thursday, January 25, 2024 at 8:12:17 PM Eastern Standard Time
From: Mejorado, Terri
To: Norris, Katie

A recap to a presentation I gave last week, its towards the bottom.

From: Cynthia Kanagui <cynthia@tcmfresno.org>
Sent: Thursday, January 25, 2024 3:17 PM
To: Pete Lugo <pete@tcmfresno.org>
Subject: Fwd: Fresno County Community Meeting - RECAP 1/18

CAUTION!!! - EXTERNAL EMAIL - THINK BEFORE YOU CLICK

Hi all!

Thanks again for joining us last week! Here is our RECAP in case you aren't currently subscribed to our listserv. If you'd like to be added, reply to this email and we can make sure to add you!

----- Forwarded message -----

From: **Mike Espinoza, TCM** <mike@tcmfresno.org>
Date: Thu, Jan 25, 2024 at 3:13 PM
Subject: Fresno County Community Meeting - RECAP 1/18
To: Cynthia <cynthia@tcmfresno.org>

[View this email in your browser](#)

RECAP: 1/18 Meeting Highlights & Resources

*[*Spanish Translation Here](#)*

Good Afternoon Fresno Community Champions!

Thank you for joining our meeting this month! Nearly 100 supporters tuned in to hear presentations from the Kings Water Alliance, Fresno County's Department of Public Health & Administrative Office, as well as TCM Fresno - Familias en Accion - Regenerate CA on our #Housing4ALL campaign kickoff. If you weren't able to catch all or part of last month's meeting, scroll down to access PPT's and other resources provided by our speakers.

Don't miss our next meeting scheduled for February 15th, 2024!

[1/18 Zoom Recording](#)

[1/18 PPT Presentation](#)

Meeting RECAP

Department of Public Health Update: Dr. Trinidad Solis, MD, MPH, Deputy Health Officer Highlights

- Respiratory Illness Updates
 - Covid-19
 - [CA Dept. of Public Health updates on Covid-19 isolation guidelines](#)
 - Now if you test positive for Covid, you do not have to isolate for 5 days. Instead, if you have symptoms and test positive you have to be fever free for 24 hours with no meds, and you can return back to work or school but must wear mask indoors for 10 days. If no symptoms, return to work or school, but again mask for 10 days.
 - Now at a different stage with Covid in that we have access to vaccines and treatments. They have aligned Covid with other respiratory diseases.
 - Second state to change guidelines, Oregon did so as well.

- Starting to see increased test positivity, in CA, test positivity is: **11.8%**
- Right now in CA, wastewater levels are at **red** which is at the highest level
- Covid-19 hospitalizations increasing but not at previous levels, not as severe but still increasing.
- Message: Covid is still around, don't let your guard down, protect yourself, get vaccinated, wear masks. Any mask is better than nothing, especially for vulnerable populations.
- Covid-19 vaccines
 - About 6% of community has been vaccinated with latest Covid-19 vaccine. This contributes to high infection rate.
- Flu
 - High levels of flu virus circulating
 - 13%, when it's above 10% it's high, so it is elevated. Same goes for waste water.
- RSV
 - Mainly affects elderly and infants
 - Still elevated but peaked closer to Thanksgiving, RSV activity starting to decrease in CA. Deaths remain low.
 - We didn't have RSV vaccines before, but now we do for vulnerable populations
 - Hospitals - Strained, if not an emergency there are options like urgent care and telehealth

#Housing4ALL Campaign Kick Off Events Highlights - TCM Fresno, Familias en Accion, and Regenerate Fresno CA

- Find our presentation slides here: [#Housing4ALL Powerpoint Slides](#)
- Slides Cover:
 - Why a Housing Campaign - Juana Iris Meza, TCM Organizer
 - 12/14 Kickoff Event Highlights, Lilia Becerril, Familias en Accion, TCM Fresno Resident
 - 150 residents gathered in front of City Hall to uplift the need for affordable housing solutions in Fresno. Residents & youth spoke outside and made public comment to City Council members
 - Resident concerns include:
 - Rent is too high
 - Home ownership is out of reach
 - Eviction support is needed
 - Access to shelters must increase
 - Updates on Southeast Development Area, Keith Bergthold, Regenerate CA, Greenfield Coalition, #Housing4ALL partner
 - #Housing4ALL Next Steps, Cynthia Kanagui, TCM Director of Advocacy
- **TAKE ACTION**
 - Request an Informative Workshop on Mayor Dyer's One Fresno Housing Strategy by [signing this petition](#)

- Why? Our residents and youth want to know what's happening with Fresno Housing
- Over 60 residents and youth have signed our petition! Sign today and help us reach our goal of 100 petitions signed!

- Fliers: Access the [English flier here](#), [Spanish Flier here](#)



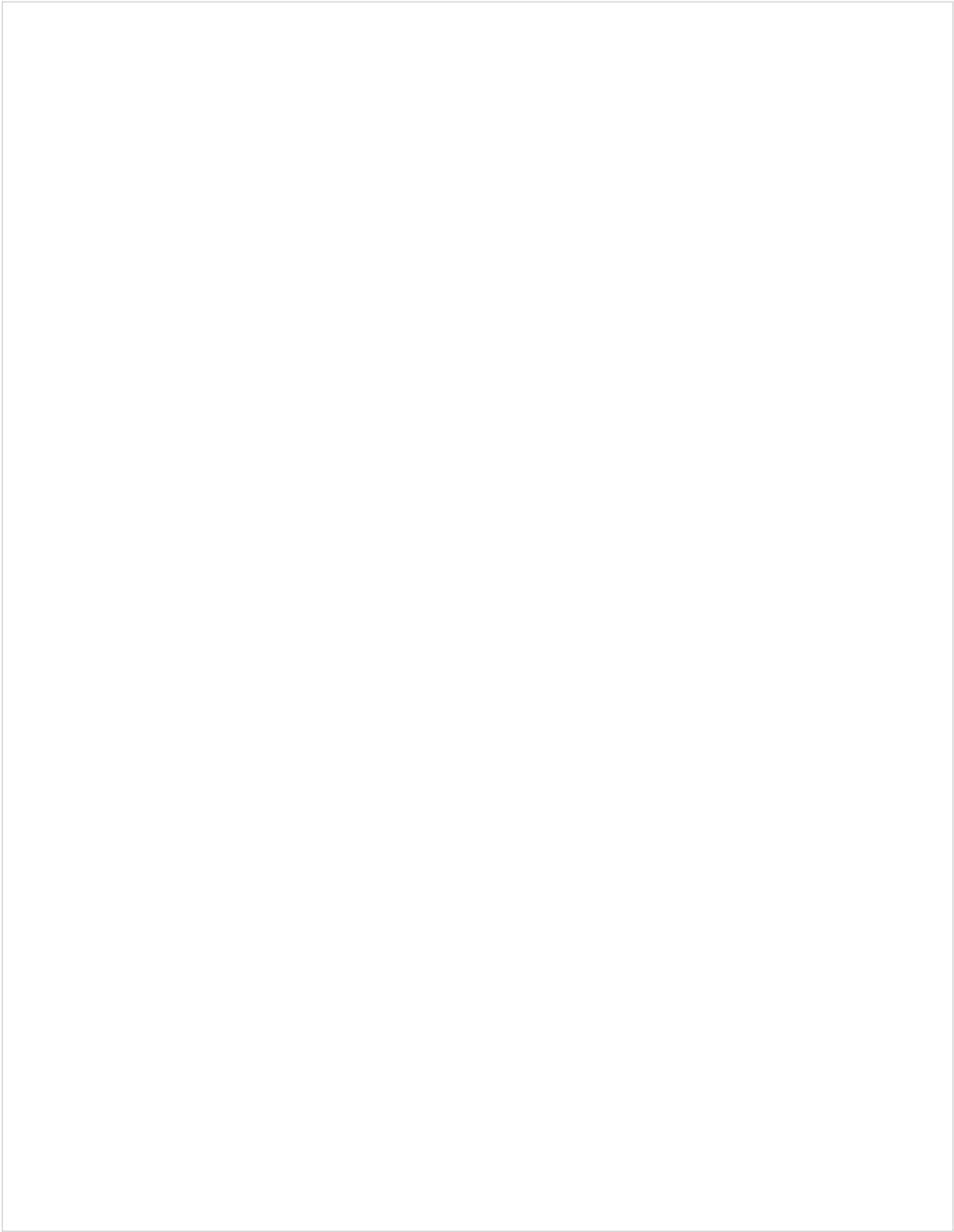
Kings Water Alliance Residential Wells & Clean Drinking Water - Dunn Executive Officer / Jose Soto, Resource Analyst Associate

- [Residential Wells and Clean Drinking Water PPT](#)
- About the Kings Water Alliance
 - Non-profit organization/community resource
 - Nitrate Control Program (State Mandated)
 - Funded by nitrate dischargers
 - Implementing programs that provide safe drinking water to nitrate-impacted residents
- Where?
 - Parts of Fresno County, Kings County, and Tulare County.
- What are Nitrates?
 - Contaminants that can make water unsafe
 - You cannot see, smell, or taste
 - You cannot boil nitrate out of water
 - Chemical found in most fertilizers, manure, and septic tanks
- Impacts of Nitrates
 - Nitrates reduces the ability of red blood cells to carry oxygen
 - Primary hazard from nitrates is blood lacks the ability to carry sufficient oxygen to cells
 - Most at risk for health effects includes infants, pregnant women, nursing mothers, and elderly
- Engagement Alert: Stakeholder Community Meetings: kingswateralliance.org/events/

Fresno County Hazard Mitigation Plan - Terri Mejorado, Emergency Manager

- Hazard Mitigation Plan Survey can be access at www.surveymonkey.com/r/L9FCVKK
 - Looking for community input and have started to engage a spectrum of organizations
- Hazard Mitigation Plan Fliers (English and Spanish): [here](#)

[Fresno Hazard Mitigation Plan Survey](#)





Resources



- **Community Schools Resources Directory**

- The Central Valley Community Schools Regional Technical Assistance and Coaching (RTAC) Department, in partnership with Fresno Cradle to Career, built a [resource directory](#) to connect Community Schools with Community Based Organizations (CBOs). The purpose of the directory is to provide school principals, other administrators, and Community Schools Coordinators in the schools with a list of CBOs that provide services within the school district boundaries area. This tool will be published on the [FCSS Regional Community Schools website](#).
- Complete [this form](#) to add/edit/ information about your organization or make recommendations for other organizations to be added to the directory.

- **Go Public Schools - Fresno Kids First Report: provides insight on the current student outcomes and strategizes on intentional next steps to support students and families.**

- Two virtual sessions: January 30 at 11am and Feb. 8 at 5pm. Email swilliams@gopublicschools.org for more information.

- **Job Fair Alert - Early Care and Education (ECE)**

- Over 15 Early Care & Education(ECE) Agencies are registered and ready to meet prospective candidates!

Positions available include: Teachers, Teachers Assistants, Office Assistants, Support Staff, Substitutes and more.

Support us in spreading the word to your listservs and/or anyone interested in exploring different career opportunities in ECE.

Invite them to add their name to the Interest List QR Code to receive event updates:
<https://forms.gle/QjywThYzzpgDHEpL8>

- [Flier](#)

• **CalKids - The First Step Toward College**

- Every California newborn can receive up to \$175 in FREE college monies; Eligible 1st-12th graders can receive up to \$1,500! Registration is easy, [follow this link](#).
- Did you know that low-income, children of color are 4X more likely to graduate from college when they have \$1-\$500 in college savings monies? You'll hear more about the importance of getting 100% of families enrolled from our Calkids presenters in our November call. In the meantime, help us in spreading the word and closing the gap on unclaimed monies in Fresno County.
- While 154,278 children are eligible, only 7,978 have claimed accounts
- Total unclaimed monies: \$75,395,950. Help us close the gap by spreading the word.

In the News

- [Cost of Locking Someone Up in California Soars to Record \\$132,860 a Year](#)
- [Big plans for a new Clovis-sized community in Fresno stumble under weight of multi-billion-dollar price tag](#)



Add event to calendar

Apple	Google	Office 365	Outlook	Outlook.com

Logo



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Our mailing address is:

The Children's Movement of Fresno
4949 E Kings Canyon Rd.
Suite 202
Fresno, CA 93727

[Add us to your address book](#)

Want to change how you receive these emails?
You can [update your preferences](#) or [unsubscribe](#)



Home (<https://www.fresnocountyca.gov/Home>) / Resources
(<https://www.fresnocountyca.gov/Resources>) / **Hazard Mitigation Plan**

Hazard Mitigation Plan

Fresno County, along with 17 participating jurisdictions, prepared this local multi-jurisdictional hazard mitigation plan to better protect the people and property of the County from the effects of hazard events. This plan underwent a comprehensive update in 2023-2024 building upon the plan that was originally developed in 2009. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed to make Fresno County and participating jurisdictions eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, and Flood Mitigation Assistance (FMA), and Building Resilient Infrastructure and Communities (BRIC). This plan also meets the planning requirements of the National Flood Insurance Program's Community Rating System (CRS).



[2024 Draft Hazard Mitigation Plan](#) ^(PDF, 19MB) [\(/files/sharedassets/county/v/1/resources/hazard-mitigation-plan/draft-2024-fresno-county-hazard-mitigation-plan.pdf\)](#)

Draft Plan Feedback Survey Form (<https://forms.office.com/pages/responsepage.aspx?id=oF1VzqfOBUqq7Z9-kOWz-0uf3IG3qrBlvazgqmkS-oxUNlc3MjlVQjZFMzNDTkFVMjRG0VU1OVZOTS4u>)

Annex Files

[draft-annex-a-city-of-clovis.pdf](#) ^(pdf 2.23 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-a-city-of-clovis.pdf\)](#)

[draft-annex-b-city-of-coalinga.pdf](#) ^(pdf 1.58 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-b-city-of-coalinga.pdf\)](#)

[draft-annex-c-city-of-firebaugh.pdf](#) ^(pdf 1.52 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-c-city-of-firebaugh.pdf\)](#)

[draft-annex-d-city-of-fowler.pdf](#) ^(pdf 1.48 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-d-city-of-fowler.pdf\)](#)

[draft-annex-e-city-of-fresno.pdf](#) ^(pdf 2.57 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-e-city-of-fresno.pdf\)](#)

[draft-annex-f-city-of-kerman.pdf](#) ^(pdf 1.59 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-f-city-of-kerman.pdf\)](#)

[draft-annex-g-city-of-kingsburg.pdf](#) ^(pdf 1.55 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-g-city-of-kingsburg.pdf\)](#)

[draft-annex-h-city-of-mendota.pdf](#) ^(pdf 1.61 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-h-city-of-mendota.pdf\)](#)

[draft-annex-i-city-of-sanger.pdf](#) ^(pdf 1.77 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-i-city-of-sanger.pdf\)](#)

[draft-annex-j-city-of-selma.pdf](#) ^(pdf 1.89 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-j-city-of-selma.pdf\)](#)

[draft-annex-k-city-of-reedley.pdf](#) (pdf 1.82 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-k-city-of-reedley.pdf\)](#)

[draft-annex-l-city-of-san-joaquin.pdf](#) (pdf 1.35 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-l-city-of-san-joaquin.pdf\)](#)

[draft-annex-m-fresno-county-metropolitan-flood-control-district.pdf](#) (pdf 1.03 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-m-fresno-county-metropolitan-flood-control-district.pdf\)](#)

[draft-annex-n-lower-san-joaquin-levee-district.pdf](#) (pdf 914.99 KB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-n-lower-san-joaquin-levee-district.pdf\)](#)

[draft-annex-o-kings-river-conservation-district.pdf](#) (pdf 701.45 KB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-o-kings-river-conservation-district.pdf\)](#)

[draft-annex-p-sierra-resource-conservation-district.pdf](#) (pdf 1.91 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-p-sierra-resource-conservation-district.pdf\)](#)

[draft-annex-q-westlands-water-district.pdf](#) (pdf 1.17 MB) [\(/files/sharedassets/county/v/1/county-administrative-office/hazard-mitigation-plan/annex-files/draft-annex-q-westlands-water-district.pdf\)](#)



County of Fresno

1d

Public Comment Meeting will be held on Friday, May 3, 2024!

To join via teams/zoom please use

Meeting ID: 239 305 371 183

Passcode: wkEVT8

To peruse the Hazard Mitigation Plan: bit.ly/3JHRr9q

Reunion para el Publico se llevara acabo este viernes 3 de mayo 2024. Para entrar a esta reunion por zoom utilice las siguientes credenciales:

Meeting ID: 239 305 371 183

Passcode: wkEVT8

Public Comment Meeting



What is hazard mitigation planning?

Hazard mitigation planning reduces loss of life and property by minimizing the impact of disasters. It begins with identifying natural disaster risks and vulnerabilities that are common in the area. After identifying these risks, mitigation plans develop long-term strategies for protecting people and property from similar events. Mitigation plans are key to breaking the cycle of disaster damage and reconstruction.

Friday
May 3,
2024

5:30 PM

EMS Training Facility
5091 N. Fresno St.
Fresno, CA 93710

Reunión para el Público



¿Qué es la planificación de mitigación de riesgos?

La planificación de la mitigación de riesgos reduce la pérdida de vidas y propiedades al minimizar el impacto de los desastres. Comienza con la identificación de los riesgos y vulnerabilidades de desastres naturales que son comunes en el área. Después de identificar estos riesgos, los planes de mitigación desarrollan estrategias a largo plazo para proteger a las personas y la propiedad de eventos similares. Los planes de mitigación son clave para romper el ciclo de daños causados por desastres y reconstrucción.

Viernes
3 de
mayo
2024

5:30 PM

EMS Training Facility
5091 N Fresno St.
Fresno, CA 93710

County of Fresno

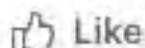
Government Organization

Send message



4

1 share



Like



Comment

Public Comment Meeting



What is hazard mitigation planning?

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Friday
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5:30 PM

EMS Training Facility
5091 N. Fresno St.
Fresno, CA 93710

**Download the
draft 2024
Fresno County
HMP by
scanning the QR
code**



or here:
bit.ly/3JHRr9q

Reunión para el Público



¿Qué es la planificación de mitigación de riesgos?

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**Viernes
3 de
mayo
2024**

5:30 PM

**EMS Training Facility
5091 N Fresno St.
Fresno, CA 93710**

**Descargue el
borrador del
HMP del
condado de
Fresno 2024
escaneando el
código QR**



**o lo encuentra
aquí:**

bit.ly/3JHRr9q



County of Fresno

2 hours ago · 🌐

...

Today is the **LAST DAY** to provide your valuable feedback on the 2024 Fresno County Hazard Mitigation Plan!

Your input is crucial in helping us create a safer and more resilient community. Don't miss this opportunity to have your voice heard and make a difference.

You can find the full plan at www.fresnocountyca.gov/Resources/Hazard-Mitigation-Plan as well as a link to a short survey.

Share your thoughts and suggestions before it's too late!

Thank you for your participation and commitment to making Fresno County a better place for all.

--

¡Hoy es el **ÚLTIMO DÍA** para brindar sus valiosos comentarios sobre el Plan de Mitigación de Riesgos del Condado de Fresno 2024!

Su opinión es crucial para ayudarnos a crear una comunidad más segura y resiliente. No pierdas esta oportunidad de que tu voz sea escuchada y marcar la diferencia.

Puede encontrar el plan completo en www.fresnocountyca.gov/Resources/Hazard-Mitigation-Plan, así como un enlace breve a la encuesta.

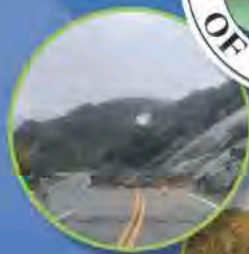
¡Comparta sus pensamientos y sugerencias antes de que sea demasiado tarde!

Gracias por su participación y compromiso para hacer del Condado de Fresno un lugar mejor para todos.

2024

Fresno County, California

Hazard Mitigation Plan



FacilityClass	Name	Address	City
Airport Facilities	NEW COALINGA MUNI	CITY HALL 155 W DURIAN	COALINGA
Airport Facilities	SANGER	210 S. ACADEMY AVE	SANGER
Airport Facilities	FIREBAUGH	1133 P STREET	FIREBAUGH
Airport Facilities	FRESNO CHANDLER EXECUTIVE	4995 E. CLINTON WAY	FRESNO
Airport Facilities	FRESNO YOSEMITE INTL	4995 E CLINTON WAY	FRESNO
Airport Facilities	WILLIAM ROBERT JOHNSTON MUNI	643 QUINCE ST	MENDOTA
Airport Facilities	REEDLEY MUNI	100 N. EAST AVE	REEDLEY
Airport Facilities	REEDLEY COLLEGE	REED AND MANNING AVE	REEDLEY
Bus Facilities	Mercado Latino	1142 F St	Fresno
Communication Facilities	KKFO 1470		COALINGA
Communication Facilities	KFRE-TV CH 59		SANGER
Communication Facilities	KFSN-TV CH 30		FRESNO
Communication Facilities	KSEE CH 24		FRESNO
Communication Facilities	KGMC CH 43		CLOVIS
Communication Facilities	KGPE CH 47		FRESNO
Communication Facilities	K12OZ CH 12		FRESNO
Communication Facilities	KVPT CH 18		FRESNO
Communication Facilities	K020H CH 2		FRESNO
Communication Facilities	KFTV CH 21		HANFORD
Communication Facilities	KAIL CH 53		FRESNO
Communication Facilities	KEYQ 980		FRESNO
Communication Facilities	KIRV 1510		FRESNO
Communication Facilities	KBIF 900		FRESNO
Communication Facilities	KCBL 1340		FRESNO
Communication Facilities	KOOR 790		CLOVIS
Communication Facilities	KFIG 1430		FRESNO
Communication Facilities	KMJ 580		FRESNO
Communication Facilities	KMJ 580		FRESNO
Communication Facilities	KQEQ 1210		FOWLER
Communication Facilities	KGST 1600		FRESNO
Communication Facilities	KXEX 1550		FRESNO
Communication Facilities	KYNO 1300		FRESNO
Communication Facilities	KOKO-FM CH 232		KERMAN
Communication Facilities	KEZL CH 244		FOWLER
Communication Facilities	KVSR CH 266		FRESNO
Communication Facilities	KFCF CH 201		FRESNO
Communication Facilities	KFSR CH 214		FRESNO
Communication Facilities	KFNO CH 212		FRESNO
Communication Facilities	KMGV CH 250		FRESNO
Communication Facilities	KSKS CH 229		FRESNO
Communication Facilities	KRNC CH 290		FRESNO
Communication Facilities	KOQO-FM CH 270		FRESNO
Communication Facilities	KLBN CH 286		AUBERRY
Communication Facilities	KJWL CH 257		FRESNO
Communication Facilities	KRZR CH 279		HANFORD
Communication Facilities	KALZ CH 274		FRESNO
Communication Facilities	KMAK CH 262		ORANGE COVE
Communication Facilities	KWOL CH 288		SAN JOAQUIN
Communication Facilities	KJFX CH 239		FRESNO
Communication Facilities	KVPR CH 207		FRESNO
Communication Facilities	KBHH CH 237		KERMAN
Electric Power Facilities	COALINGA 25D COGEN	39405 SOUTH DERRICK AVE	COALINGA
Electric Power Facilities	COALINGA COGENERATION	32812 WEST GALE AVE.	COALINGA
Electric Power Facilities	COALINGA 6C COGEN	39405 SOUTH DERRICK AVE	COALINGA
Electric Power Facilities	COALINGA COGENERATION FACILITY	29010 SHELL RD	COALINGA
Electric Power Facilities	ALGONQUIN POWER SANGER LLC	1125 MUSCAT AVE	SANGER
Electric Power Facilities	FRIANT HYDRO FACILITY	18015 FRIANT RD	FRIANT
Electric Power Facilities	PINE FLAT	27709 PINE FLAT ROAD	PIEDRA
Electric Power Facilities	PORTAL	HWY168 SIERRA NAT'L FOREST	LAKESHORE
Electric Power Facilities	FIVE POINTS SOLAR STATION	23011 S LASSEN AVENUE	FIVE POINTS
Electric Power Facilities	FIVE POINTS 1	24117 W EXCELSIOR	FIVE POINTS
Electric Power Facilities	PANOCH PEAKER	43649 W. PANOCH ROAD	FIREBAUGH
Electric Power Facilities	RE ADAMS EAST LLC	32111 W. SOUTH AVE	FRESNO
Electric Power Facilities	RE TRANQUILLITY	9810 S. OHIO STREET	CANTUA CREEK
Electric Power Facilities	SAINT AGNES MEDICAL CENTER	4615 E. HERNDON AVENUE	FRESNO
Electric Power Facilities	NORTH STAR SOLAR	CALIFORNIA AVE AND SAN BERNADI	MENDOTA

Electric Power Facilities	GIFFEN	NOT AVAILABLE	NOT AVAILABLE
Electric Power Facilities	KINGSBURG COGEN	11675 MOUNTIAN VIEW	KINGSBRURG
Electric Power Facilities	J S EASTWOOD	HWY 168 SIERRA NATIONAL FOREST	SHAVER LAKE
Electric Power Facilities	CANTUA SOLAR STATION	NOT AVAILABLE	FRESNO
Electric Power Facilities	BIG CREEK 2A	SIERRA NATIONAL FOREST	AUBERRY
Electric Power Facilities	WESTLANDS SOLAR PV FARM	18393 W JAYNE AVE	HURON
Electric Power Facilities	WEST GATES SOLAR STATION	18364 WEST JAYNE AVE.	HURON
Electric Power Facilities	CALRENEW-1	450 BELMONT AVENUE	MENDOTA
Electric Power Facilities	CITIZEN SOLAR B	35564 W CALIFONIA AVE	MENDOTA
Electric Power Facilities	BALCH 2	TRIMMER SPRINGS ROAD	BALCH CAMP
Electric Power Facilities	CALPEAK POWER PANOCH PEAKER PLANT	43699 WEST PANOCH ROAD	FIREBAUGH
Electric Power Facilities	STROUD SOLAR STATION	18285 W KAMM AVENUE	HELM
Electric Power Facilities	BIG CREEK 8	51374 MAMMOTH POOL ROAD	AUBERRY
Electric Power Facilities	GATES SOLAR STATION	17115 W. GALE AVE.	HURON
Electric Power Facilities	HELMS PUMPED STORAGE	67250 HELMS CIRCLE	SHAVER LAKE
Electric Power Facilities	HAAS	TRIMMER SPRINGS ROAD	BALCH CAMP
Electric Power Facilities	KERCKHOFF 2	SMALLY ROAD	AUBERRY
Electric Power Facilities	COVANTA MENDOTA	400 GUILLEN PARKWAY	MENDOTA
Electric Power Facilities	KINGS RIVER PH	TRIMMER SPRINGS ROAD	BALCH CAMP
Electric Power Facilities	FRESNO COGEN PARTNERS	8105 SOUTH LASSEN	SAN JOAQUIN
Electric Power Facilities	KERCKHOFF	11	AUBERRY
Electric Power Facilities	GIFFEN SOLAR PARK	12771 S. STANISLAUS AVENUE	CANTUA CREEK
Electric Power Facilities	ADAMS E	8008 S. DERRICK AVENUE	MENDOTA
Electric Power Facilities	MIDWAY PEAKING LLC	43627 WEST PANOCH ROAD	FIREBAUGH
Electric Power Facilities	WESTSIDE SOLAR STATION	34345 S TRINITY AVENUE	FIVE POINTS
Electric Power Facilities	BIG CREEK 3	47369 LOWER REDINGER ROAD	AUBERRY
Electric Power Facilities	BIG CREEK 2	53615 UPPER CHAWANAKEE ROAD	AUBERRY
Electric Power Facilities	BIG CREEK 1	55325 CASCADA ROAD	BIG CREEK
Electric Power Facilities	KINGS RIVER	NOT AVAILABLE	MALAGA
Electric Power Facilities	PANOCH ENERGY CENTER	43833 WEST PANOCH ROAD	FIRBAUGH
Electric Power Facilities	ORO LOMA 1	9575 N. RUSSELL	FIREBAUGH
Electric Power Facilities	BALCH 1	TRIMMER SPRINGS ROAD	BALCH CAMP
Electric Power Facilities	HURON	17123 W GALE AVENUE	HURON
Electric Power Facilities	RIO BRAVO FRESNO	3350 SO. WILLOW	FRESNO
Electric Power Facilities	NEXTERA WESTSIDE PV	24090 SOUTH LAKE AVE	FIVE POINTS
Electric Power Facilities	FRESNO SOLAR	8105 SOUTH LASSEN AVE	SAN JOAQUIN
Electric Power Facilities	GREAT VALLEY SOLAR PORTFOLIO HOLDINGS...	34886 W. DINUBA AVE. #C	CANTUA CREEK
Electric Power Facilities	SAN JOAQUIN SOLAR	SE CORNER OF W. KAMM AVE & S.	HELM
Electric Power Facilities	ASPIRATION G	WEST MOUNTAIN VIEW AVENUE	SAN JOAQUIN
Electric Power Facilities	WHITNEY POINT SOLAR	24372 SOUTH LAKE AVE	FIVE POINTS
Electric Power Facilities	VITRO FLAT GLASS LLC	3333 SOUTH PEACH AVE	FRESNO
Electric Power Facilities	CANTUA	NOT AVAILABLE	NOT AVAILABLE
Electric Power Facilities	HURON SOLAR FARM	NOT AVAILABLE	NOT AVAILABLE
Electric Power Facilities	BURFORD GIFFEN	30336 WEST MOUNTAIN AVENUE	CANTUA CREEK
Electric Power Facilities	FIVE POINTS SOLAR STATION	NOT AVAILABLE	NOT AVAILABLE
EOCs	FIREBAUGH EMERGENCY OPERATIONS CENTER	1575 11TH STREET	FIREBAUGH
EOCs	FIREBAUGH EMERGENCY OPERATIONS CENTER...	1133 P STREET	FIREBAUGH
EOCs	FRESNO COUNTY OFFICE OF EMERGENCY SER...	1221 FULTON MALL	FRESNO
EOCs	CITY OF KERMAN EMERGENCY SERVICES	850 SOUTH MADERA AVENUE	KERMAN
EOCs	FOWLER EMERGENCY SERVICES	128 SOUTH 5TH STREET	FOWLER
EOCs	SAN JOAQUIN EMERGENCY SERVICES-EMERGE...	21900 WEST COLORADO AVENUE	SAN JOAQUIN
EOCs	SAN JOAQUIN EMERGENCY SERVICES-EMERGE...	21991 WEST COLORADO AVENUE	SAN JOAQUIN
EOCs	COALINGA EMERGENCY OPERATIONS CENTER	155 WEST DURIAN AVENUE	COALINGA
Fire Stations	Clovis Fire Department Station 42	2300 Minnewawa Avenue	Clovis
Fire Stations	Fresno City Fire Department Station 13	815 East Nees Avenue	Fresno
Fire Stations	Fresno County Fire Protection Distric...	2701 West Tahoe Avenue	Caruthers
Fire Stations	Fresno City Fire Department Station 7	2571 South Cherry Avenue	Fresno
Fire Stations	Fresno City Fire Department Station 15	5630 East Park Circle Drive	Fresno
Fire Stations	Mountain Valley Volunteer Fire Depart...	46694 Chuckwagon Road	Squaw Valley
Fire Stations	Fresno County Fire Protection Distric...	11500 East Mountain View Avenue	Selma
Fire Stations	Fresno City Fire Department Station 3	1406 Fresno Street	Fresno
Fire Stations	Big Creek Volunteer Fire Department	55112 Point Road	Big Creek
Fire Stations	Clovis Fire Department Station 44	2427 Armstrong Avenue	Clovis
Fire Stations	Fresno County Fire Protection Distric...	36421 South Lassen Avenue	Huron
Fire Stations	Fresno County Fire Protection Distric...	9700 East American Avenue	Del Rey
Fire Stations	Fowler Fire Department	127 South 6th Street	Fowler
Fire Stations	Fresno City Fire Department Station 18	5938 La Ventana Avenue	Fresno

Fire Stations	Fresno City Fire Department Station 6	4343 East Gettysburg Avenue	Fresno
Fire Stations	Fresno City Fire Department Station 17	10512 North Maple Avenue	Fresno
Fire Stations	Fresno City Fire Department Station 8	1428 South Cedar Avenue	Fresno
Fire Stations	Clovis Fire Department Station 45	790 North Temperance Avenue	Clovis
Fire Stations	Hume Lake Volunteer Fire and Rescue C...	64144 Hume Lake Road	Hume
Fire Stations	Fresno City Fire Department Station 20	4537 North Wishon Avenue	Fresno
Fire Stations	Kingsburg Fire Department	1460 Marion Street	Kingsburg
Fire Stations	Fresno County Fire Protection Distric...	4706 East Drummond Avenue	Fresno
Fire Stations	Huntington Lake Volunteer Fire Depart...	60900 La Salle Lane	Lakeshore
Fire Stations	Fresno County Fire Protection Distric...	25101 West Morton Avenue	Tranquillity
Fire Stations	Fresno City Fire Department Headquarters	911 H Street	Fresno
Fire Stations	Bald Mountain Volunteer Fire Department	41967 Auberry Road	Auberry
Fire Stations	Selma City Fire Department Station 53	1927 West Front Street	Selma
Fire Stations	Fresno City Fire Department Station 10	5545 Aircorp Way	Fresno
Fire Stations	Fresno City Fire Department Station 12	2874 West Acacia Avenue	Fresno
Fire Stations	Fresno City Fire Department Station 16	4170 North Brix Avenue	Fresno
Fire Stations	North Central Fire Protection Distric...	806 South Garfield Avenue	Fresno
Fire Stations	Clovis Fire Department Station 41	633 Pollasky Avenue	Clovis
Fire Stations	Clovis Fire Department Station 43	555 North Villa Avenue	Clovis
Fire Stations	Fresno City Fire Department Station 14	6239 North Polk Avenue	Fresno
Fire Stations	North Central Fire Protection Distric...	4550 North Biola Avenue	Biola
Fire Stations	Firebaugh City Fire Department	1575 11th Street	Firebaugh
Fire Stations	Fresno County Fire Protection Distric...	5810 South Cherry Avenue	Fresno
Fire Stations	Fresno City Fire Department Station 2	7114 North West Avenue	Fresno
Fire Stations	Fresno City Fire Department Station 4	3065 East Iowa Avenue	Fresno
Fire Stations	Reedley Fire Department	1060 D Street	Reedley
Fire Stations	Fresno County Fire Protection Distric...	25627 North Auberry Road	Clovis
Fire Stations	Fresno County Fire Protection Distric...	4091 East Millerton Road	Friant
Fire Stations	Shaver Lake Volunteer Fire Department	41801 Tollhouse Road	Shaver Lake
Fire Stations	North Central Fire Protection Distric...	7285 West Shields Avenue	Fresno
Fire Stations	North Central Fire Protection Distric...	1709 West Bullard Avenue	Fresno
Fire Stations	Fresno County Fire Protection Distric...	32515 East Kings Canyon Road	Squaw Valley
Fire Stations	Laton Volunteer Fire Department	20799 South Fowler Avenue	Laton
Fire Stations	Fresno County Fire Protection Distric...	101 McCabe Avenue	Mendota
Fire Stations	Selma City Fire Department Station 54...	2861 A Street	Selma
Fire Stations	Fresno City Fire Department Station 11	5544 Fresno Street	Fresno
Fire Stations	Fresno County Fire Protection Distric...	23087 East Tollhouse Road	Clovis
Fire Stations	Fresno County Fire Protection Distric...	4955 East Nees Avenue	Clovis
Fire Stations	Orange Cove Fire Protection District ...	550 Center Street	Orange Cove
Fire Stations	Auberry Volunteer Fire Department	Powerhouse Road	Auberry
Fire Stations	Fresno Yosemite International Airport...	4995 East Clinton Way	Fresno
Fire Stations	Pine Ridge Volunteer Fire Department	38018 Glenwood Lane	Shaver Lake
Fire Stations	Riverdale Volunteer Fire Department	20868 Malsbary Street	Riverdale
Fire Stations	Fresno County Fire Protection Distric...	41505 Sand Creek Road	Squaw Valley
Fire Stations	Parlier Volunteer Fire Department	13000 Parlier Avenue	Parlier
Fire Stations	North Central Fire Protection Distric...	15850 West Kearney Boulevard	Kerman
Fire Stations	Fresno County Fire Protection Distric...	41640 Dinkey Creek Road	Shaver Lake
Fire Stations	Huntington Lake Volunteer Fire Depart...	63000 Huntington Vista Lane	Lakeshore
Fire Stations	Fresno City Fire Department Station 9	2340 North Vagedes Avenue	Fresno
Fire Stations	Fresno City Fire Department Station 1	1264 North Jackson Avenue	Fresno
Fire Stations	Fresno County Fire Protection Distric...	4925 North Nelson Avenue	Clovis
Fire Stations	Fresno City Fire Department Station 5	3131 North Fresno Street	Fresno
Fire Stations	Coalinga Fire Department	300 West Elm Avenue	Coalinga
Fire Stations	Fresno Air National Guard Fire Depart...	5323 East McKinley Avenue	Fresno
Fire Stations	Sanger Fire Department	1700 7th Street	Sanger
Fire Stations	Mountain Rest Fire Station	34911 Tollhouse Road	Auberry
Fire Stations	Coalinga State Hospital Fire Services	24511 West Jayne Avenue	Coalinga
Fire Stations	Fresno County Fire Protection Distric...	6185 Elwood Road	Sanger
Fire Stations	Fresno County Fire Protection Distric...	24125 West Dorris Avenue	Coalinga
Fire Stations	Pleasant Valley State Prison Fire Dep...	24863 West Jayne Avenue	Coalinga
Fire Stations	California Department of Forestry and...	210 South Academy Avenue	Sanger
Fire Stations	Fresno County Fire Protection Distric...	25600 West Jayne Avenue	Coalinga
Fire Stations	Fresno County Fire Protection Distric...	210 South Academy Avenue	Sanger
GDFLT	CRIMSON RESOURCE MANAGEMENT - RIVERDA...	RIVERDALE AREA	RIVERDALE
Medical Care Facilities	FRESNO HEART AND SURGICAL HOSPITAL	15 E. AUDUBON DRIVE	FRESNO
Medical Care Facilities	SAN JOAQUIN VALLEY REHABILITATION HOS...	7173 NO. SHARON AVENUE	FRESNO
Medical Care Facilities	FRESNO SURGICAL HOSPITAL	6125 NORTH FRESNO STREET	FRESNO

Medical Care Facilities	COMMUNITY REGIONAL MEDICAL CENTER-FRESNO	2823 FRESNO ST	FRESNO
Medical Care Facilities	ST. AGNES MEDICAL CENTER	1303 EAST HERNDON AVENUE	FRESNO
Medical Care Facilities	ADVENTIST HEALTH REEDLEY	372 WEST CYPRESS AVENUE	REEDLEY
Medical Care Facilities	COMMUNITY SUBACUTE AND TRANSITIONAL C...	3003 NORTH MARIPOSA STREET	FRESNO
Medical Care Facilities	KAISER FOUNDATION HOSPITAL - FRESNO	7300 NORTH FRESNO STREET	FRESNO
Medical Care Facilities	ADVENTIST HEALTH SELMA	1141 ROSE AVENUE	SELMA
Medical Care Facilities	CENTRAL STAR PSYCHIATRIC HEALTH FACIL...	4411 E. KINGS CANYON ROAD	FRESNO
Medical Care Facilities	COMMUNITY BEHAVIORAL HEALTH CENTER	7171 NORTH CEDAR AVENUE	FRESNO
Medical Care Facilities	CLOVIS COMMUNITY MEDICAL CENTER	2755 HERNDON AVENUE	CLOVIS
Medical Care Facilities	VA CENTRAL CALIFORNIA HEALTH CARE SYSTEM	2615 E CLINTON AVE	FRESNO
Medical Care Facilities	EXODUS PSYCHIATRIC HEALTH FACILITY FR...	4411 E KINGS CANYON RD	FRESNO
Medical Care Facilities	FRESNO VETERANS AFFAIRS CENTRAL CALIF...	2615 EAST CLINTON AVENUE	FRESNO
Medical Care Facilities	FRESNO VETERANS CENTER	3636 NORTH 1ST STREET	FRESNO
Medical Care Facilities	DEPARTMENT OF STATE HOSPITAL - COALINGA	24511 WEST JAYNE AVENUE	COALINGA
Medical Care Facilities	COALINGA REGIONAL MEDICAL CENTER	1191 PHELPS AVENUE	COALINGA
Oil Crude Pipeline Facilities	KINGSBURG COGENERATION FACILITY	11765 MOUNTAINVIEW ROAD	KINGSBURG
Police Stations	PARLIER POLICE DEPARTMENT	8770 SOUTH MENDOCINO AVENUE, SUITE A	PARLIER
Police Stations	FIREBAUGH POLICE DEPARTMENT	1575 11TH STREET	FIREBAUGH
Police Stations	SELMA POLICE DEPARTMENT	1935 EAST FRONT STREET	SELMA
Police Stations	FRESNO INTERNATIONAL AIRPORT POLICE	2401 NORTH ASHLEY WAY	FRESNO
Police Stations	CALIFORNIA STATE UNIVERSITY POLICE DE...	2311 EAST BARSTOW AVENUE	FRESNO
Police Stations	FOWLER POLICE DEPARTMENT	128 SOUTH 5TH STREET	FOWLER
Police Stations	TABLE MOUNTAIN TRIBAL POLICE DEPARTMENT	8184 TABLE MOUNTAIN RD	FRIANT
Police Stations	FRESNO COUNTY SHERIFFS OFFICE	2200 FRESNO STREET	FRESNO
Police Stations	KINGSBURG POLICE DEPARTMENT	1300 CALIFORNIA STREET	KINGSBURG
Police Stations	FRESNO POLICE DEPARTMENT - HEADQUARTERS	2323 MARIPOSA MALL	FRESNO
Police Stations	KERMAN POLICE DEPARTMENT	850 SOUTH MADERA AVENUE	KERMAN
Police Stations	STATE CENTER COMMUNITY COLLEGE DISTRI...	1940 NORTH CALAVERAS STREET	FRESNO
Police Stations	REEDLEY POLICE DEPARTMENT	843 G STREET	REEDLEY
Police Stations	CLOVIS POLICE DEPARTMENT	1233 5TH STREET	CLOVIS
Police Stations	FRESNO POLICE DEPARTMENT - CENTRAL PO...	940 NORTH BROADWAY STREET	FRESNO
Police Stations	FRESNO POLICE DEPARTMENT - NORTHEAST ...	1450 EAST TEAGUE AVENUE	FRESNO
Police Stations	FRESNO POLICE DEPARTMENT - SOUTHEAST ...	1617 SOUTH CEDAR AVENUE	FRESNO
Police Stations	CALIFORNIA HIGHWAY PATROL - FRESNO AREA	1382 WEST OLIVE AVENUE	FRESNO
Police Stations	CLOVIS UNIFIED SCHOOL DISTRICT POLICE...	1465 DAVID E COOK WAY	CLOVIS
Police Stations	FRESNO POLICE DEPARTMENT - NORTHWEST ...	3781 NORTH HUGHES AVENUE	FRESNO
Police Stations	FRESNO POLICE DEPARTMENT - SOUTHWEST ...	1211 FRESNO STREET	FRESNO
Police Stations	HURON POLICE DEPARTMENT	36389 SOUTH LASSEN AVENUE	HURON
Police Stations	SANGER POLICE DEPARTMENT	1700 7TH STREET	SANGER
Police Stations	COALINGA POLICE DEPARTMENT	270 NORTH 6TH STREET	COALINGA
Police Stations	CLAREMONT CUSTODY CENTER	185 WEST GALE AVENUE	COALINGA
Police Stations	CALIFORNIA HIGHWAY PATROL - COALINGA ...	125 SOUTH SIXTH STREET	COALINGA
Railways Facilities	Fresno, California	2650 Tulare St.	Fresno
Railways Facilities	GROUP WAREHOUSE CO.-FRESNO-CA		FRESNO
Railways Facilities	BNSF-FRESNO-CA		FRESNO
Railways Facilities	Integrated Grain and Milling		Fresno
Railways Facilities	Nutrius, Inc.		Kingsburg
Railways Facilities	Foster Feed Mill		Burrell
Railways Facilities	RANCHER'S COTTON OIL-FRESNO-CA		FRESNO
Railways Facilities	KACH TRANSPORTATION, INC.-FRESNO-CA		FRESNO
Railways Facilities	BUDWAY ENTERPRISES, INC.-FRESNO-CA		FRESNO
Schools	HELM ELEMENTARY	13883 S. LASSEN AVE.	HELM
Schools	PACIFIC UNION ELEMENTARY	2065 E. BOWLES AVE.	FRESNO
Schools	DRY CREEK ELEMENTARY	1273 N. ARMSTRONG AVE.	CLOVIS
Schools	AHWAHNEE MIDDLE	1127 E. ESCALON AVE.	FRESNO
Schools	GLACIER POINT MIDDLE	4055 N. BRYAN AVE.	FRESNO
Schools	PHOENIX ELEMENTARY ACADEMY COMMUNITY DAY	3335 N. ARTHUR AVE.	FRESNO
Schools	FOWLER ACADEMY INDEPENDENT STUDY	975 E. ADAMS AVE.	FOWLER
Schools	COLE ELEMENTARY	615 W. STUART AVE.	CLOVIS
Schools	HERNDON-BARSTOW ELEMENTARY	6265 N. GRANTLAND AVE.	FRESNO
Schools	KRATT ELEMENTARY	650 W. SIERRA AVE.	FRESNO
Schools	TARPEY ELEMENTARY	2700 MINNEWAWA AVE.	CLOVIS
Schools	HOLLAND ELEMENTARY	4676 N. FRESNO ST.	FRESNO
Schools	GIBSON ELEMENTARY	1266 W. BARSTOW AVE.	FRESNO
Schools	VINLAND ELEMENTARY	4666 N. MAPLE AVE.	FRESNO
Schools	POWERS-GINSBURG ELEMENTARY	110 E. SWIFT AVE.	FRESNO
Schools	MCLANE HIGH	2727 N. CEDAR AVE.	FRESNO

Schools	MUIR ELEMENTARY	410 E. DENNETT AVE.	FRESNO
Schools	JOHN SUTTER MIDDLE	701 E. WALTER	FOWLER
Schools	CENTRAL VALLEY HOME	1776 SIXTH AVE.	KINGSBURG
Schools	WAWONA K-8	4524 N. THORNE AVE.	FRESNO
Schools	ALICE M. WORSLEY	3333 AMERICAN AVE.	FRESNO
Schools	PARLIER JUNIOR HIGH	1200 E. PARLIER AVE.	PARLIER
Schools	FRESNO COUNTY SPECIAL EDUCATION	1111 VAN NESS AVE.	FRESNO
Schools	CAMBRIDGE CONTINUATION HIGH	1001 S. CHESTNUT	FRESNO
Schools	MENDOTA JUNIOR HIGH	1258 E. BELMONT AVE.	MENDOTA
Schools	FREEDOM ELEMENTARY	2955 GETTYSBURG AVE.	CLOVIS
Schools	J. E. YOUNG ACADEMIC CENTER	822 N. ABBY ST.	FRESNO
Schools	MENDOTA CONTINUATION HIGH	211 SMOOT AVE.	MENDOTA
Schools	TEAGUE ELEMENTARY	4725 N. POLK AVE.	FRESNO
Schools	EDITH B. STOREY ELEMENTARY	5250 E. CHURCH AVE.	FRESNO
Schools	CHESNUT HIGH (CONTINUATION)	16673 PALMER	HURON
Schools	FLORENCE E. RATA	1373 W. MESA AVE.	FRESNO
Schools	SUNSET ELEMENTARY	1755 S. CRYSTAL AVE.	FRESNO
Schools	FORT WASHINGTON ELEMENTARY	960 E. TEAGUE AVE.	FRESNO
Schools	OAK MEADOW COMMUNITY DAY	33411 LODGE RD.	TOLLHOUSE
Schools	WELDON ELEMENTARY	150 DEWITT AVE.	CLOVIS
Schools	BIRNEY ELEMENTARY	3034 E. CORNELL AVE.	FRESNO
Schools	VALLEY OAK ELEMENTARY	465 E. CHAPLAIN DR.	FRESNO
Schools	SHERIDAN ELEMENTARY	1001 NINTH ST.	ORANGE COVE
Schools	RIVER BLUFF ELEMENTARY	6150 W. PALO ALTO	FRESNO
Schools	VIKING ELEMENTARY	4251 N. WINERY AVE.	FRESNO
Schools	REYBURN INTERMEDIATE	2901 DEWOLF AVE.	CLOVIS
Schools	LOWELL ELEMENTARY	171 N. POPLAR AVE.	FRESNO
Schools	ENTERPRISE HIGH	15405 SUNSET AVE.	KERMAN
Schools	BIOLA-PERSHING ELEMENTARY	4885 N. BIOLA AVE.	FRESNO
Schools	MARC HIGH	2580 W. TAHOE AVE.	CARUTHERS
Schools	CEDARWOOD ELEMENTARY	2851 PALO ALTO AVE.	CLOVIS
Schools	WASHINGTON ELEMENTARY	1501 ELLIS ST.	KINGSBURG
Schools	WEST PARK CHARTER ACADEMY	2695 S. VALENTINE AVE.	FRESNO
Schools	ELM HIGH	5865 S. CLARA AVE.	FRESNO
Schools	KINGS CANYON UNIFIED SCHOOL DISTRICT ...	1801 TENTH ST.	REEDLEY
Schools	INDIANOLA ELEMENTARY	11524 E. DINUBA AVE.	SELMA
Schools	KASTNER INTERMEDIATE	7676 N. FIRST ST.	FRESNO
Schools	BUCHANAN HIGH	1560 N. MINNEWAWA AVE.	CLOVIS
Schools	MOLLY S. BAKMAN ELEMENTARY	588 N. HELM	FRESNO
Schools	CENTRAL HIGH EAST CAMPUS	3535 N. CORNELIA AVE.	FRESNO
Schools	HAMILTON ELEMENTARY	102 E. CLINTON	FRESNO
Schools	CENTURY ELEMENTARY	965 N. SUNNYSIDE AVE.	CLOVIS
Schools	TEMPERANCE-KUTNER ELEMENTARY	1448 N. ARMSTRONG AVE.	FRESNO
Schools	JEFFERSON ELEMENTARY	1037 E. DUFF AVE.	REEDLEY
Schools	PYLE ELEMENTARY	4140 N. AUGUSTA AVE.	FRESNO
Schools	WASHINGTON HIGH	6041 S. ELM AVE.	FRESNO
Schools	HOUGHTON-KEARNEY ELEMENTARY	8905 W. KEARNEY BLVD.	FRESNO
Schools	SCANDINAVIAN MIDDLE	3216 N. SIERRA VISTA	FRESNO
Schools	CLOVIS COMMUNITY DAY SECONDARY	1715 DAVID E COOK WAY	CLOVIS
Schools	FRESNO COE DISTRICT-WIDE PRESCHOOL	1111 VAN NESS AVE.	FRESNO
Schools	EDISON HIGH	540 E. CA AVE.	FRESNO
Schools	ELIZABETH TERRONEZ MIDDLE	2300 S. WILLOW	FRESNO
Schools	PINEDALE ELEMENTARY	7171 SUGAR PINE AVE.	PINEDALE
Schools	ENTERPRISE ALTERNATIVE	1550 HERNDON AVE.	CLOVIS
Schools	CALWA ELEMENTARY	4303 E. JENSEN AVE.	FRESNO
Schools	MARSHALL ELEMENTARY	142 N. ARMSTRONG AVE.	FOWLER
Schools	EASTON CONTINUATION HIGH	5865 S. CLARA AVE.	FRESNO
Schools	SIERRA HIGH	33326 LODGE RD.	TOLLHOUSE
Schools	EASTON COMMUNITY DAY	5865 S. CLARA AVE.	FRESNO
Schools	MOUNTAIN VIEW ELEMENTARY	2002 E. ALLUVIAL AVE.	FRESNO
Schools	MANCHESTER GATE	2307 E. DAKOTA AVE.	FRESNO
Schools	EATON ELEMENTARY	1451 E. SIERRA AVE.	FRESNO
Schools	JOHN STEINBECK ELEMENTARY	3550 N. MILBURN AVE.	FRESNO
Schools	CENTENNIAL ELEMENTARY	3830 E. SAGINAW WAY	FRESNO
Schools	DUNLAP LEADERSHIP ACADEMY	39500 DUNLAP RD.	DUNLAP
Schools	GATEWAY HIGH (CONTINUATION)	1550 HERNDON AVE.	CLOVIS
Schools	ADDAMS ELEMENTARY	2117 W. MCKINLEY AVE.	FRESNO

Schools	CLOVIS ELEMENTARY	1100 ARMSTRONG AVE.	CLOVIS
Schools	MAYFAIR ELEMENTARY	3305 E. HOME AVE.	FRESNO
Schools	LATON ELEMENTARY	6065 LATONIA	LATON
Schools	RONALD W. REAGAN ELEMENTARY	1180 DIANE AVE.	KINGSBURG
Schools	FOWLER HIGH	701 E. MAIN ST.	FOWLER
Schools	MALLOCH ELEMENTARY	2251 W. MORRIS AVE.	FRESNO
Schools	BURREL ELEMENTARY	16704 S. JAMESON AVE.	RIVERDALE
Schools	CLOVIS EAST HIGH	2940 LEONARD AVE.	CLOVIS
Schools	MCCORD ELEMENTARY	333 CENTER ST.	ORANGE COVE
Schools	CESAR E CHAVEZ ELEMENTARY	500 TUOLUMNE ST.	PARLIER
Schools	WOODROW WILSON ELEMENTARY	1325 STILLMAN ST.	SELMA
Schools	WILLIAM SAROYAN ELEMENTARY	5650 W. ESCALON AVE.	FRESNO
Schools	ISLAND COMMUNITY DAY	1776 SIXTH AVE. DR.	KINGSBURG
Schools	PHOENIX SECONDARY	5090 E CHURCH	FRESNO
Schools	THOMAS ELEMENTARY	4444 N. MILLBROOK AVE.	FRESNO
Schools	WEST FRESNO ELEMENTARY	2910 S. IVY ST.	FRESNO
Schools	FOWLER ACADEMY CONTINUATION	975 E. ADAMS AVE.	FOWLER
Schools	MORRIS E. DAILEY CHARTER ELEMENTARY	3135 N. HARRISON AVE.	FRESNO
Schools	BULLARD TALENT	4950 N. HARRISON AVE.	FRESNO
Schools	SEQUOIA ELEMENTARY	1820 S. ARMSTRONG AVE.	FRESNO
Schools	MCKINLEY ELEMENTARY	4444 W. MCKINLEY AVE.	FRESNO
Schools	ABRAHAM LINCOLN MIDDLE	1239 NELSON BLVD.	SELMA
Schools	KERMAN HIGH	205 S. FIRST ST.	KERMAN
Schools	HERBERT HOOVER HIGH	5550 N. FIRST ST.	FRESNO
Schools	RAFER JOHNSON JUNIOR HIGH	1300 STROUD AVE.	KINGSBURG
Schools	ANDREW JACKSON ELEMENTARY	2220 HUNTSMAN AVE.	SELMA
Schools	DESIGN SCIENCE MIDDLE COLLEGE HIGH	1101 E UNIV AVE	FRESNO
Schools	CANTUA ELEMENTARY	29288 W. CLARKSON	CANTUA CREEK
Schools	GEORGE WASHINGTON ELEMENTARY	1420 SECOND ST.	SELMA
Schools	AMERICAN UNION ELEMENTARY	2801 W. ADAMS AVE.	FRESNO
Schools	SANGER HIGH	1045 BETHEL AVE.	SANGER
Schools	DUNLAP ELEMENTARY	39667 DUNLAP RD.	DUNLAP
Schools	HAZEL M. BAILEY PRIMARY	1691 Q ST.	FIREBAUGH
Schools	KINGSBURG HIGH	1900 18TH AVE.	KINGSBURG
Schools	LODGE POLE ELEMENTARY (ALTERNATIVE)	33461 LODGE RD.	TOLLHOUSE
Schools	TRANQUILLITY ELEMENTARY	6116 S. DANIELS	TRANQUILLITY
Schools	WOLTERS ELEMENTARY	5174 N. FIRST ST.	FRESNO
Schools	EWING ELEMENTARY	4873 E. OLIVE AVE.	FRESNO
Schools	SUN EMPIRE ELEMENTARY	2649 N. MODOC AVE.	KERMAN
Schools	RONALD W. REAGAN ELEMENTARY	1586 S. INDIANOLA	SANGER
Schools	TERRY ELEMENTARY	12906 S. FOWLER AVE.	SELMA
Schools	GARFIELD ELEMENTARY	1315 N. PEACH AVE.	CLOVIS
Schools	BULLARD HIGH	5445 N. PALM AVE.	FRESNO
Schools	RIVERDALE HIGH	3086 W. MT. WHITNEY AVE.	RIVERDALE
Schools	FIPPS PRIMARY	21320 S. FELAND	RIVERDALE
Schools	JEFFERSON ELEMENTARY	1880 FOWLER AVE.	CLOVIS
Schools	JACKSON ELEMENTARY	1810 THIRD ST.	SANGER
Schools	MATHEW J BRLETIC ELEMENTARY	601 THIRD ST.	PARLIER
Schools	ALTA ELEMENTARY	21771 E. PARLIER AVE.	REEDLEY
Schools	DEBORAH A. WILLIAMS ELEMENTARY	525 W. SAGINAW	FRESNO
Schools	CLOVIS WEST HIGH	1070 E. TEAGUE AVE.	FRESNO
Schools	COOPER MIDDLE	2277 W. BELLAIRE WAY	FRESNO
Schools	EDISON COMPUTECH	555 E. BELGRAVIA	FRESNO
Schools	NELSON ELEMENTARY	1336 W. SPRUCE AVE.	PINEDALE
Schools	ROEDING ELEMENTARY	1225 W. DAKOTA AVE.	FRESNO
Schools	ROBINSON ELEMENTARY	555 E. BROWNING AVE.	FRESNO
Schools	ALVINA ELEMENTARY CHARTER	295 W. SAGINAW AVE.	CARUTHERS
Schools	MCCABE ELEMENTARY	250 S. DERRICK ST.	MENDOTA
Schools	JAMES GARFIELD ELEMENTARY	2535 B ST.	SELMA
Schools	TRANQUILLITY HIGH	6052 JUANCHE ST.	TRANQUILLITY
Schools	SANGER ACADEMY CHARTER	2207 NINTH ST.	SANGER
Schools	CLOVIS NORTH HIGH	2770 E. INTERNATIONAL AVE.	FRESNO
Schools	PERSHING CONTINUATION HIGH	855 W. NIELSEN	FRESNO
Schools	SELMA INDEPENDENT	2269 SYLVIA ST.	SELMA
Schools	FIREBAUGH MIDDLE	1600 16TH ST.	FIREBAUGH
Schools	WASHINGTON ELEMENTARY	1250 K ST.	REEDLEY
Schools	EL CAPITAN MIDDLE	4443 W. WELDON AVE.	FRESNO

Schools	VANG PAO ELEMENTARY	4100 E. HEATON AVE.	FRESNO
Schools	FREMONT ELEMENTARY	306 E. TUOLUMNE ST.	FOWLER
Schools	RIO VISTA MIDDLE	6240 W. PALO ALTO	FRESNO
Schools	LIBERTY ELEMENTARY	1250 E. LIBERTY HILL DR.	FRESNO
Schools	CENTERVILLE ELEMENTARY	48 S. SMITH AVE.	SANGER
Schools	FOWLER ACADEMY COMMUNITY DAY	975 E. ADAMS AVE.	FOWLER
Schools	PHILLIP J PATINO SCHOOL OF ENTREPRENE...	2000 E. CAMBRIDGE AVE.	FRESNO
Schools	RIO DEL REY HIGH (CONTINUATION)	13883 LASSEN AVE.	HELM
Schools	VIRGINIA R. BORIS ELEMENTARY	7071 E. CLINTON AVE.	FRESNO
Schools	MOUNTAIN VIEW (ALTERNATIVE)	877 E. N. AVE.	REEDLEY
Schools	MALAGA ELEMENTARY	3910 S. WARD AVE.	FRESNO
Schools	LATON MIDDLE	6065 E. LATONIA	LATON
Schools	VIOLET HEINTZ EDUCATION ACADEMY	4939 E. YALE AVE.	FRESNO
Schools	FRESNO ROP	1318 E. SHAW AVE. STE. 420	FRESNO
Schools	MAPLE CREEK ELEMENTARY	2025 E. TEAGUE AVE.	FRESNO
Schools	STARR ELEMENTARY	1780 W. SIERRA AVE.	FRESNO
Schools	AKIRA YOKOMI ELEMENTARY	2323 E. MCKENZIE	FRESNO
Schools	KERMAN MIDDLE	601 S. FIRST ST.	KERMAN
Schools	WASHINGTON ELEMENTARY	1599 FIFTH ST.	MENDOTA
Schools	ROOSEVELT ELEMENTARY	2600 N. GARFIELD AVE.	FRESNO
Schools	TURNER ELEMENTARY	5218 E. CLAY AVE.	FRESNO
Schools	COLUMBIA ELEMENTARY	1025 S. TRINITY ST.	FRESNO
Schools	TEHIPITE MIDDLE	630 N. AUGUSTA	FRESNO
Schools	JEFFERSON ELEMENTARY	1110 TUCKER ST.	SANGER
Schools	MADISON ELEMENTARY	2324 CHERRY ST.	SANGER
Schools	FOOTHILL ELEMENTARY	29147 AUBERRY RD.	PRATHER
Schools	FORKNER ELEMENTARY	7120 N. VALENTINE AVE.	FRESNO
Schools	LIBERTY ELEMENTARY	16001 E ST.	KERMAN
Schools	WEST FRESNO MIDDLE	2888 S. IVY ST.	FRESNO
Schools	SEQUOIA MIDDLE	4050 E. HAMILTON AVE.	FRESNO
Schools	MENDOTA COMMUNITY DAY	241 SMOOT AVE.	MENDOTA
Schools	LONE STAR ELEMENTARY	2617 S. FOWLER AVE.	FRESNO
Schools	SUSAN B. ANTHONY ELEMENTARY	1542 E. WEBSTER ST.	FRESNO
Schools	SAN JOAQUIN VALLEY HIGH	900 NEWMARK AVE.	PARLIER
Schools	ORANGE CENTER ELEMENTARY	3530 S. CHERRY AVE.	FRESNO
Schools	WINCHELL ELEMENTARY	3722 E. LOWE ST.	FRESNO
Schools	JACKSON ELEMENTARY	3750 E. PLATT AVE.	FRESNO
Schools	LAWLESS ELEMENTARY	5255 N. REESE AVE.	FRESNO
Schools	TIOGA MIDDLE	3232 E. FAIRMONT AVE.	FRESNO
Schools	YOSEMITE MIDDLE	1292 N. NINTH ST.	FRESNO
Schools	FIREBAUGH COMMUNITY DAY	1666 SAIPAN AVE.	FIREBAUGH
Schools	ARTHUR E. MILLS INTERMEDIATE	1191 P ST.	FIREBAUGH
Schools	FRESNO HIGH	1839 ECHO AVE.	FRESNO
Schools	DEWOLF CONTINUATION HIGH	2445 W. DAKOTA AVE.	FRESNO
Schools	HOMAN ELEMENTARY	1602 W. HARVARD ST.	FRESNO
Schools	PARLIER HIGH	603 THIRD ST.	PARLIER
Schools	EZEKIEL BALDERAS ELEMENTARY	4625 E. FLORENCE AVE.	FRESNO
Schools	CITRUS MIDDLE	1400 ANCHOR AVE.	ORANGE COVE
Schools	REEDLEY MIDDLE COLLEGE HIGH	995 N. REED AVE.	REEDLEY
Schools	LATON HIGH	6449 DEWOODY	LATON
Schools	BAIRD MIDDLE	5500 N. MAROA AVE.	FRESNO
Schools	WEST PARK ELEMENTARY	2695 S. VALENTINE AVE.	FRESNO
Schools	CARUTHERS HIGH	2580 W. TAHOE AVE.	CARUTHERS
Schools	ROWELL ELEMENTARY	3460 E. MCKENZIE ST.	FRESNO
Schools	SILAS BARTSCH	2225 E. N. AVE.	REEDLEY
Schools	LANE ELEMENTARY	4730 E. LOWE AVE.	FRESNO
Schools	FIREBAUGH HIGH	1976 MORRIS KYLE DR.	FIREBAUGH
Schools	ANN B. LEAVENWORTH	4420 E. THOMAS AVE.	FRESNO
Schools	MIGUEL HIDALGO ELEMENTARY	3550 E. THOMAS AVE.	FRESNO
Schools	JOHN C MARTINEZ ELEMENTARY	13174 E. PARLIER AVE.	PARLIER
Schools	SUNNYSIDE HIGH	1019 S. PEACH AVE.	FRESNO
Schools	AYER ELEMENTARY	5272 E. LOWE AVE.	FRESNO
Schools	FULTON	3058 N. MILLBROOK AVE.	FRESNO
Schools	LINCOLN ELEMENTARY	374 E. N. AVE.	REEDLEY
Schools	HURON MIDDLE	16875 FOURTH ST.	HURON
Schools	MADISON ELEMENTARY	330 S. BRAWLEY AVE.	FRESNO
Schools	AYNESWORTH ELEMENTARY	4765 E. BURNS AVE.	FRESNO

Schools	ERIC WHITE ELEMENTARY	2001 MITCHELL	SELMA
Schools	HURON ELEMENTARY	36131 N ST.	HURON
Schools	PATHWAY COMMUNITY DAY	11 S. TEILMAN	FRESNO
Schools	ROOSEVELT HIGH	4250 E. TULARE ST.	FRESNO
Schools	ERICSON ELEMENTARY	4774 E. YALE AVE.	FRESNO
Schools	BURROUGHS ELEMENTARY	166 N. SIERRA VISTA AVE.	FRESNO
Schools	NORMAN LIDDELL ELEMENTARY	5455 W. ALLUVIAL AVE.	FRESNO
Schools	RIVERDALE ELEMENTARY	3700 STATHEM ST.	RIVERDALE
Schools	FREMONT ELEMENTARY	1005 W. WELDON	FRESNO
Schools	RED BANK ELEMENTARY	1454 LOCAN AVE.	CLOVIS
Schools	HEATON ELEMENTARY	1533 N. SAN PABLO AVE.	FRESNO
Schools	VALLEY ROP	1305 Q ST.	SANGER
Schools	KINGS CANYON CONTINUATION	10026 S. CRAWFORD AVE.	DINUBA
Schools	MENDOTA HIGH	1200 BELMONT AVE.	MENDOTA
Schools	KC KIDS PRE-SCHOOL	1220 E. WASHINGTON AVE.	REEDLEY
Schools	CLARK INTERMEDIATE	902 FIFTH ST.	CLOVIS
Schools	JAMES K. POLK ELEMENTARY	2195 N. POLK AVE.	FRESNO
Schools	GETTYSBURG ELEMENTARY	2100 GETTYSBURG AVE.	CLOVIS
Schools	DEL MAR ELEMENTARY	4122 N. DEL MAR AVE.	FRESNO
Schools	HEARTLAND HIGH (CONTINUATION)	2269 SYLVIA ST.	SELMA
Schools	THEODORE ROOSEVELT ELEMENTARY	1802 FLORAL AVE.	SELMA
Schools	JOHN S. WASH ELEMENTARY	6350 E. LN. AVE.	FRESNO
Schools	ORANGE COVE HIGH	1700 ANCHOR AVE.	ORANGE COVE
Schools	JEFFERSON ELEMENTARY	202 N. MARIPOSA ST.	FRESNO
Schools	GRANITE RIDGE INTERMEDIATE	2770 E. INTERNATIONAL AVE.	FRESNO
Schools	WILSON ELEMENTARY	2131 W. ASHLAN AVE.	FRESNO
Schools	WASHINGTON COLONY ELEMENTARY	130 E. LINCOLN AVE.	FRESNO
Schools	RIVERVIEW ELEMENTARY	8662 S. LAC JAC AVE.	PARLIER
Schools	WESTSIDE ELEMENTARY	19191 W. EXCELSIOR AVE.	FIVE POINTS
Schools	A. L. CONNER ELEMENTARY	222 FOURTH ST.	ORANGE COVE
Schools	FORT MILLER MIDDLE	1302 E. DAKOTA AVE.	FRESNO
Schools	EASTERBY ELEMENTARY	5211 E. TULARE ST.	FRESNO
Schools	EL PUENTE HIGH	1691 SAIPAN AVE.	FIREBAUGH
Schools	CLOVIS COMMUNITY DAY ELEMENTARY	1715 DAVID E COOK WAY	CLOVIS
Schools	OASIS CONTINUATION HIGH	2311 SIERRA ST.	KINGSBURG
Schools	DAVID L. GREENBERG ELEMENTARY	5081 E. LN. AVE.	FRESNO
Schools	HARVEST ELEMENTARY	6514 W. GETTYSBURG AVE.	FRESNO
Schools	FOWLER ACADEMY COMMUNITY DAY (9-12)	975 E. ADAMS AVE.	FOWLER
Schools	WEBSTER ELEMENTARY	2600 E. TYLER	FRESNO
Schools	PINE RIDGE ELEMENTARY	45828 AUBERRY RD.	AUBERRY
Schools	CLOVIS HIGH	1055 FOWLER AVE.	CLOVIS
Schools	SAN JOAQUIN ELEMENTARY	8535 S. NINTH	SAN JOAQUIN
Schools	SELMA HIGH	3125 WRIGHT ST.	SELMA
Schools	FAIRMONT ELEMENTARY	3095 N. GREENWOOD AVE.	SANGER
Schools	GOLDENROD ELEMENTARY	445 S. GOLDENROD AVE.	KERMAN
Schools	ALTA SIERRA INTERMEDIATE	380 W. TEAGUE AVE.	CLOVIS
Schools	SIERRA JUNIOR HIGH	33326 LODGE RD.	TOLLHOUSE
Schools	SIERRA VISTA ELEMENTARY	510 BARSTOW AVE.	CLOVIS
Schools	NORSEMAN ELEMENTARY	4636 E. WELDON AVE.	FRESNO
Schools	ERMA DUNCAN POLYTECHNICAL HIGH	4330 E. GARLAND AVE.	FRESNO
Schools	WISHON ELEMENTARY	3857 E. HARVARD AVE.	FRESNO
Schools	GREAT WESTERN ELEMENTARY	5051 S. FRANKWOOD AVE.	REEDLEY
Schools	RAISIN CITY ELEMENTARY	6425 W. BOWLES AVE.	RAISIN CITY
Schools	TENAYA MIDDLE	1239 W. MESA AVE.	FRESNO
Schools	BIG CREEK ELEMENTARY	55190 POINT RD.	BIG CREEK
Schools	KINGSBURG INDEPENDENT STUDY HIGH	2311 SIERRA ST.	KINGSBURG
Schools	CARUTHERS ELEMENTARY	13699 S. QUINCE	CARUTHERS
Schools	ROGER S. ORAZA ELEMENTARY	3468 N. ARMSTRONG AVE.	FRESNO
Schools	NAVELENCIA MIDDLE	22620 E. WAHTOKE AVE.	REEDLEY
Schools	KINGS CANYON MIDDLE	5117 E. TULARE ST.	FRESNO
Schools	MCCARDLE ELEMENTARY	577 E. SIERRA AVE.	FRESNO
Schools	THOMAS LAW REED ELEMENTARY	1400 N. FRANKWOOD AVE.	REEDLEY
Schools	LINCOLN ELEMENTARY	774 E. ALLUVIAL AVE.	FRESNO
Schools	RIVERVIEW ELEMENTARY	2491 E. BEHYMER AVE.	FRESNO
Schools	REEDLEY HIGH	740 W. N. AVE.	REEDLEY
Schools	MICKEY COX ELEMENTARY	2191 SIERRA AVE.	CLOVIS
Schools	KERMAN-FLOYD ELEMENTARY	14655 W. F ST.	KERMAN

Schools	CAMBRIDGE HIGH	516 BAKER ST.	COALINGA
Schools	CENTRAL UNIFIED ALTERNATIVE/OPPORTUNITY	2698 N. BRAWLEY	FRESNO
Schools	WOODS (HAROLD L.) ELEMENTARY	700 TEAGUE AVE.	CLOVIS
Schools	FIGARDEN ELEMENTARY	6235 N. BRAWLEY AVE.	FRESNO
Schools	DEL REY ELEMENTARY	10620 MORRO ST.	DEL REY
Schools	MENDOTA ELEMENTARY	605 BASS AVE.	MENDOTA
Schools	LINCOLN ELEMENTARY	1900 MARIPOSA ST.	KINGSBURG
Schools	MIRAMONTE ELEMENTARY	1590 BELLAIRE AVE.	CLOVIS
Schools	HALLMARK CHARTER	2445 NINTH ST.	SANGER
Schools	HANH PHAN TILLEY ELEMENTARY	2280 N. VALENTINE AVE.	FRESNO
Schools	RUTHERFORD B. GASTON SR. MIDDLE	1100 E. CHURCH AVE.	FRESNO
Schools	MONROE ELEMENTARY	11842 S. CHESTNUT AVE.	FRESNO
Schools	FRESNO CITY AND FRESNO STATE PRESCHOOLS	1101 E. UNIV AVE.	FRESNO
Schools	CLAY ELEMENTARY	12449 S. SMITH AVE.	KINGSBURG
Schools	REAGAN ELEMENTARY	3701 ASHLAN AVE.	CLOVIS
Schools	SLATER ELEMENTARY	4472 N. EMERSON AVE.	FRESNO
Schools	KIRK ELEMENTARY	2000 E. BELGRAVIA AVE.	FRESNO
Schools	COPPER HILLS ELEMENTARY	1881 E. PLYMOUTH AVE.	FRESNO
Schools	S BEN BENAVIDEZ ELEMENTARY	13900 TUOLUMNE ST.	PARLIER
Schools	PATHWAY ELEMENTARY COMMUNITY DAY	21 S. TEILMAN	FRESNO
Schools	LINCOLN ELEMENTARY	1100 MONO ST.	FRESNO
Schools	QUAIL LAKE ENVIRONMENTAL CHARTER	4087 N. QUAIL LAKE DR.	CLOVIS
Schools	IRWIN O. ADDICOTT ELEMENTARY	4784 E. DAYTON AVE.	FRESNO
Schools	MILES W. CULWELL COMMUNITY DAY	275 CAMBRIDGE AVE.	COALINGA
Schools	JAMES S. FUGMAN ELEMENTARY	10825 N. CEDAR AVE.	FRESNO
Schools	GENERAL GRANT MIDDLE	360 N. E. AVE.	REEDLEY
Schools	HORIZON HIGH	3086 W. MT. WHITNEY AVE.	RIVERDALE
Schools	BUD RANK ELEMENTARY	3650 POWERS AVE.	CLOVIS
Schools	WASHINGTON ACADEMIC MIDDLE	1705 TENTH ST.	SANGER
Schools	LINCOLN ELEMENTARY	1700 14TH ST.	SANGER
Schools	MARIO G. OLMOS ELEMENTARY	550 S. GARDEN AVE.	FRESNO
Schools	ROOSEVELT ELEMENTARY	1185 TENTH ST.	KINGSBURG
Schools	SANDY BLUFFS ALTERNATIVE EDUCATION CE...	33280 LODGE RD.	TOLLHOUSE
Schools	FANCHER CREEK ELEMENTARY	5948 E. TULARE AVE.	FRESNO
Schools	KING ELEMENTARY	1001 E. FLORENCE AVE.	FRESNO
Schools	COMMUNITY DAY	818 L ST.	SANGER
Schools	EDISON-BETHUNE CHARTER ACADEMY	1616 S. FRUIT AVE.	FRESNO
Schools	SIERRA CHARTER	1931 N. FINE AVE.	FRESNO
Schools	CRESCENT VIEW WEST PUBLIC CHARTER	1901 E. SHIELDS AVE. STE. 105	FRESNO
Schools	ASPEN VALLEY PREP ACADEMY	4221 N. HUGHES	FRESNO
Schools	HUME LAKE CHARTER	64144 HUME LAKE RD.	HUME
Schools	BIG PICTURE EDUCATIONAL ACADEMY	1207 S. TRINITY ST.	FRESNO
Schools	UNIVERSITY HIGH	2611 E. MATOIAN M/S UH134	FRESNO
Schools	KEPLER NEIGHBORHOOD	1462 BRD.WAY ST.	FRESNO
Schools	CAREER TECHNICAL EDUCATION CHARTER	1320 N. MARIPOSA ST.	FRESNO
Schools	SCHOOL OF UNLIMITED LEARNING	2336 CALAVERAS ST.	FRESNO
Schools	AMBASSADOR PHILLIP V. SANCHEZ II PUBL...	830 FRESNO ST.	FRESNO
Schools	W.E.B. DUBOIS PUBLIC CHARTER	2604 MLK BLVD.	FRESNO
Schools	ASPEN MEADOW PUBLIC	1400 E. SAGINAW WAY	FRESNO
Schools	CARTER G. WOODSON PUBLIC CHARTER	3333 N. BOND AVE.	FRESNO
Schools	CRESCENT VIEW SOUTH II	4348 W. SHAW AVE.	FRESNO
Schools	YOSEMITE VALLEY CHARTER	1781 E. FIR AVE. STE. #101	FRESNO
Schools	ENDEAVOR CHARTER	777 W. SHAW	FRESNO
Schools	TRUTH TABERNACLE CHRISTIAN SCHOOL	4411 N 1ST ST	FRESNO
Schools	NEW HEIGHTS CHRISTIAN ACADEMY	5690 E SHIELDS AVE	FRESNO
Schools	VALLEY CRESCENT SCHOOL	547 W NEES AVE	CLOVIS
Schools	CARDEN SCHOOL OF FRESNO	6901 N MAPLE AVE	FRESNO
Schools	FRESNO CHRISTIAN SCHOOLS	7280 N CEDAR AVE	FRESNO
Schools	OUR LADY OF PERPETUAL HELP SCHOOL	836 DEWITT AVE	CLOVIS
Schools	KERMAN CHRISTIAN SCHOOL	15495 W WHITESBRIDGE AVE	KERMAN
Schools	ST ANTHONY OF PADUA SCHOOL	5680 N MAROA AVE	FRESNO
Schools	FRESNO MONTESSORI SCHOOL	1572 E BARSTOW AVE	FRESNO
Schools	FAIRMONT PRIVATE SCHOOL	435 W FAIRMONT AVE	FRESNO
Schools	OUR LADY OF VICTORY ELEMENTARY SCHOOL	1626 W PRINCETON AVE	FRESNO
Schools	SAN JOAQUIN MEMORIAL HIGH SCHOOL	1406 N FRESNO STREE	FRESNO
Schools	FRESNO ADVENTIST ACADEMY	5397 E OLIVE AVE	FRESNO
Schools	ST HELENS SCHOOL	4888 E BELMONT AVE	FRESNO

Schools	ST LA SALLE ELEMENTARY SCHOOL	404 E MANNING AVE	REEDLEY
Schools	CHARLIE KEYAN ARMENIAN COMMUNITY SCHOOL	108 N VILLA AVE	CLOVIS
Schools	BRIGHTEN ACADEMY PRESCHOOL	1825 AUSTIN AVE	CLOVIS
Schools	APPLES OF GOLD EDUCATIONAL CENTER	7272 W SHAW AVE	FRESNO
Schools	CENTRAL VALLEY CHRISTIAN MOLOKAN SCHOOL	16201 W OLIVE AVE	KERMAN
Schools	CLOVIS CHRISTIAN SCHOOLS, LLC	3105 LOCAN AVE	CLOVIS
Schools	CREATIVE ALTERNATIVES SCHOOL	4460 E YALE AVE	FRESNO
Schools	KINDER CARE LEARNING CENTER	1190 W HERNDON AVE	PINEDALE
Schools	SEQUOIA CHRISTIAN SCHOOL	30506 GEORGE SMITH RD	SQUAW VALLEY
Schools	DEVRY UNIVERSITY - FRESNO CAMPUS	7575 N. FRESNO ST	FRESNO
Schools	UNIVERSITY OF CALIFORNIA-MERCED - FRESNO	550 E SHAW AVE	FRESNO
Schools	ADVANCED CAREER INSTITUTE - FRESNO CA...	2953 SE AVE	FRESNO
Schools	GURNICK ACADEMY OF MEDICAL ARTS - FRE...	7335 NORTH PALMS BLUFFS AVENUE	FRESNO
Schools	FRESNO PACIFIC UNIVERSITY - NORTH FRE...	5 RIVER PARK PL W #303	FRESNO
Schools	CALIFORNIA INSTITUTE OF MEDICAL SCIENCE	1175 SHAW AVENUE # 103	CLOVIS
Schools	CLOVIS ADULT EDUCATION	1452 DAVID E COOK WAY	CLOVIS
Schools	PRINCESS INSTITUTE OF BEAUTY	1605 EAST MANNING AVENUE	REEDLEY
Schools	UEI COLLEGE-FRESNO	3602 N. BLACKSTONE, SUITE 0268	FRESNO
Schools	CALIFORNIA CHRISTIAN COLLEGE	5364 E. BELMONT AVENUE	FRESNO
Schools	CALIFORNIA HEALTH SCIENCES UNIVERSITY	120 NORTH CLOVIS AVENUE	CLOVIS
Schools	CLOVIS COMMUNITY COLLEGE	10309 NORTH WILLOW AVENUE	FRESNO
Schools	PAUL MITCHELL THE SCHOOL-FRESNO	5091 N FRESNO STREET STE 104	FRESNO
Schools	LAWRENCE & COMPANY COLLEGE OF COSMETO...	2048 GRANT STREET	SELMA
Schools	REEDLEY COLLEGE	995 N REED AVE	REEDLEY
Schools	INSTITUTE OF TECHNOLOGY	564 W HERNDON	CLOVIS
Schools	FRESNO CITY COLLEGE	1101 E. UNIVERSITY AVE	FRESNO
Schools	STATE CENTER COMMUNITY COLLEGE DISTRICT	1171 FULTON STREET	FRESNO
Schools	CALIFORNIA STATE UNIVERSITY-FRESNO	5241 N MAPLE AVE	FRESNO
Schools	LYLE'S COLLEGE OF BEAUTY	6735 N FIRST AVE STE 112	FRESNO
Schools	COALINGA MIDDLE	265 CAMBRIDGE AVE.	COALINGA
Schools	NELL DAWSON ELEMENTARY	1303 SUNSET AVE.	COALINGA
Schools	FRESNO PACIFIC UNIVERSITY	1717 S CHESTNUT AVE	FRESNO
Schools	SAN JOAQUIN COLLEGE OF LAW	901 FIFTH ST	CLOVIS
Schools	MILAN INSTITUTE-FRESNO	255 W. BULLARD AVE	FRESNO
Schools	COALINGA HIGH	750 VAN NESS AVE.	COALINGA
Schools	KINGS RIVER HIGH (CONTINUATION)	1801 SEVENTH ST.	SANGER
Schools	TAFT HIGH	1801 SEVENTH ST.	SANGER
Schools	SUNSET ELEMENTARY	985 SUNSET AVE.	COALINGA
Schools	HENRY F. BISHOP ELEMENTARY	615 BAKER ST.	COALINGA
Schools	ANNIE E. CHENEY KINDERGARTEN	149 ADAMS ST.	COALINGA
Schools	WEST HILLS COLLEGE-COALINGA	300 CHERRY LANE	COALINGA
Schools	WILSON ELEMENTARY	610 FALLER ST.	SANGER
Schools	WEST HILLS COMMUNITY COLLEGE DISTRICT	9900 CODY STREET	COALINGA
Waster Water Treatment Facilities	WWTF	1295 W OLSEN AVE	REEDLEY
Waster Water Treatment Facilities	MALAGA WWTF	3749 SOUTH MAPLE AVENUE	FRESNO
Waster Water Treatment Facilities	CLOVIS SEWAGE TREATMENT AND WATER REU...	9700 E ASHLAN AVE	CLOVIS
Waster Water Treatment Facilities	NORTH FRESNO WWRF	1660 E. COPPER AVENUE	FRESNO

Annex A: City of Clovis



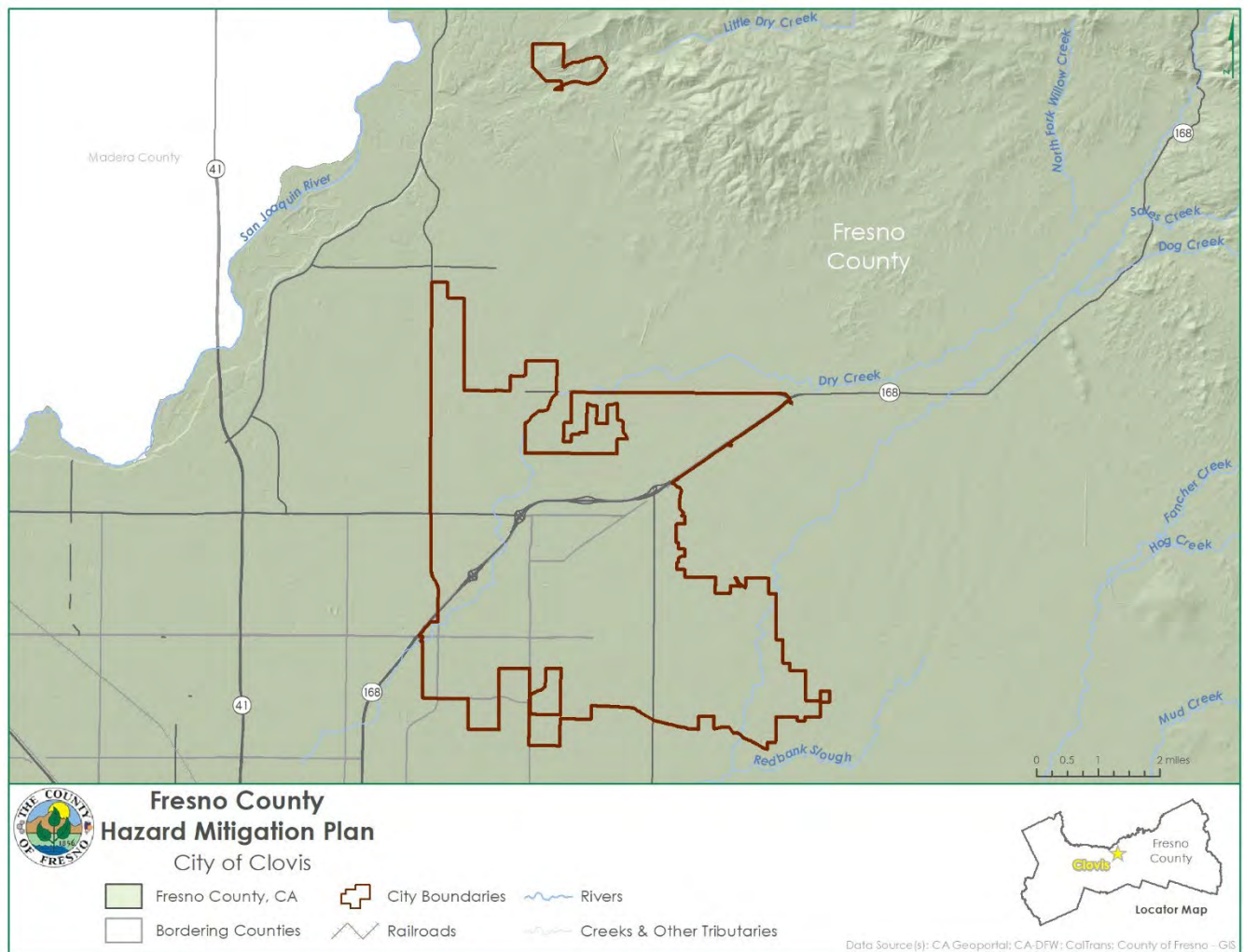
PARTICIPATION

To update the City of Clovis' jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of Clovis' input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of Clovis did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee. These stakeholders are documented in Appendix B.

COMMUNITY PROFILE

Figure 1. City of Clovis displays a map and the location within Fresno County of the City of Clovis.

Figure 1. City of Clovis



Source: CA-Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

GEOGRAPHY AND CLIMATE

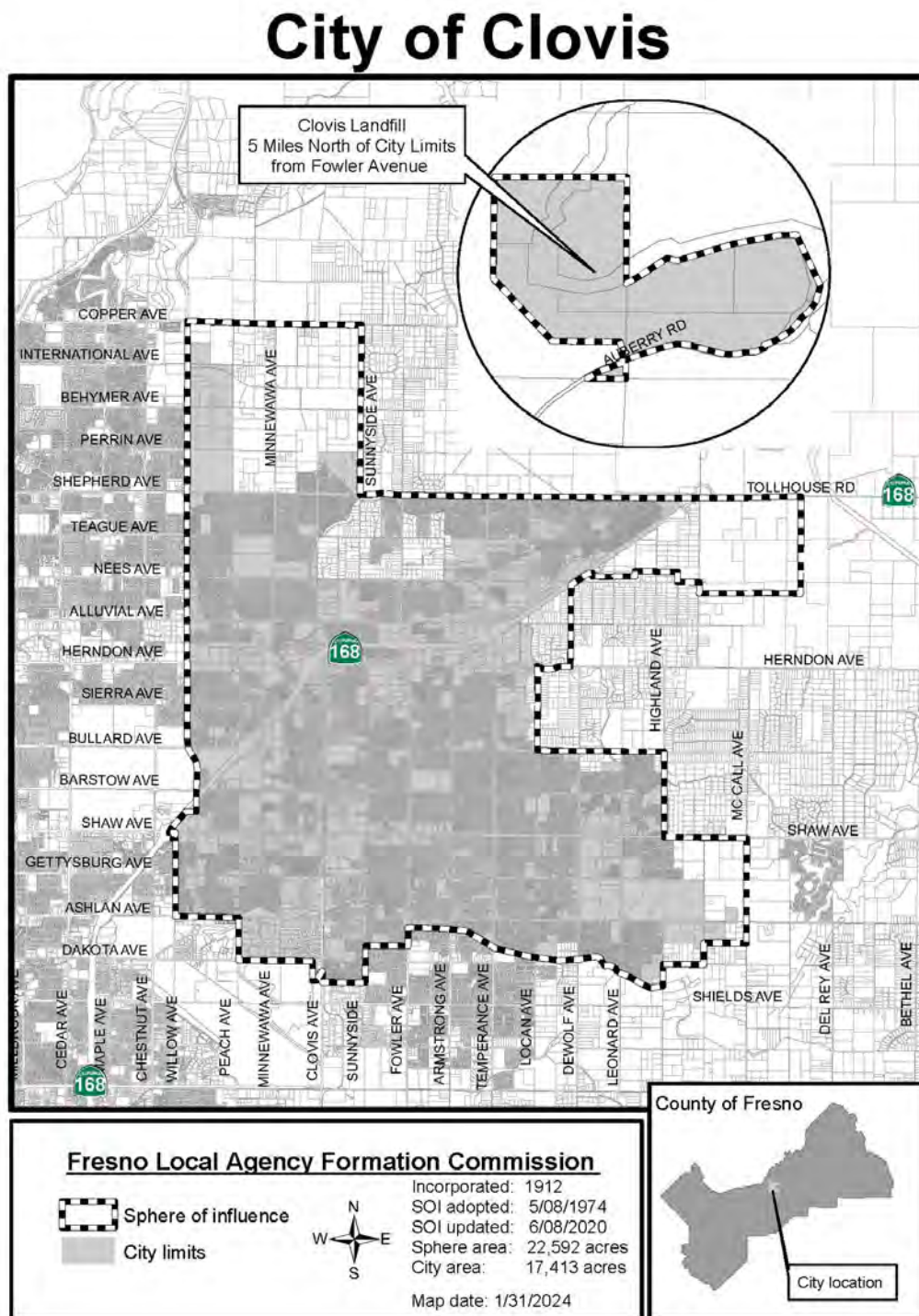
Located in the northeast quadrant of the Fresno-Clovis Metropolitan Area in northern Fresno County, Clovis is situated in the midst of the agriculturally rich San Joaquin Valley. The Clovis planning area encompasses, which include the Sphere of Influence (SOI), is approximately 40,000 acres, shown in **Figure 2. City of Clovis Limits and Sphere of Influence**. In recent years, the city has annexed land in the southeast near Dog Creek and expanded its Sphere of Influence in the north. All lands outside of the City's Sphere of Influence are regulated by the Fresno County General Plan and zoning designations. However, state law requires that cities plan for areas outside of their immediate jurisdiction if the areas have a direct relationship to planning needs.

Clovis consists of three distinct geographical areas: The City, which represents the incorporated City within the City limit boundaries; the Sphere of Influence, which corresponds to the City's existing Sphere of Influence; and the study area, which includes unincorporated Fresno County lands outside of the City's Sphere of Influence. Immediately beyond Clovis to the northeast are the western foothills of the Sierra Nevada Mountains. The City of Fresno and its Sphere of Influence are located to the southwest. The southwestern portion of Clovis is characterized by mostly urbanized land uses, whereas the northern and eastern portions of Clovis are predominantly rural in nature, comprised of agricultural, rural, residential, and vacant land uses.

Clovis has an average annual temperature of 64.9°F and receives 17.1 inches of rain, shown in the figure below. While the average is relatively temperate, summer and winter months bring unique weather patterns to the region. During the winter, high temperatures hover in the 50's. **Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)** shows the monthly temperature and precipitation normals for the nearest National Weather Service (NWS) weather station which is at the Fresno-Yosemite International Airport. Combined with the regional geography and precipitation during this time, Clovis experiences numerous days with dense fog, which has its greatest impact on transportation: accident rates jump 50 percent on foggy days.¹

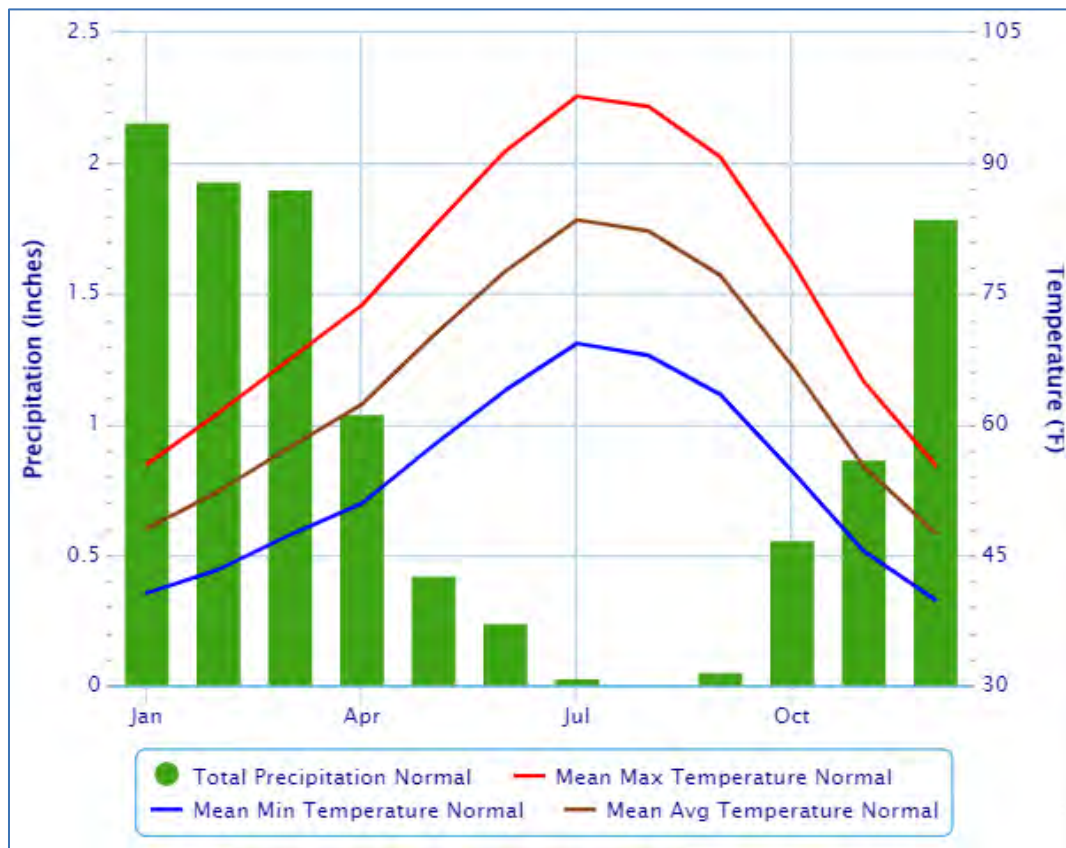
¹ Clovis Fire Department, Community Risk Assessment Standards of Cover 2022-2027 <https://cityofclovis.com/wp-content/uploads/2022/11/Standards-of-Cover-2022-2027.pdf>

Figure 2. City of Clovis Limits and Sphere of Influence



Source: Fresno Local Agency Formation Commission,
https://www.fresnolafo.org/files/d49225f78/Clovis_01312024.pdf

Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: National Weather Service (NWS)

The figure above shows the monthly precipitation and temperature normal for the Fresno-Yosemite International Airport weather station, which is the closest station to the City of Clovis.

During the summer months, the region has extended periods where temperatures exceed 100°F. While the average temperature is 90°F during the summer, these extended heat waves impact the medically fragile, elderly, and animal populations. In addition to heat waves, the Fresno County region continues to suffer regular drought due to lower than normal snowpack in the Sierra Nevada, which supplies water for agricultural use and replenishes the groundwater supply.

HISTORY

The City of Clovis was named after the spirited pioneer, Clovis M. Cole, who spent nearly all of his life in the vicinity. The area was known for the thousands of acres of wheat that he had cultivated. The first thoughts of settlement, however, are credited to Padre Martin, who explored the area in 1806 while searching for a mission site. Missionaries and trappers were the first nonnative people to roam the area. Miners soon followed during the gold rush, forcibly displacing the many Native American tribes that were settled in the foothills and near the rivers.

Another early settler, Marcus Pollasky, proposed and coordinated the construction of a railroad through the grain, cattle, and mining country and into the timber-rich forests of the nearby Sierra. The City eventually grew up around the San Joaquin Division of the Southern Pacific Railroad, which played an important role in the founding and growth of Clovis. In addition to the arrival of the railroad, the completion of the 42-mile-long Shaver log flume, development of the 40-acre Clovis mill and finishing plant, expansion of grain production, and the livestock industry all contributed to the founding of Clovis in 1891. The City was incorporated in 1912.

ECONOMY

The City’s economic base consists of retail sales and services and light manufacturing. Availability of housing, quality hospital care, excellent schools with modern facilities, responsive safety services, a mild climate, access to varied recreational opportunities, and strong community identity all contribute to Clovis’ reputation as a great place to live.

Clovis has actively maintained a small-town community spirit as envisioned by its founders, exemplified by such community events as the annual Rodeo Days, Big Hat Days, and Clovisfest celebration. This community pride, combined with Clovis’ unique growth opportunities, continues to attract new residents, developers, businesses, and industries to the City.

Select estimates of economic characteristics for the City of Clovis are shown **Table 1. City of Clovis' Economic Characteristics**.

Table 1. City of Clovis' Economic Characteristics

Characteristics	City of Clovis
Persons in Poverty	8.4%
Median Household Income `	\$98,554
Median gross rent	\$1,482
Per Capita Income	\$41,909
Employed (16 years +)	66.4%
Unemployment	7.51%
Total employer establishments	N/A

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Clovis' Employment by Occupation and **Table 3. City of Clovis' Employment by Industry** show how the City of Clovis’ labor force breaks down by occupation and industry based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Clovis' Employment by Occupation

Occupation	# Employed	% Employed
Management, business, science, and arts occupations	24,265	39.50%

Occupation	# Employed	% Employed
Service Occupations	10,588	17.24%
Sales and Office Occupations	14,146	23.03%
Natural Resources, Construction, and Maintenance Occupations	4,079	6.64%
Production, transportation, and material moving occupations	8,347	13.59%
Total	61,425	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Clovis' Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care and Social Assistance	18,288	29.77%
Retail Trade	6,388	10.40%
Professional, Scientific, and Mgmt., and Administrative and Waste Mgmt. Services	5,323	8.67%
Manufacturing	2,620	4.27%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	4,392	7.15%
Construction	4,919	8.01%
Finance and Insurance, and Real Estate and Rental and Leasing	2,870	4.67%
Public Administration	3,907	6.36%
Other Services, Except Public Administration	3,165	5.15%
Wholesale Trade	2,075	3.38%
Transportation and Warehousing, and Utilities	5,754	9.37%
Agriculture, Forestry, Fishing and Hunting, and Mining	1,114	1.81%
Information	610	0.99%
Total	61,425	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

POPULATION

According to the U.S. Census Bureau's 2022 Population Estimates, the total population for the City of Clovis was estimated at 124,556. Select demographic and social characteristics for the City of Clovis from the 2018-2022 American Community Survey are shown in **Table 4. City of Clovis' Demographic and Social Characteristics**.

Table 4. City of Clovis' Demographic and Social Characteristics

Characteristics	City of Clovis
Gender/Age	
Male	48.7%
Female	51.3%
Median Age	34.8
Under 5 Years	6.9%
Under 18 Years	28.9%
65 Years and Over	13.1%
Race/Ethnicity	
White	59.3%
Asian	11.6%
Black or African American	3.1%
American Indian/Alaska Native	1.5%
Hispanic or Latino (of any race)	34.3%
Education	
High school graduate or higher	92.9%
Disability Status	
Persons with a disability, under age 65 years	6.6%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Clovis' planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Clovis (see **Table 6. City of Clovis - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Clovis.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
impacts localized or regional?	Large	Greater than 25% of area affected	4	
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	

Table 6. City of Clovis - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Minor	Negligible	12-24 hours*	Less than 1 week*	Medium
Avalanche	Unlikely	Minor	Negligible	Less than 6 hours	Less than 6 hours	Low
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours*	Medium*
Drought	Highly Likely**	Limited	Large	More than 24 hours	More than a week	Medium
Earthquake	Possible	Critical	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Likely	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Possible	Critical	Large	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Medium*
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Winter Storm	Highly Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Soil Hazards						
Erosion	Possible	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Possible	Minor	Negligible	N/A	N/A	Low
Landslide	Unlikely	Minor	Negligible	N/A	N/A	Low
Land Subsidence	Possible	Limited	No Data	N/A	N/A	Low
Volcano	Unlikely	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Possible	Limited	Small	12-24 hours*	More than 1 week*	Medium

*Rated on an average basis. For example, warning time for agricultural hazards vary by the type of hazard (When under the Warning Time and Duration column).

**Hazard “Overall Risk” column differs from the risk factor methodology used based on the jurisdiction’s Hazard Risk Assessment Worksheet. For example, the “Overall Risk” for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.*

***The City of Clovis feels that the frequency of drought within their jurisdiction merits reflecting this hazard as highly likely, which differs from the assessments found elsewhere in this plan.*

Note: N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.

VULNERABILITY ASSESSMENT

The intent of this section is to assess Clovis' vulnerability separate from that of the planning area, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Clovis - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Clovis' HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

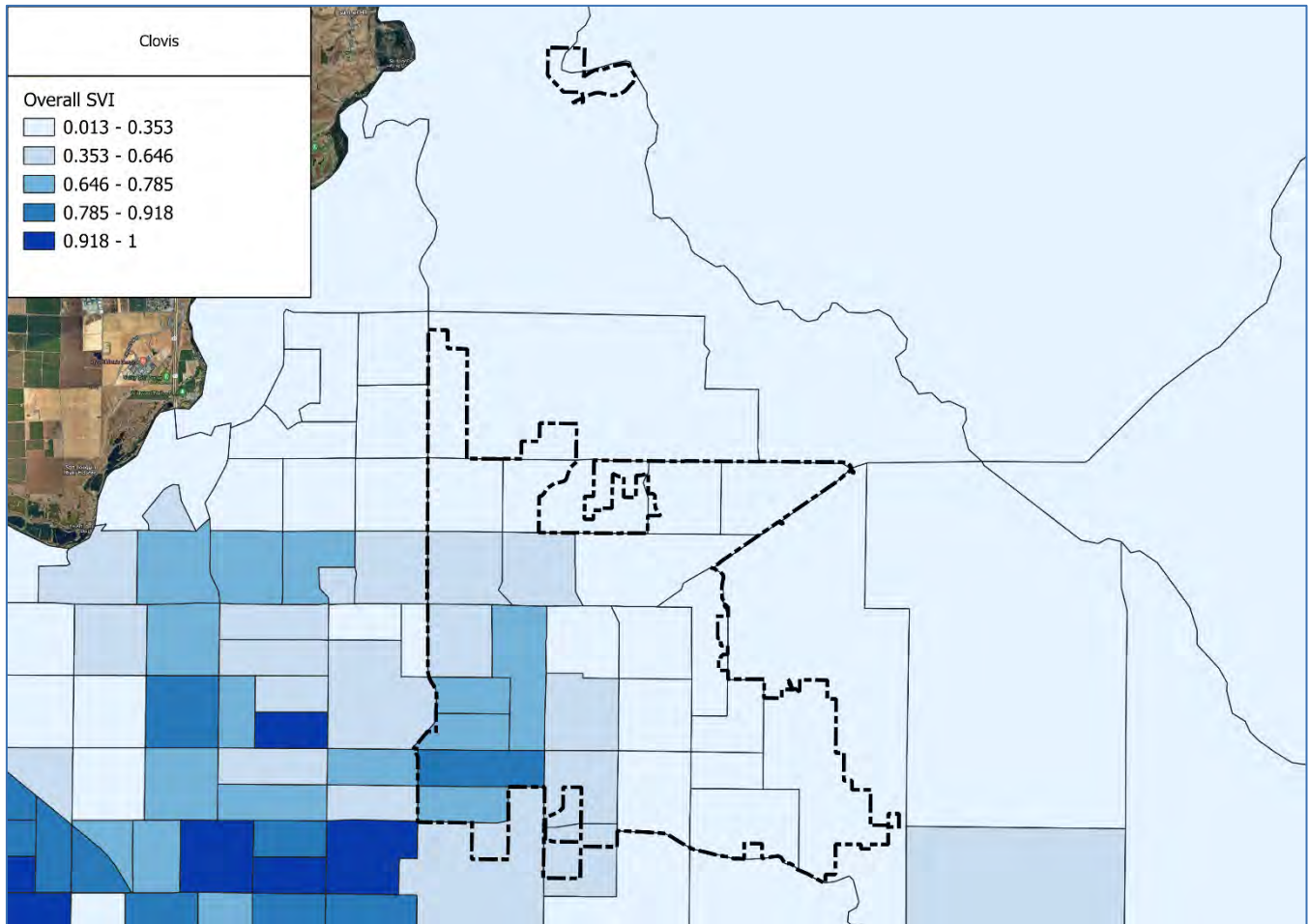
POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Clovis, census tracts with a higher SVI are clustered near the southwestern portion of the City, as shown in **Figure 4. City of Clovis Social Vulnerability Index Map**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.). ²

² CDC/ATSDR Social Vulnerability Index (SVI) | Place and Health | ATSDR
https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html

Figure 4. City of Clovis Social Vulnerability Index Map



Source: CDC 2022 Social Vulnerability Index, City of Clovis Municipal Boundary

ASSETS AT RISK

This section considers Clovis' assets at risk, including population, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Clovis from Fresno County GIS is provided in **Table 7. City of Clovis' Critical Facilities** and in **Figure 5. City of Clovis Critical Facilities**.

Table 7. City of Clovis' Critical Facilities

Facility Type	Counts
CalARP	2
Colleges & Universities	3
Fire Station	9
Fire Support Facilities	3
Health Care	1
Police	2
School	36
Water/Wastewater	2
Communications	3
Total	58

Source: Fresno County, HAZUS Critical Facilities 2023

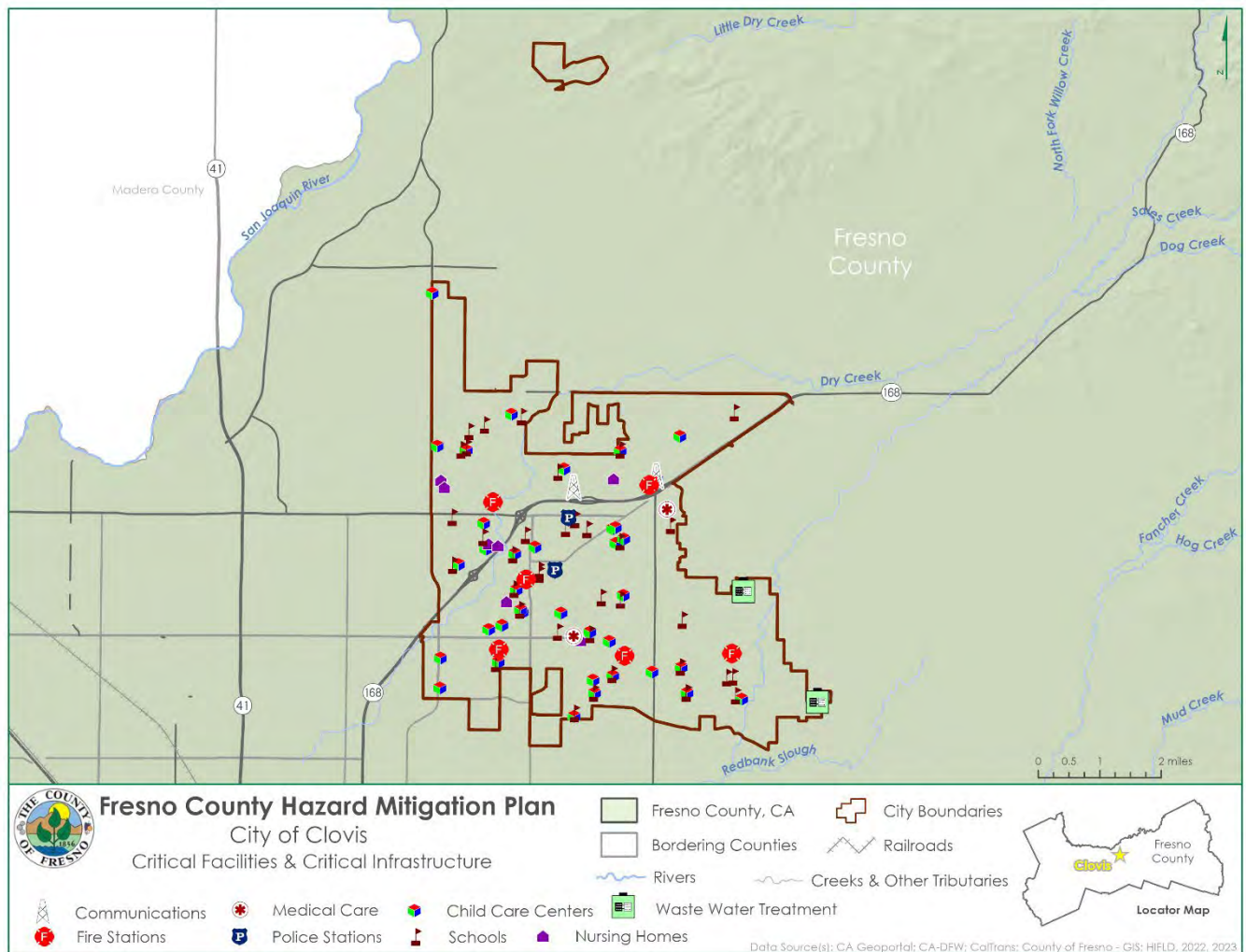
HIGH POTENTIAL LOSS FACILITIES

High potential loss facilities as identified by FEMA HAZUS-MH are located throughout Clovis. Clovis works closely with the Clovis Unified School District, Fresno Metropolitan Flood Control District, and elder care property owners in monitoring and assessing facilities that fall into this category that are not owned by the City.

TRANSPORTATION AND LIFELINE FACILITIES

Transportation and lifeline facilities are located in the center and northeast portion of Clovis. Highway 168 is the major thoroughfare through Clovis. The surface water treatment plant converts raw water from the Enterprise Canal (originating from the Kings River) into potable water for the residents of Clovis. This additional water production enables the City to turn off a portion of its groundwater wells throughout the year, resulting in the replenishment of the water table. The plant is capable of treating and delivering up to 15 million gallons per day of potable water to the City's customers (expandable to 45 million gallons per day).

Figure 5. City of Clovis Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; HIFLD, 2022, 2023

HISTORIC RESOURCES

While the City of Clovis has no registered state or federal historic sites, there are several assets within Clovis that define the community and represent the City's history. Some of the historical sites of importance to Clovis are listed below.

- The Clovis Rodeo Grounds: 748 Rodeo Dr, Clovis, CA
- The Water Tower on 4th Street and Veterans Parkway
- The "Stones" / "All Class Stones" at Clovis Veterans Memorial Square: 808 4th St, Clovis, CA
- The Clovis – Big Dry Creek Museum: 401 Pollasky Ave, Clovis, CA
- Cecil Cox American Legion Post 147
- The San Joaquin College of Law: 901 5th St, Clovis, CA
- Crossover Church of God: 434 5th St, Clovis, CA
- Clovis Carnegie Library, now the Clovis Chamber of Commerce: 325 Pollasky Ave, Clovis, CA
- The Clovis Veterans Memorial Building: 808 4th St, Clovis, CA
- The Tarpey Depot: 99 Clovis Avenue, Clovis, CA
- The J.E. Good Building: 454 Clovis Ave, Clovis, CA

ECONOMIC ASSETS

Clovis is the home to the Fresno County Department of Social Services, which employs more than 1,000 individuals. The loss of this facility could result in displaced employees and disrupted social services.

GROWTH AND DEVELOPMENT TRENDS

Clovis continues to be the premier choice for housing developers and home buyers in the Fresno/Clovis metropolitan area. The City has been aided by an outstanding school district, which ranks among the best in the nation. The City has a reputation for being a safe and friendly community to raise a family. The community is also making progress towards increased walkability as stretches of rail have been converted to public trails. However, land is costly and becoming very short in supply for housing, commercial, and industrial development. As Clovis strives to be more than a bedroom community, attention needs to be paid to preserving land for job generating activity in order to meet the jobs/housing balance.

Continued growth and development trends continue to be addressed at a local level and regional level through the Local Agency Formation Commission. These agencies coordinate to develop solutions that mitigate the impact of growth to land use, transportation, land use, air quality and access to services. Hazard vulnerability and mitigation is addressed through these governing bodies based on the subject matter expertise of local public safety agencies or special districts who have jurisdictional authority in particular areas.

Table 8. City of Clovis' Change in Population and Housing Units, 2015-2020 illustrates how the City has grown in terms of population and number of housing units between 2015 and 2020. As of 2020, the population of Clovis was 120,124 which is about 19.6 percent increase from 2015. Housing units have increased as well since 2015 with a four percent increase.

Table 8. City of Clovis' Change in Population and Housing Units, 2015-2020

2015 Population Estimate	2020 Population	Estimated Percent Change 2015- 2020	2015 Estimated # of Housing Units	2020 Estimated # of Housing Units	Estimated Percent Change 2015- 2020
100,437	120,124	19.6%+	36,270	37,726	4%+

Source: U.S. Census Bureau

Of the 37,726 housing units in Clovis, 65.1 percent are occupied. Owner-occupied units account for 60.2 percent of all occupied housing. Single family detached homes comprise 75.1 percent of the housing stock in the city. The southwestern portion of Clovis is characterized by mostly urbanized land uses, whereas the northern and eastern portions of Clovis are predominantly rural in nature and characterized by agricultural, rural, residential, and vacant land uses.

California state law (Government Code Section 65302) requires each city and county to have an adopted general plan, a blueprint for future growth and development that addresses issues directly related to land use decisions (see Figure A.3 for current land use designations). The law specifies that each general plan addresses eight issue areas: land use, circulation, open space, conservation, housing, safety, noise, and an environmental justice element, which has recently been added since the last hazard mitigation plan update. Currently, the City of Clovis general plan does not address the newly added environmental justice element in their 2014 plan.

Adopted in 1993, the City of Clovis General Plan Program provides comprehensive planning for the future. It encompasses what the City is now, and what it intends to be, and provides the overall framework of how to achieve this future condition. Estimates are made about future population, household types, and employment base, so that plans for land use, circulation, and facilities can be made to meet future needs. The general plan represents an agreement on the fundamental values and vision that is shared by the residents and the business community of Clovis and the surrounding area of interest. Its purpose is to provide decision makers and City staff with direction for confronting present issues as an aid in coordinating planning issues with other governmental agencies and for navigating the future.

Clovis' 2014 general plan is an update, expansion, and reorganization of the 1993 general plan. Significant changes to the planning area have occurred, expanding the boundaries of the new planning area to the north and east to include both a Sphere of Influence and a study area beyond the sphere. Pressure for development in the metropolitan area in and around the City of Clovis, the need for linkage to the regional transportation network, and the desire to establish Clovis in a pivotal position in the regional context warrant the decision to greatly expand the planning area as the foundation for the update and augmentation of the general plan. Clovis' general plan consists of eight separate elements:

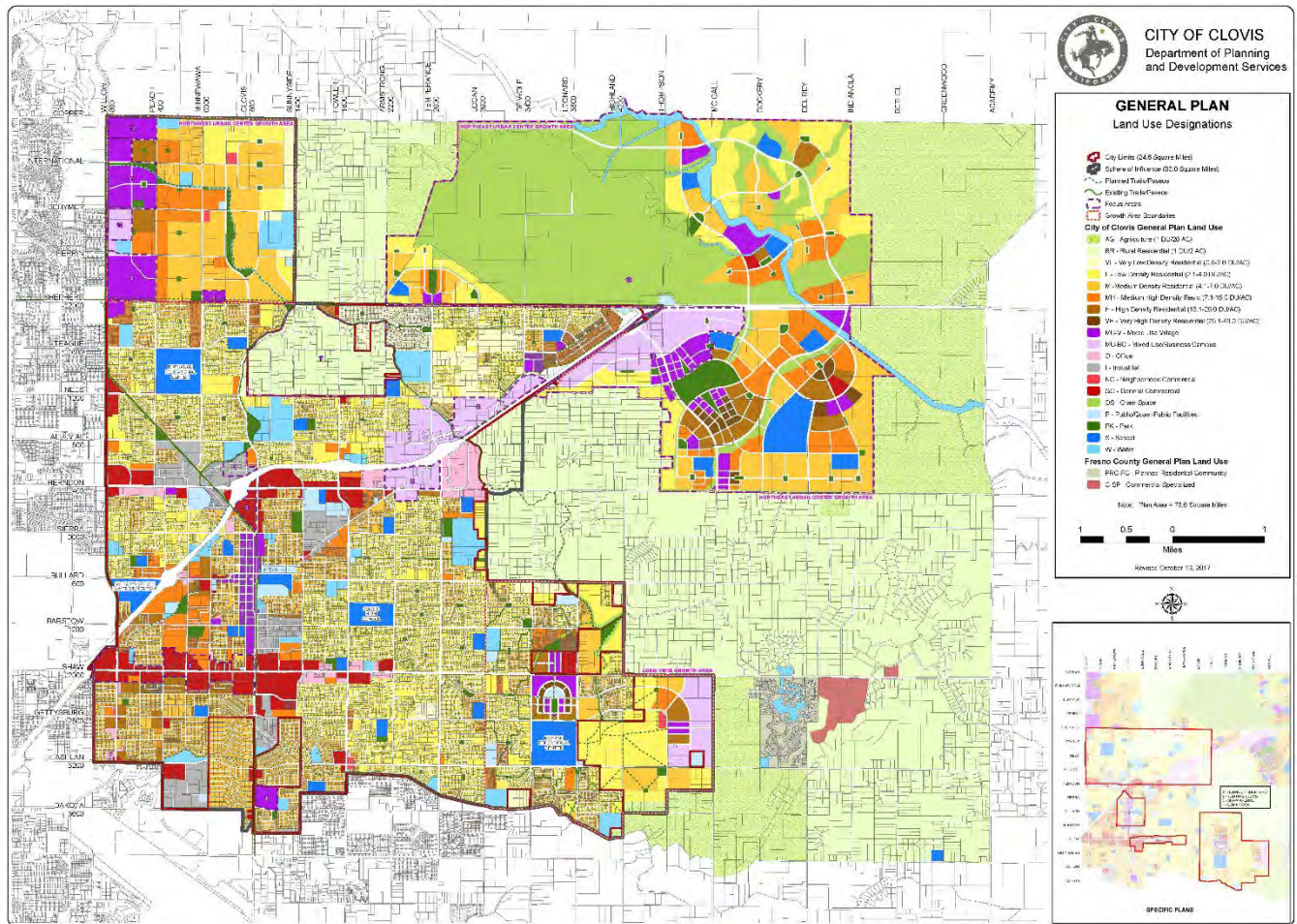
- Land Use
- Economic Development
- Circulation
- Housing
- Public Facilities and Services
- Environmental Safety
- Open Space and Conservation
- Air Quality

Mitigation activities continue to be done in accordance with applicable state and federal requirements for floodplain management and in coordination with the Fresno Metropolitan Flood Control District which maintains regional responsibility for water management. Additional mitigation measures for critical infrastructure protection and rehabilitation are done through the City's Capital Improvement Project (CIP) budget. To date, those mitigation projects have included fire station security, water/sewer infrastructure improvements and City Hall building rehabilitation.

For more information on hazard mitigation-related aspects of the general plan, see the discussion in Section Regulatory Mitigation Capabilities.

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk section of the base plan.

Figure 6. City of Clovis Land Use



Source: City of Clovis

ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (according to HMPC member input) it differs from that of the overall County.

Figure 6. City of Clovis Land Use above show Clovis' exposure to hazards in terms of number and value of structures. Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Impacts of past events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County as a whole).

DAM FAILURE (MEDIUM)

Potential flooding also exists in the form of reservoirs to the northeast and southeast of Clovis: Fancher Creek Reservoir and Big Dry Creek Reservoir. The major inundation areas from potential overflows from the Big Dry Creek Reservoir affect a major part of the northwesterly portion of Clovis as well as the northwesterly portions of the current City Sphere of Influence and City boundaries.

The Big Dry Creek Dam, which is immediately upstream from the City of Clovis, impounds stormwater runoff from Big Dry Creek in the Big Dry Creek Reservoir. The Big Dry Creek Reservoir is owned and operated by the Fresno County Metropolitan Flood Control District and is intended primarily for flood control of winter runoff from the Dry Creek and Dog Creek watersheds. In the 1990s, modifications were made to increase the capacity of the reservoir, and it now provides protection against the 200-year flood.

Under wet conditions, the Big Dry Creek Reservoir captures runoff and controls releases into artificial ditches and canals, which drain into either Little Dry Creek, located north of the reservoir, or in a southerly direction into Mill Ditch. Flows from Little Dry Creek and Mill Ditch eventually drain to the San Joaquin River. Flows from the reservoir can also be diverted into Dog Creek, which also eventually drains into the San Joaquin River. During dry weather conditions, the reservoir does not discharge water and is normally empty, except for a 156-acre-foot residual pool. The top of the pool remains below the elevation of an existing discharge gate. There have been no previous incidents from the Fancher Creek Reservoir and Big Dry Creek Reservoir.

DROUGHT (MEDIUM)

In 1988, 45 California counties experienced water shortages that adversely affected about 30 percent of the state's population, much of the dry farmed agriculture, and over 40 percent of the irrigated agriculture. Fish and wildlife resources suffered, recreational use of lakes and rivers decreased, forestry losses and fires increased, and hydroelectric power production decreased. The most recent drought period occurred from 2020 to 2023 which ranked the driest period on record.

The City of Clovis rated drought as a medium priority hazard than for the County as a whole. While Clovis is not heavily dependent on agriculture, the City is highly dependent on surface water allocations from DWR to fulfill service deliveries to the community and to support ground water recharge. Snowpack reductions and downstream allocations to agriculture can negatively impact the available surface water in Clovis in any given year. Extensive pumping of groundwater to meet the hydrologic

needs of Clovis when surface water is scarce may cause ground subsidence which can damage structures and create additional challenges for the community. The state has experienced frequent drought period over the past several decades. Additionally, when a drought period occurs, water is in high demand and can lead to high prices for water use and can pose a risk to people in affording higher prices and having access to clean water. Overall, the state experienced 76 percent of its average precipitation in 2022. The beginning of 2022 was the driest January through April based on records dating back to 1895 and received only 25 percent of the average statewide precipitation. In addition to a lack of precipitation, a persistent heat dome settled over California in early September that was long-lasting and intense, setting numerous daily and nightly high temperatures records. The majority of California did not receive any precipitation for a record-breaking 212 days.³

EARTHQUAKE (MEDIUM)

Clovis is subject to relatively low seismic hazards compared to many other parts of California, however the area is prone to moderate earthquake risk. The primary seismic hazard is ground shaking produced by earthquakes generated on regional faults. The northwest-trending Clovis fault is believed to be located approximately five to six miles east of the City of Clovis, extending from an area just south of the San Joaquin River to a few miles south of Fancher Creek. It is considered a pre-Quaternary fault or fault without recognized Quaternary displacement. This fault is not necessarily inactive.

The most probable sources of earthquakes that might cause damage in Clovis are the Owens Valley Fault Group about 68 miles to the northeast, the Foothills Suture Fault Zone approximately 75 miles to the north, the San Andreas fault approximately 80 miles to the southwest, and the White Wolf fault located about 120 miles to the south. A maximum probable earthquake on any of the major faults would produce a maximum ground acceleration in the area of about 0.1g as ground deceleration generally decreases with increasing distance from the earthquake source. Several unreinforced masonry buildings are located in the Old Town part of the City. The recreation building also may be vulnerable to earthquakes.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Clovis' vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

³ Statewide Rankings | Climate at a Glance | National Centers for Environmental Information (NCEI) (noaa.gov)
<https://www.ncei.noaa.gov/access/monitoring/climate-at-a-glance/statewide/rankings/4/pcp/202209>

FLOOD/LEVEE FAILURE (HIGH)

Clovis is traversed by three natural stream systems. Each of these systems consists of sub streams or creeks that collect together to discharge to a centralized natural drainage channel. These systems are the Red Bank, Fancher, and Dog Creek System; the Dry and Dog Creek System; and the Pup Creek/Alluvial Drain System. The latter is a tributary of the original Dry Creek channel. These stream systems collect storm runoff from the foothills east of Clovis and convey such runoff through the Clovis/Fresno metropolitan areas to the Fresno Slough, which is located west of the City of Fresno.

Many of these channels have been modified over time such that they have become dual use stormwater conveyance channels and irrigation water conveyance channels. Those streams that have not been used for irrigation purposes have essentially remained in their natural state and have flowed uncontrolled during storm runoff events. These stream channels have limited flow capacity. In some cases, the uncontrolled grading of land has obliterated or severely modified the natural channels to the extent that their flow capacity has been seriously limited. Flooding has been a serious problem in the Clovis/Fresno metropolitan area when these channel capacities are exceeded.

The flat slope characteristics in Clovis that exhibit natural slopes of less than .001 feet per foot can make the control of drainage runoff difficult and many natural depressions within the flat topography naturally collect and pond stormwater runoff. Nevertheless, the soils within or relatively near the stream courses tend to be the loamy, well-drained soils with high permeability.

The major sources of flooding include areas along the Pup Creek alignment from the northeasterly portion of Clovis through the center of the City of Clovis. Most of this flooding is confined to the areas in and around the Pup Creek channel. Pup Creek enters the northeastern portion of the City of Clovis near the intersection of Armstrong and East Bullard avenues. Most flood flows enter a culvert at Minnewawa Avenue, north of Barstow Avenue, and are conveyed to Dry Creek in the vicinity of North Helm and Mitchell Avenues. Dry Creek enters the northwestern portion of the City of Clovis near the intersection of the Union Pacific Railroad and Herndon Avenue. The creek flows out of the City at the southwestern corporate limits just south of the intersection of Shaw and Winery avenues.

Other areas of flooding are related to the Alluvial Drain area, the Big Dry Creek Reservoir and its possible overflow areas, along the Dog Creek channel alignment, and in low depressed areas along the easterly sides of the Enterprise Canal. Small areas of localized flooding occur in the southeastern part of the City during periods of moderate rainfall or heavy cloudburst storms. There are also a number of ponding areas in the City:

- The ponding area at the northern corporate limits of the City of Clovis, east of Dry Creek and north of the trail, is caused by the limited channel capacity of Dry Creek from the vicinity of Herndon Avenue to the vicinity of Nees Avenue outside the corporate limits of the City of Clovis.
- The ponding area along Pup Creek between Minnewawa and Peach avenues is caused by excessive overland losses from Dry Creek and limited culvert capacity for Pup Creek at Minnewawa Avenue.
- The ponding area south of Pup Creek and east of the trail between Jefferson and Barstow avenues is caused by excessive overbank losses on Pup Creek crossing back over the trail and from a local drainage problem east of Brookhaven Avenue.

Flood protection in Clovis is afforded by Big Dry Creek Dam on Dry Creek. Big Dry Creek Dam is located immediately upstream of the City of Clovis. Its main purpose is flood control, and it has a storage capacity of 16,250 acre-feet. The 2018 plan update mentioned that Big Dry Creek Reservoir has prevented an estimated \$15 million in damage in the Fresno-Clovis area since its completion in 1948.

Even with significant investment in planning/mitigation and water management through Fresno Metropolitan Flood Control District, portions of the City of Clovis, the Sphere of Influence areas, and the unincorporated Fresno County area, have been subject to historical flooding. Flooding occurred in January 2023 (CDAA-2023-1), January 2006 (CDAA-2006-01), and March 2006 (CDAA-2006-03). The combined impact of these storms left Clovis with \$110,300 in damage that was reimbursable since Fresno County received state declarations for the storms. In all instances, there were periods when intersections were closed due to flooding and customers could not reach businesses.

According to FEMA's 2016 Flood Insurance Study (FIS), damaging floods also occurred in the area in 1938, 1955, 1958, 1969, and 1978. Details on some of these events follow:

- **December 1955:** Pup Creek overflowed and flooded more than 20 homes in the vicinity of Clovis Avenue and Ninth Street. Floodwater two feet deep in some places blocked streets and disrupted traffic.
- **March 1958:** Pup Creek overflowed and flooded areas along Ninth Street. Floodwater was up to three feet deep, but damage was limited to streets, external residential improvements, and disruption of traffic.
- **January-February 1969:** Creeks and canals in the area overflowed and inundated agricultural land, residential property, and streets and roads. Many homes were evacuated, and others protected by sandbags. Traffic was disrupted by flooded streets and roads. Dry Creek and tributaries flooded approximately 1,400 acres and caused an estimated \$329,000 in damage below Big Dry Creek Reservoir.
- **February 1978:** Pup Creek overflowed. Residential property was inundated, homes were evacuated, roads and streets were closed, and traffic was disrupted. The recurrence interval of this flood was 74 years.

The 2016 FIS also notes problems of localized flooding in the City of Clovis. Localized flooding primarily occurs in areas east of Clovis Avenue and south of Shaw Avenue in addition to an area south of Keats Avenue and an area south of Celeste Street. In each of these locations, flooding is common following moderate rainfall or heavy cloudburst storms.

Since the County's latest FIRM update in 2016, a Letter of Map Revision (LOMR) will be effective May 20, 2024, north of the McFarlane ⁴Ditch. The LOMR states that Zone A (from the intersection of North Highland Avenue and East Ashlan Avenue to approximately 600 feet southeast of the intersection of North Highland Avenue and East Ashlan Avenue) will be rezoned to Zone X (unshaded).

⁴ 22-09-1501P-060044.pdf (fema.gov) <https://map1.msc.fema.gov/mipdata/22-09-1501P-060044.pdf?LOC=9a14bfd0e4499faf4fea56c00dcd4da0>

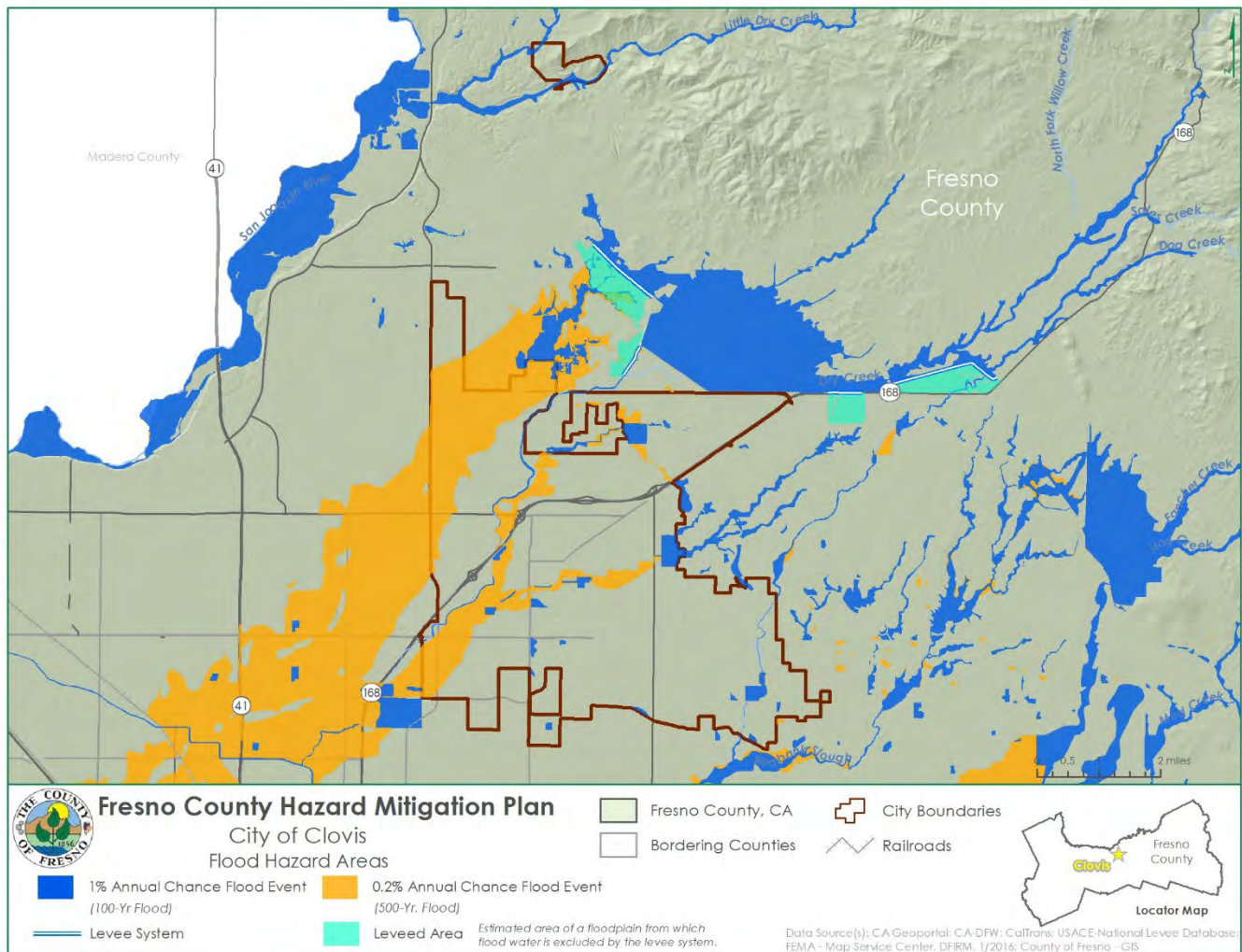
Recent flood events are described in more detail below

- **2005-2006:** Above average rainfall occurred between December 19, 2005, and January 1, 2006. This resulted in flooding of low-lying areas throughout the County. Flood control basins were overflowing in several areas, including the Cities of Fresno and Clovis. Property damage included damage to approximately 180 businesses and homes estimated at \$1.4 million within the unincorporated County. Damage to other jurisdictions was estimated at \$611,307. Damage to crops was minimal due to the time of year. Flooding further resulted in several road closures, which were one to two weeks in duration.
- **November 30, 2011:** Fresno set record high minimum temperatures on the last day of the month, establishing the total record for the sixth warmest November. This was also the fourth consecutive month that Fresno ranked in the top 10 warmest months. Fresno had a record rainfall on November 30th of 0.62 inch; the old record was 0.50 inch. As a result of the heavy rainfall, some rock and mud slides occurred as the moisture weakened the soil. Law enforcement reported a rock and mud slide on Highway 168 about 15 miles northeast of Clovis, which closed the road for several hours while authorities cleaned up the debris.
- **June 2021:** A water main break caused flooding in the Clovis residential area near Shepherd and Peach Avenues and Shepherd and Minnewawa Avenues.
- **January 2023:** Stretches of intense rainfall over January 2023 resulted in considerable flooding in the City of Clovis. Flooding along the Dry Creek Trail in Clovis was significant, with nearby yards and basements flooded.

VALUES AT RISK

A flood map for the City of Clovis was created (see **Figure 7. City of Clovis Flood Hazard Areas**). **Table 9. City of Clovis Parcels within the Flood Hazard Area**, **Table 10. City of Clovis Parcels within the 500-Year Floodplain**, and **Table 11. City of Clovis Buildings within the 100-Year and 500-Year Floodplain** summarize the values at risk in the City's 100-year and 500-year floodplain, respectively.

Figure 7. City of Clovis Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database ; FEMA – Map Service Center, DFIRM, 1/2016 ; County of Fresno - GIS

Table 9. City of Clovis Parcels within the 100-Year Floodplain

Property Type	Parcel Count	Improvement Value	Land Value	Total Assessed Value
Agriculture	1	\$0	\$219,888	\$219,888
Apartments	267	\$1,905,890,327	\$214,699,129	\$2,120,589,456
Commercial	40	\$332,694,331	\$177,387,512	\$510,201,043
Group Housing/Lodging	1	\$970,556	\$1,834,595	\$2,805,151
Primary Use Not Designated	4	\$0	\$0	\$0
School	2	\$2,134,198	\$169,598	\$2,303,796
Single-Family Residence	8	\$1,828,859	\$498,098	\$2,326,957
Vacant	5	\$0	\$206,417	\$206,417
Unknown	700			
Clovis Total	1,028	\$2,243,518,271	\$395,015,237	\$2,638,652,708

Source: City of Clovis parcel data; National Flood Insurance Program Flood Mapping Data

Table 10. City of Clovis Parcels within the 500-Year Floodplain

Property Type	Parcel Count	Improvement Value	Land Value	Total Assessed Value
Agriculture	1	\$0	\$219,888	\$219,888
Apartments	1,141	\$8,723,654,401	\$1,770,457,282	\$10,494,111,683
Church	1	\$3,752,099	\$433,843	\$4,185,942
Commercial	62	\$112,128,247	\$40,922,602	\$153,625,949
Group Housing/Lodging	1	\$7,358,249	\$3,153,535	\$11,940,484
Industrial	23	\$10,025,114	\$4,367,145	\$14,392,259
Mobile/Manufactured Home	50	\$30,000,000	\$70,000,000	\$100,000,000
Office/Professional Space	10	\$9,857,671	\$2,962,439	\$13,293,510
Primary Use Not Designated	134	\$0	\$0	\$0
Recreation	1	\$1,850,000	\$550,000	\$2,400,000
School	4	\$4,506,578	\$1,262,854	\$5,769,432
Single-Family Residence	1,370	\$296,583,268	\$106,213,026	\$402,796,294
Vacant	16	\$1,118,282	\$2,273,969	\$3,410,151
Agriculture	1	\$0	\$219,888	\$219,888
Clovis Total	2,814	\$9,200,833,909	\$2,002,816,583	\$11,206,145,592

Source: City of Clovis parcel data; National Flood Insurance Program Flood Mapping Data

Table 11. City of Clovis Buildings within the 100-Year and 500-Year Floodplain

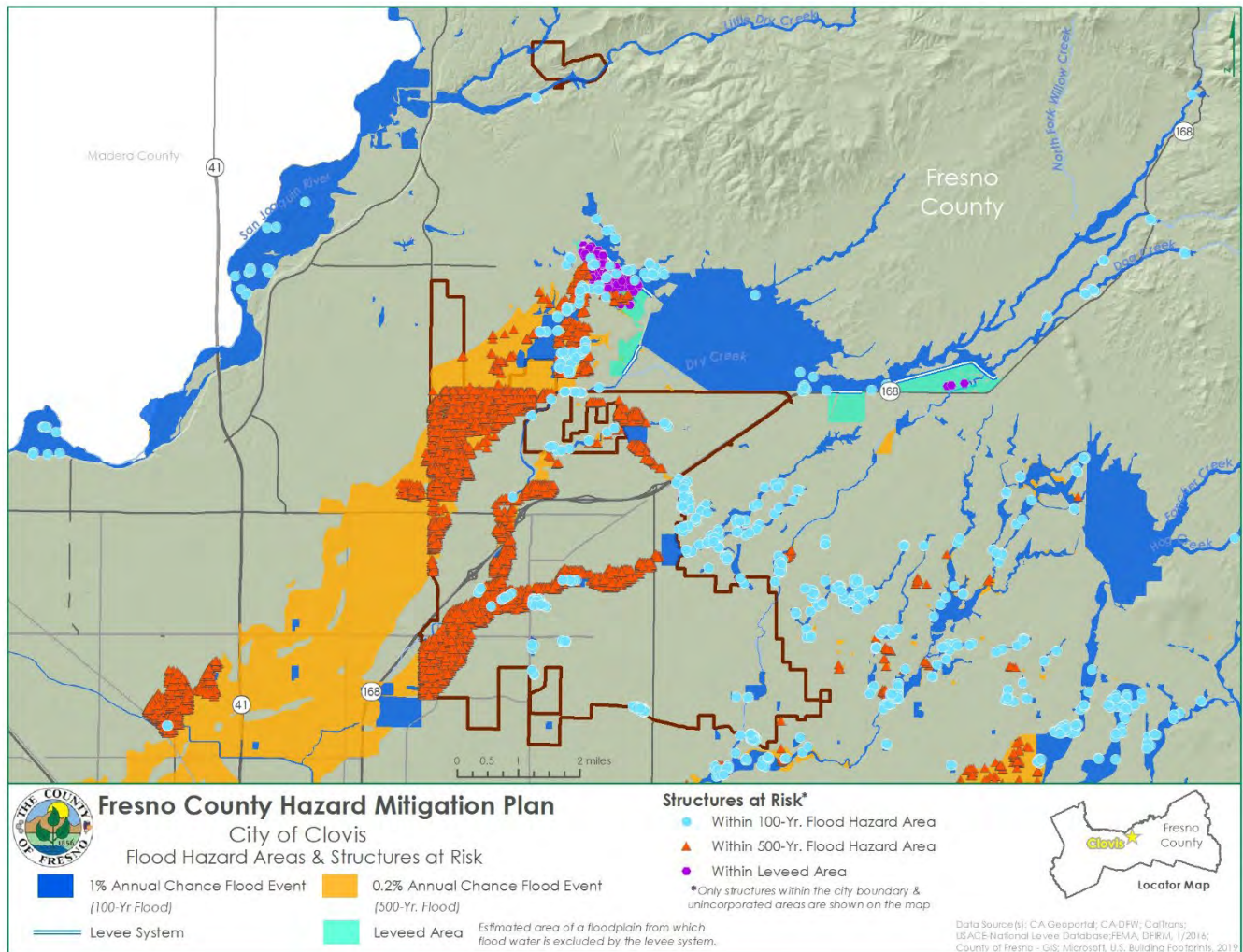
Leveed Area	100-Year Flood Hazard Area	500-Year Flood Hazard Area	Total Building in Flood Hazard Areas by Jurisdiction
0	147	7,149	7,296

Source: City of Clovis parcel data; National Flood Insurance Program Flood Mapping Data

Based on this analysis, the City of Clovis has significant assets at risk of 100-year and greater floods. There are 1,028 parcels that are within the flood hazard area which includes the 100-year floodplain with a total assessed value of \$2,638,652,708. Additionally, there are a total of 7,296 buildings in the 100-year and 500-year floodplain. **Figure 8. City of Clovis Properties at Risk Within the Flood Hazard Areas** shows the properties at risk to flooding in and around the City of Clovis in relation to the mapped floodplain.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Figure 8. City of Clovis Properties at Risk Within the Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database, FEMA, DFIRM, 1/2016 ; County of Fresno – GIS; Microsoft, U.S. Building Footprints, 2019

POPULATION AT RISK

For the population estimates, two analyses were completed: weighted and unweighted. For the weighted population analysis, the percentage area of each of the flood zones were identified for each of the census tracts then multiplied this percent by the total population for the census tract.

Note: Population is not evenly distributed within the census tract, however the analysis was conducted to provide a perspective of an estimated population at risk of flooding.

The unweighted analysis calculated the total population for any census tract that intersected any of the flood zones, including the 100-year and 500-year floodplain. The following are at risk to flooding in the City of Clovis:

Weighted Analysis

- 100-year flood - 640 people
- 500-year flood - 11,704 people

Unweighted Analysis

- 100-year flood – 19,334 people
- 500-year flood – 42,472 people

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.⁵

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Clovis joined the National Flood Insurance Program (NFIP) on March 16, 1983. NFIP Insurance data indicates that as of March 19, 2024, there were 171 flood insurance policies in force in the City with \$110,455 of total premium or total paid.

There have been 49 historical claims for flood losses totaling \$424,668. According to the FEMA Community Information System accessed 3/19/2024, there is one severe repetitive loss property within the City of Clovis which is a single-family home.

⁵ Ermagun, A., Smith, V. & Janatabadi, F. High urban flood risk and no shelter access disproportionately impacts vulnerable communities in the USA. *Commun Earth Environ* 5, 2 (2024). <https://doi.org/10.1038/s43247-023-01165-x>

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. Currently, there are no critical facilities that are within the 100-year and 500-year floodplain. All identified critical facilities were confirmed with the jurisdiction.

HAZARDOUS MATERIALS INCIDENT (HIGH)

Hazardous materials likely to be involved in a spill or release within the City include herbicides, pesticides, chemicals in gas, liquid, solid, or slurry form; flammables; explosives; petroleum products; toxic wastes; and radioactive substances. The County Health Department is the designated administering agency for the Fresno County area hazardous material monitoring program. There are two CalARP hazardous materials facilities located in the City of Clovis. Additionally, there have been 2 hazardous materials incidents from 2017-2022 that have occurred in the City of Clovis. Of the 2 incidents, both were fixed incidents. There were no injuries, fatalities, or property damage during the time period.⁶ There are two CalARP facilities within the City of Clovis.

⁶ California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>

SEVERE WEATHER: EXTREME COLD/FREEZE (MEDIUM)

Figure A.7 below illustrates the average temperature by month. From the information below, one can see that December and January have the greatest potential for extreme cold/freeze. In Clovis, it is not uncommon to have consecutive days with a minimum overnight low temperature of 32°F. Clovis has been impacted by severe freezing in winters past. Most notable were the freeze of 1997/98 and 2006/2007. Severe cold/freeze declarations occurred in 1990, 1998, and 2001. These incidents impacted local agriculture and City infrastructure. Estimated agricultural losses in 2006/2007 totaled \$1 million with another \$10,000 in damage to infrastructure. The following chronicles historic periods of extreme cold in the City of Fresno since it is very close to the City of Clovis

17 Degrees Fahrenheit

- January 6, 1913

18 Degrees Fahrenheit

- January 10, 1949
- December 12, 1932
- December 23, 1990

19 Degrees Fahrenheit

- January 11, 1949
- January 13, 1963
- January 21, 1937
- December 22, 1990

20 Degrees Fahrenheit

- January 2, 1976
- January 5, 1949
- January 7, 1913
- January 12, 1902
- January 16, 1888
- January 17, 1888
- December 24, 1990
- December 25, 1987

Since records started in 1887, there have been 16 instances in Fresno of a low temperature of 20 degrees or lower.⁷

During the January 2007 freeze (CDAA 2007-02), Clovis experienced 19 days of consecutive low temperatures at or below 32°F. In response, Clovis coordinated the resources and staff necessary to establish a warming station at the Clovis Senior Center. Public safety personnel continually monitored calls for service related to vulnerable populations, such as the homeless and seniors who might have needed these services. In addition, fire prevention staff checked on mobile home residents during their normal smoke alarm check/installs. Fortunately, Clovis residents were prepared, and the City did not have to open a warming center.

School facilities incurred \$55,000 in damage. In the urban area, there was some damage to wells, and some small businesses reported leaky/broken sprinkler pipes. City damage reimbursable through the state declaration totaled \$9,373. Agricultural losses were greatest in the citrus growing and packaging industry. Local growers/packers included P&R Farms and Harlan Ranch. Since P&R Farms primarily handles stone fruit (i.e., peaches, apricots), impact to their crops was minimal. Harlan Ranch suffered 100 percent crop loss due to the fact that their primary commodity was citrus, and they had planted over 100 new acres of trees. At last check, their crop loss was \$2.5 million. While some oranges were juiced, Harlan Ranch representatives said the juice market was break-even at best.

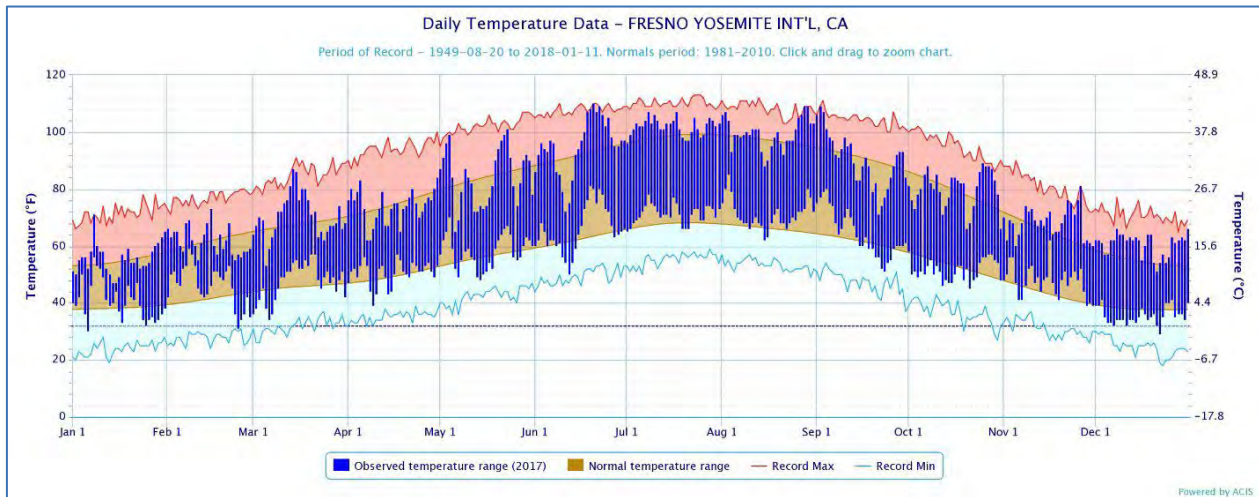
SEVERE WEATHER: EXTREME HEAT (MEDIUM)

The following data support the City of Clovis' decision to rate extreme heat a medium significance hazard (higher than the overall County rating). In 2006 and 2007, Clovis experienced heat waves that exceeded 24 days. While no direct loss of livestock was reported, the City staffed cooling centers to protect vulnerable populations, and there were several power outages that rotated through the area. Recently, since the plan update, there have been many extreme heat events. According to the NOAA Storm Events Database, the extreme heat event that occurred on August 14, 2020, caused \$4,000,000 in property damage. **Figure 9. Fresno Yosemite International, CA - Daily Temperature Data.**

⁷ Coldest Temperatures ever at Fresno.pdf (weather.gov)

<https://www.weather.gov/media/hnx/Coldest%20Temperatures%20ever%20at%20Fresno.pdf>

Figure 9. Fresno Yosemite International, CA - Daily Temperature Data



Source: High Plains Regional Climate Center; climod.unl.edu

It is not uncommon in Clovis to have consecutive days over 100°F. The following chronicles historic periods of extreme cold in the City of Fresno since it is very close to the City of Clovis.

115 Degrees Fahrenheit

- July 8, 1905

114 Degrees Fahrenheit

- July 1, 1891
- July 11, 2021
- July 17, 1925
- July 27, 1925
- July 27, 1933
- July 30, 1898
- July 31, 1908

113 Degrees Fahrenheit

- July 9, 1905
- July 23, 2006
- July 24, 2006
- July 25, 2006

- July 26, 1931
- July 29, 1898
- August 8, 1908
- August 11, 1898

As the data above shows, a high temperature of 113 degrees or higher has only occurred in the Fresno area 16 times since records began in 1887.⁸

In response to extreme heat events in 2007, the City implemented Phase II of the City's Heat Emergency Plan, which entailed opening facilities and using volunteer staff from 12–10 p.m. to provide cooling for individuals impacted by the heat. The cost to provide this level of service was negligible since the facility used was already open and volunteers staffed the center. While few people sought relief, the most significant benefit was from volunteers checking the welfare of vulnerable seniors who rely on swamp coolers for cooling and who cannot always determine their physiological need for hydration. For the summer, Phase II of the plan was activated seven times. Over 20 individuals sought refuge in the center, and volunteers placed over 183 personal welfare calls to the medically fragile. In Clovis, there was no loss of human or livestock life.

In recent years, due to extreme heat events, the City has opened cooling shelters several times to provide its residents relief from extreme heat exposure.

⁸ Highest Temperatures ever at Fresno.pdf (weather.gov)
<https://www.weather.gov/media/hnx/Highest%20Temperatures%20ever%20at%20Fresno.pdf>

SEVERE WEATHER: FOG (MEDIUM)

In Fresno/Clovis, the average number of days with dense fog per year is about 62 days since the National Weather Service has been tracking fog days starting back in 1910, shown in **Table 12. Average Number of Days in Fresno/Clovis with Dense Fog**. The most consecutive days with dense fog were the following:

Table 12. Average Number of Days in Fresno/Clovis with Dense Fog

Month	Number of Days (1910-2024)
October	64
November	515
December	1122
January	1099
February	515
March	170
April	22
Total	3,498

Source: NWS

WILDFIRE (MEDIUM)

The Wildfire Hazard Severity Zone is mostly outside of jurisdictional boundaries, except for a small area off of Aubery Road which encompasses the Clovis Landfill, shown in **Figure 10. City of Clovis Wildfire Hazard Severity Zone**. The Wildfire Hazard Severity Zone is categorized as “Moderate” under the State Responsibility Area (SRA). SRA is a legal term defining the area where the state has financial responsibility for wildland fire protection and prevention. Incorporated cities and federal ownership are not included. Within the SRA, CAL FIRE is responsible for fire prevention and suppression. There are more than 31 million acres in SRA, with an estimated 1.7 million people and 800,000 existing homes.⁹ There have been no known fires that have occurred in the past several years.

According to **Table 13. City of Clovis Buildings at Risk of Wildfires**, there is one building within the Moderate Interface Zone and one building “not within the Wildfire Urban Interface (WUI) zone”.

Table 13. City of Clovis Buildings at Risk of Wildfires

Influence Zone				Interface Zone		Intermix Zone			Not WUI Zone		
Not FHSZ	Moderate	High	Very High	Moderate	High	Moderate	High	Very High	Moderate	High	Very High
				1					1		

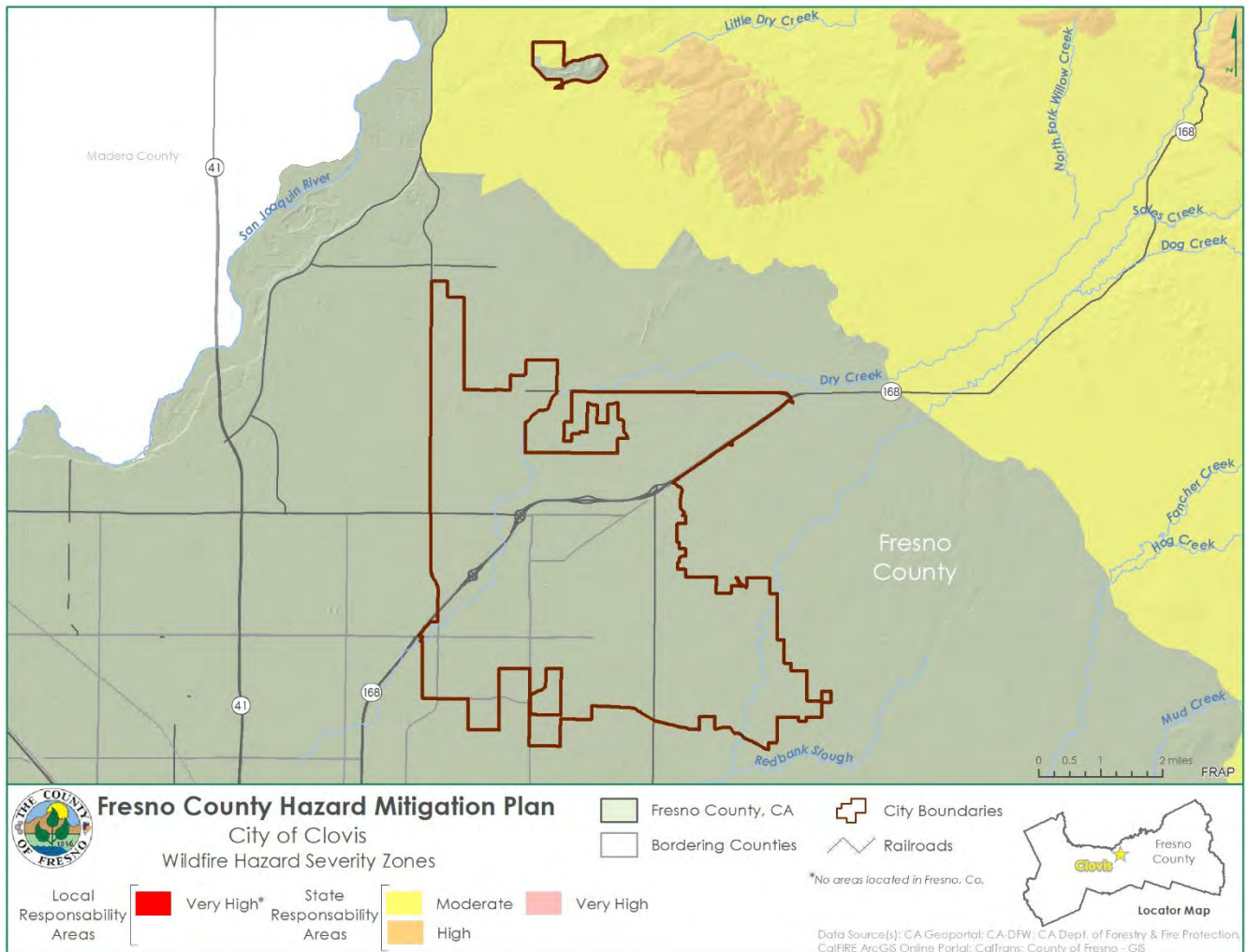
Source: City of Clovis parcel data; CAL FIRE

POPULATION AT RISK

There are census tracts within the City of Clovis that intersect with the wildfire risk areas. However, the City reports that there are no individuals living within the wildfire risk areas.

⁹ 2022 FHSZ FAQs (July 27 2023) (azureedge.net) <https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/osfm-website/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones/2022-fhsz-faqs-july-27-2023.pdf>

Figure 10. City of Clovis Wildfire Hazard Severity Zone



Source: CA Geoportal; CA-DFW; CA Department of Forestry and Fire Protection CalFIRE ArcGIS Online Portal; CalTrans; County of Fresno - GIS

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and planning mitigation capabilities. Each jurisdiction filled out a worksheet to assess the four capabilities listed above. The results of the self-assessment the jurisdictions filled out were used to update this section of the plan. To develop this capability assessment, the jurisdictional planning representatives reviewed policies, plans, or programs that supported mitigation activities and reduced overall risk.

During the plan update process, the Witt O' Brien's consultant team reviewed the self-assessments to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Clovis' updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 14. City of Clovis Mitigation Capability Summary**. Overall, the City of Clovis assessed their capabilities to be moderate or high which can significantly reduce their overall risk to hazards based on certain policies, plans, and activities that the city is involved in.

Table 14. City of Clovis Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Fiscal Capability			X
Available Staff		X	
Political Support/Interest			X
Community Support		X	

REGULATORY MITIGATION CAPABILITIES

Table 15. City of Clovis' Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Clovis.

Table 15. City of Clovis' Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X		2022			
Community Emergency Response Team (CERT)	X		Ongoing			
Community Rating System (CRS Program of the NFIP)	X		Ongoing			
Emergency Management Accreditation Program (EMAP)		X				
Fire Code	X		2022			
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance	X		2017			
Land Use/Development Planning	X		2014			
National Flood Insurance Program (NFIP)	X		Ongoing			
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready	X		Ongoing			
Stormwater Management Plan/Ordinance	X		2022			
Subdivision Regulations/Ordinance	X		Ongoing			
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance	X		Ongoing			

THE CITY OF CLOVIS GENERAL PLAN PROGRAM, 2014

The City of Clovis General Plan Program serves as the blueprint for future growth and development and provides comprehensive planning for the future. It encompasses what the City is now, and what it intends to be, and provides the overall framework of how to achieve this future condition (see the discussion in the Growth and Development Trends section).

The general plan includes a Safety Element that focuses on safety issues to be considered in planning for the present and future development of the Clovis planning area. Identified hazards include fire, geologic/seismic, flooding, and hazardous materials. Mitigation-related goals, policies, and actions are presented in **Table 16. City of Clovis Mitigation-Related Goals, Policies, and Actions** below.

Table 16. City of Clovis Mitigation-Related Goals, Policies, and Actions

Goal 1:	Protect the Clovis community from hazards associated with the natural environment
Policy 1.1:	Minimize risks of personal injury and property damage associated with natural hazards
Actions: Educating the community on procedures regarding preparedness and response to natural disasters providing information describing procedures and evacuation routes to be followed in the event of a disaster. Establishing design criteria for publicly accessible stream corridors, detention basins, and drainage facilities to minimize potential for accidents and injury Preserve as open space areas along waterways, detention basins, and ponding areas, and in areas of wildfire and known flooding hazards where building for human occupancy is hazardous	
Policy 1.2:	Provide flood protection for existing development and for areas planned for new development
Actions: Coordinate with the Fresno Metropolitan Flood Control District (FMFCD) in its efforts to enact program of channel preservation, renovation, and maintenance Support the FMFCD in the creation of an inventory of all streams draining from the foothills areas and identifying all channels that have been obliterated or altered Require, as a condition of development, protection of channel alignments, identification of floodways areas, and construction of channel improvement so that projected 100-year flood flows can pass without affecting new development Utilize zoning and other land use regulation to limit and or prohibit development in flood prone areas Map dam inundation areas and develop, maintain, and inform the public of an evacuation procedure for all affected areas in the event of failure of dams	
Policy 1.3:	Utilize the unprotected 100-year floodplain for low density uses such as agriculture, open space, recreation, and for reclaiming water and wetlands
Action: Establish development set-back requirements from natural water courses that traverse the project areas	
Policy 1.4:	Mitigate potential adverse impacts of geologic and seismic hazards
Action: Require geologic and soils studies to identify potential hazards as part of the approval process for all new development prior to grading activities Conduct a building survey to identify structures that are substandard in terms of seismic safety. Develop a program to bring these structures up to current seismic safety code standards. Require that underground utilities be designed to withstand seismic forces Coordinate with the FMFCD to regularly inspect and repair levees as part of the proposed program of channel preservation, renovation, and maintenance	
Goal 1:	Protect the Clovis community from hazards associated with the natural environment
Action: Incorporate appropriate earthquake prevention standards into the uniform technical codes and require that all new structures are engineered to meet seismic safety code standards	

The Public Facilities Element of the general plan defines policy for public facilities and services, including infrastructure, and addresses the issues of providing adequate infrastructure and community services to expanding populations by planning in conjunction with land use. Clovis' infrastructure

consists of water, wastewater, storm drainage/flood control, and solid waste systems. The Development Review Committee process includes representation from FMFCD and FID which provides clear communication on project citing and mitigation as part of the planning process for new facilities. It does include hazard-related policies to provide effective storm drainage facilities for planned development by maintaining agreement with the Fresno Metropolitan Flood Control District to reduce the effect that development has on natural watercourses and to ensure that adequate water supply can be provided through water reuse and water conservation.

CLOVIS MUNICIPAL CODE

The following ordinances are used for implementing the general plan and/or are critical to the mitigation of hazards identified in this plan.

ZONING ORDINANCE (TITLE 9—CHAPTER 9.08)

The purpose of the Zoning Ordinance is to encourage, classify, designate, regulate, restrict, and segregate the highest and best locations for, and uses of, buildings, structures, and land for agriculture, residence, commerce, trade, industry, water conservation, or other purposes in appropriate places; to regulate and limit the height, number of stories, and size of buildings and other structures hereafter designed, erected, or altered; to regulate and determine the size of yards and other open spaces; and to regulate and limit the density of population, and for such purposes to divide the City into districts of such number, shape, and area as may be deemed best suited to provide for their enforcement. Further, the Zoning Ordinance addresses the following:

- Most appropriate uses of land
- Conservation and stabilization of property values
- Provision of adequate open space for light and air and to prevent and fight fires
- Prevention of undue concentration of population
- Lessening of congestion of streets
- Facilitation of adequate provision of community utilities, such as transportation, water, sewerage, schools, parks, and other public requirements
- Promotion of the public health, safety, and general welfare

SITE PLAN ORDINANCE (TITLE 9—CHAPTER 9.56)

The site plan review is performed by the Clovis Planning and Development Services Department. During the review, the owner of a parcel is required to submit a plan to scale demonstrating all of the uses for a specific parcel of land. This review ensures compliance with applicable law and the zoning requirements within the City.

SUBDIVISION ORDINANCE (TITLE 9—CHAPTER 9.100)

The Subdivision Ordinance specifically provides for proper grading and erosion control and prevention of sedimentation or damage to off-site property. Each local agency may by ordinance regulate and control other subdivisions, provided that the regulations are not more restrictive than the regulations commencing in California Government Code Section 66410.

Erosion or Sediment Control Program (Title 9—Chapter 9.2.309)

Every map approved pursuant to the provisions of the Subdivisions Ordinance are conditioned on compliance with the requirements for grading and erosion control, including the prevention of sedimentation or damage to off-site property, set forth in Appendix Chapter 70 of the California Building Code, as adopted and amended by the City.

FLOODPLAIN MANAGEMENT (TITLE 8—CHAPTER 8.12)

Flood losses are caused by uses that are inadequately elevated, floodproofed, or protected from flood damage. The cumulative effect of obstructions in areas of special flood hazards that increase flood heights and velocities also contribute to flood loss. It is the purpose of the Flood Hazard Ordinance to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health.
- Minimize expenditure of public money for costly flood control projects.
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public.
- Minimize prolonged business interruptions.
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard.
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage.
- Ensure that potential buyers are notified that property is in an area of special flood hazard.
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to reduce flood losses, the ordinance includes methods and provisions to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;

- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters;
- Control filling, grading, dredging, and other development which may increase flood damage; and
- Prevent or regulate the construction of flood barriers which will unnaturally divert floodwaters or which may increase flood hazards in other areas.

EMERGENCY SERVICES ORDINANCE (TITLE 4—CHAPTER 4.2)

The declared purposes of the Emergency Services Ordinance are to provide for the preparation and carrying out of plans for the protection of persons and property within the City in the event of an emergency; the direction of the emergency organization; and the coordination of the emergency functions of the City with all other public agencies, corporations, organizations, and affected private persons.

STORMWATER MANAGEMENT PROGRAM (EMERGENCY FLOOD CONTROL PROCEDURES 2007- 2008)

The City's Public Utilities Department has three Stormwater Patrol teams, made up of 22 public utilities employees, to implement emergency flood control measures. The plan contains information and procedures to rapidly address flooding throughout the City. Contact information and team assignment data is updated regularly as are geographic locations subject to flooding. Appendices include suppliers/contractors, storm basin list, problem drain lists, and partnerships and agencies with shared responsibility for storm preparedness, mitigation, and response.

FIVE-YEAR COMMUNITY INVESTMENT PROGRAM

The Five-Year Community Investment Program (CIP) represents an effort to identify major capital needs and schedule projects consistent with community priorities and available funding. A major portion of the funding for these projects comes from development fees. Projects identified in the CIP are broken down as follows:

- **General Government Facilities:** The capital projects for the General Government Facilities program consist of acquisition of new facilities, improvement to existing facilities, and maintenance of existing improvements required by City departments to enable them to adequately carry out their mission.
- **Sewer Capital Projects:** The Enterprise budget includes projects that will repair and/or replace existing sanitary sewer mains that are severely deteriorated or are not adequately sized for the flows being experienced. The Developer budget includes the debt service payments for the 2007 Sewer Revenue Bond for the Sewage Treatment and Water Reuse Facility.
- **Parks Improvements:** These primarily consist of master planning and design and construction of park improvements. Community park improvements are funded by development fees and state

grants when available. Neighborhood parks are installed by development. Park fees are paid by all new developments constructed within the City of Clovis.

- **Street Improvements:** These include traffic signal installation, street repair and improvement, sidewalk installation/modification, and design work throughout the City.
- **Water:** This includes projects that will continue to improve the water distribution system, and improve water quality through the addition of treatment facilities at existing wells, and increase the reliability of the water supply by the addition of auxiliary power generators.
- **Refuse:** This includes regulatory design and maintenance of City-owned landfill and associated projects.
- **Clovis Community Development Agency:** This focuses on projects that provide affordable housing in the community and on encouraging and enhancing the business environment of Clovis.
- **Police/Fire:** This addresses facility design and maintenance for satellite locations and main headquarters.

ECONOMIC DEVELOPMENT STRATEGY, 2014

On July 14, 2014, the City Council adopted an updated Economic Development Strategy, developed by the City’s Economic Development Strategy Advisory Committee (EDSAC) and based on presentations from experts regarding perspectives on current markets, the regulatory environment, access to capital, characteristics of the local labor force, public incentive programs, and the local commercial and industrial real estate market.

The City of Clovis adopted the initial Economic Development Strategy in March 1998. The 1998 strategy included a mission statement as well as goals and objectives for three individual strategies: Industrial Development, Commercial Development, and Tourism. The City of Clovis believes that these three individual strategies make up the basis for a well-rounded economic development program. If progress is made in the implementation of the stated goals and objectives in each of these strategies, the City will be better able to create the wealth necessary to provide municipal services to Clovis residents and businesses.

PLANNING MITIGATION CAPABILITIES

Table 17. City of Clovis’ Planning Capabilities identifies the plans related to mitigation and loss prevention in Clovis.

Table 17. City of Clovis’ Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes		Annually updated
Climate Resiliency or Adaptation Plan	No		

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Community Wildfire Protection Plan (CWPP)	No		
Comprehensive Emergency Management Plan	Yes		2022 updated
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes		2014 updated/adopted
Continuity of Operations Plan (COOP)	Yes		2022 updated/adopted
Disaster Recovery Plan	Yes		2022 updated/adopted
Economic Development Plan	Yes		2023 updated/adopted
Emergency Operations Plan (EOP)	Yes		2022 updated/adopted
Evacuation Plan	No		
Flood Response Plan	Yes		2023 updated/adopted
Floodplain Management Plan/Flood Mitigation Plan	Yes		2014 updated/adopted
Hazard Mitigation Plan	Yes		2018 updated/adopted
Historic Preservation Plan	Yes		2018 updated/adopted
Natural Resources Protection Plan (NRPP)	Yes		2014 updated/adopted
Open Space Management Plan (Parks and Rec/Greenway Plan)	Yes		2014 updated/adopted
Threat Hazard Identification and Risk Assessment	Yes		2022 updated/adopted

CITY OF CLOVIS EMERGENCY OPERATIONS PLAN

The City of Clovis Emergency Operations Plan (EOP) Basic Plan addresses the planned response for the City of Clovis to emergencies associated with disasters, technological incidents, or other dangerous conditions created by either man or nature. It provides an overview of operational concepts, identifies components of the City emergency management organization, and describes the overall responsibilities of local, state, and federal entities. The City will place emphasis on emergency planning; training of full-time, auxiliary, and reserve personnel; public awareness and education; and assuring the adequacy and availability of sufficient resources to cope with emergencies. Emphasis will also be placed on mitigation measures to reduce losses from disasters, including the development and enforcement of appropriate land use, design, and construction regulations.

The EOP's section on hazard mitigation establishes actions, policies, and procedures for implementing Section 409 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act following a presidentially declared emergency or major disaster. It also assigns hazard mitigation responsibilities to various elements of federal, state, and local governments in California.

HEAT EMERGENCY CONTINGENCY PLAN

The Heat Emergency Contingency Plan describes City operations during heat-related emergencies and provides guidance for City departments and personnel. It recognizes the need to communicate and coordinate with local agencies and mobilize and initiate actions in advance of local requests and supports local actions according to the Standardized Emergency Management System and the National Incident Management System. The plan’s goal is to reduce the incidence of morbidity and mortality associated with local extreme heat events.

URBAN WATER MANAGEMENT PLAN

Clovis proactively manages water supplies and has policies in place to effectively deliver water to local residents. In order to appropriately manage water resources within Clovis, the City updated its Urban Water Management Plan in 2020 in coordination with the City of Fresno, County of Fresno, Fresno Irrigation District, and Fresno Metropolitan Flood Control district. The City of Clovis utilizes many water management tools and options to maximize water resources and minimize the need to import water. The City of Clovis is participating with other local agencies in the North Kings Groundwater Sustainability Agency (NKGSA). Over the next few years the Agency will be developing a plan that will guide the area in providing groundwater sustainability.

CLOVIS UNIFIED SCHOOL DISTRICT HAZARD MITIGATION PLAN

The Clovis Unified School District is a K-12 public school system that serves the Cities of Clovis and Fresno, some unincorporated areas of Fresno County, and the rural community of Friant. It covers approximately 198 square miles and has a student population of nearly 38,000. The overall goal of the Clovis Unified School District Hazard Mitigation Plan is to reduce or prevent injury and damage from natural hazards in the District by addressing the hazards that present the greatest risk to the District, its students, staff, facilities, infrastructure, properties, and the natural environment. The plan examines past events and hazard mitigation programs already in place and prioritizes additional mitigation activities for the District. Planning goals include facilitating the integration of City and County hazard mitigation planning activities into District efforts.

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 18. City of Clovis' Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Clovis.

Table 18. City of Clovis' Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X			

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		City of Clovis Engineering Division	
Fiscal Management or Procurement Specialists	X		City of Clovis Finance Division	
Floodplain Manager	X		City of Clovis Building Official	
Land Surveyors		X		
Land Use/Management/Development Planning	X		City of Clovis Planning and Development Services Department	
Planners or engineers with an understanding of natural and/or human-caused hazards	X		City of Clovis Engineering Division	
Resource Development Staff or Grant-writing	X		Multiple Departments	
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)	X		City of Clovis Planning and Development Services Department	
Staff with education or expertise to assess the community's vulnerability to hazards		X		

FISCAL MITIGATION CAPABILITIES

Table 19. City of Clovis' Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 19. City of Clovis' Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Community Development Block Grants (CDBG)			X	
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fee	X			
Water/Sewer Fees			X	
Stormwater Utility Fees			X	
Development Impact Fees			X	
General Obligation, revenue, and/or Special Tax Bonds			X	
Partnering Agreements or Intergovernmental Agreements			X	
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)			X	
Homeland Security Grants (HSGP)			X	
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants			X	
Infrastructure Investment and Jobs Act (IIJA)			X	

MITIGATION OUTREACH AND PARTNERSHIPS

The City of Clovis has firefighters and Prevention staff that provide public education, reaching 17,000 kids per year in the school system. The city also runs a responsible water use outreach program to encourage conservation and efficiency. Additionally, the City has a Community Emergency Response Team volunteer program and a Citizens On Patrol volunteer group.

OTHER MITIGATION EFFORTS

The fire department is accredited through the Commission on Fire Accreditation International, which is part of the Center for Public Safety Excellence. Additionally, the City is recognized by the National Weather Service as a StormReady Community.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of Clovis has several existing mechanisms in place that already help to mitigate hazards. These capabilities remain relevant as the priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train City staff on mitigation and the hazards that pose a risk to the City of Clovis will lead to more informed staff members who can better communicate this information to the public.

MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Clovis adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Engineering Division may utilize the hazard information when implementing the City's Community Investment Program and the Planning and Building Divisions may utilize the hazard information when reviewing a site plan or other type of development applications. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Clovis will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting. The previous plan was integrated into the city's Emergency Operations Plan (EOP), Emergency Operations Center (EOC) workflow, and noted within the Safety Element of our General Plan.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1983. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.

COMPLETED 2009 MITIGATION ACTIONS

The City of Clovis completed nine mitigations actions identified in the 2009 plan. These completed actions are as follows:

- Establish Post-Disaster Action Plan for City Continuity of Operations Plan
- Train and Certify City Inspectors to Conduct Post-Disaster Damage Assessment
- Implement a System of Automatic Vehicle Location
- Install Battery Back-Up Systems at Traffic Signals in the City of Clovis on Major Transportation Routes

- Replace Traffic Management Center Software and Herndon Avenue Traffic Signal Equipment and Implement Communications Upgrades
- Modify and Enhance Emergency Traffic Control System
- Implement a System to Share Information with City Police Officers/Employees (SharePoint)
- Integrate Local Hazard Mitigation Plan into Safety Element of General Plan
- Implement a Flood Awareness Program for the Public

These completed actions have reduced vulnerability to hazards and increased local capability to implement additional mitigation actions.

COMPLETED 2018 MITIGATION ACTIONS

The City of Clovis has continued to seek opportunities for implementing the actions set forth in the 2018 plan, and the process is still ongoing. The City of Clovis has indicated its desire to continue working towards completion of 2018 actions, and the 2018 actions have been carried over to this 2024 plan.

MITIGATION ACTIONS

The planning team for the City of Clovis identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. Actions with an “*” are those that mitigate losses to future development.

In addition to implementing the mitigation actions below the City of Clovis will be participating in county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.

1. CONSTRUCT A WATER INTERTIE BETWEEN THE CITIES OF CLOVIS AND FRESNO

Hazard(s) Addressed: Multi-Hazard: dam failure, drought, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: The City of Clovis operates a water system that serves over 95,000 residents. During rolling power blackouts or earthquakes or due to potential contamination of the water supply, there is a need to have a backup supply of potable water available. The City has an agreement with the City of Fresno to construct an intertie between the two water systems to act as an emergency backup.

Other Alternatives: The City has backup power at many of its facilities but not all of them. Additionally, backup power will not help if the issue is unrelated to a power blackout.

Responsible Office: City of Clovis Public Utilities Department Water Division

Priority (High, Medium, Low): High

Cost Estimate: \$890,000

Potential Funding: City of Clovis Water Enterprise Fund

Benefits (Avoided Losses): This will prevent the loss of human life, illness, customer confidence, and revenue.

Schedule: Estimated completion in 2038

Status: 2009 project, implementation in progress

2. MODERNIZE INFORMATION TECHNOLOGY BACKUP INFRASTRUCTURE

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, volcano, hazardous materials

Issue/Background: During the last emergency operations center exercise, it became evident that many of the technology systems needed to coordinate services during a disaster were limited or not available at all. Personal computer systems were out of date, the telecommunications system and phones were not properly functioning, and many resources (software applications) were not configured or available. The City could benefit from disaster recovery/business continuity technology systems that use virtualization and storage area network backup infrastructure systems for emergency operations center operations.

Other Alternatives: Tapes and backup systems that are not real time are not as reliable and cause delays in data restoration.

Responsible Office: City of Clovis Information Services Division

Priority (High, Medium, Low): High

Cost Estimate: \$100,000

Potential Funding: General fund

Benefits (Avoided Losses): Ensures business continuity and avoids downtime. Thus, speeds up relief efforts during a disaster.

Schedule: Estimated completion in 2038

Status: 2009 project, implementation in progress

3. IMPROVE THE CITY'S CAPABILITIES FOR SHELTERING ANIMALS IN A DISASTER

Hazard(s) Addressed: Multi-Hazard: dam failure, flood, wildfire, hazardous materials

Issue/Background: During a disaster, not only do people need to be rescued, but their pets do also. Hurricane Katrina showed the nation that shelters do not typically allow pets, so pets may be left behind when their owners evacuate. The care of the animals left behind falls to local animal shelters. Currently, the City of Clovis Animal Shelter does not have the supplies to handle a large scale animal emergency. The City has approximately 8,000 licensed dogs. If a disaster occurred, they would only be able to house 102 of them. Overcrowding of animals usually causes diseases and loss of animal life. Purchasing new cages would alleviate some of the overcrowding created by a disaster.

Other Alternatives: Ask other agencies for supplies, if they have them available.

Responsible Office: City of Clovis Police Department

Priority (High, Medium, Low): High

Cost Estimate: \$44,000

Potential Funding: General fund

Benefits (Avoided Losses): This will cut down on the spread of disease and animal loss during an emergency or disaster.

Schedule: Estimate completion in 2038

Status: 2009 project, implementation in progress

4. PURCHASE HAZARD MITIGATION PUBLIC NOTIFICATION BOARDS

Hazard(s) Addressed: Multi-Hazard: dam failure, flood, wildfire, hazardous materials

Issue/Background: Purchase mobile self-contained changeable message signs to pre-alert motorists to avoid a "real time" traffic (or other) hazard.

Other Alternatives: Rely on contract service providers who may not be able to respond with adequate resources in a timely fashion.

Responsible Office: City of Clovis Engineering Division Traffic Management Group, Public Utilities Department Streets Division, Police Department, and Fire Department

Priority (High, Medium, Low): High

Cost Estimate: 4 signs @ \$35,000 each = \$140,000

Potential Funding: General Fund

Benefits (Avoided Losses): Provides the ability for City forces to aid emergency response crews by dispatching mobile sign units to be stationed at critical locations to alert motorists and citizens of potential hazard areas. This will allow for better routing of nonessential vehicle traffic that may impede the delivery of critical health and safety services and ultimately result in quicker overall response delivery times.

Schedule: Estimate completion in 2038

Status: 2009 project, implementation not yet started

5. IMPROVE EMERGENCY EVACUATION AND EMERGENCY VEHICLE ROUTES

Hazard(s) Addressed: Multi-Hazard: dam failure, flood, wildfire, hazardous materials

Issue/Background: Currently, there are several street segments within the City of Clovis that could serve as evacuation routes or detour routes in the event of a disaster. These segments are currently deficient in terms of traffic carrying capacity and serviceability. Improvements to these routes would provide the additional pavement width necessary to provide increased flexibility and capacity in routing traffic and emergency vehicles. Routes include:

- Shepherd Avenue from Clovis to Fowler (1 mile)
- Nees Avenue from Clovis to Armstrong (1.6 miles)
- Alluvial Avenue from Sunnyside to Temperance (1.25 miles)
- Sunnyside Avenue from Nees to Shepherd (1 mile)

Other Alternatives: No action. Existing road segments would remain constricted, impeding evacuation expediency and limiting detour alternatives.

Responsible Office: City of Clovis Public Utilities Department—Long-term Maintenance, City of Clovis Engineering Department—Construction

Priority (High, Medium, Low): High

Cost Estimate: \$7,500,000

Potential Funding: General Fund

Benefits (Avoided Losses): Improved traffic flow and increased flexibility in moving traffic and emergency vehicles during a disaster

Schedule: Estimate completion in 2038

Status: 2009 project, awaiting funding and annexation

6. CONDUCT A SEISMIC VULNERABILITY ASSESSMENT OF CITY-OWNED CRITICAL FACILITIES

Hazard(s) Addressed: earthquake

Issue/Background: The City is interested in performing a building-specific, seismic vulnerability assessment of City-owned critical facilities constructed prior to 1980 (including infrastructure). Included in this assessment will be recommended mitigation alternatives that meet goals and objectives of this plan.

Other Alternatives: No action

Responsible Office: City of Clovis Planning and Development Services—Building

Priority (High, Medium, Low): Medium

Cost Estimate: \$200,000.

Potential Funding: General Fund

Benefits (Avoided Losses): This will prevent the loss of human life, economic loss, and property loss.

Schedule: Estimate completion in 2038

Status: 2009 project, awaiting funding

7. CONSTRUCT CHANNEL IMPROVEMENTS FOR DOG CREEK STREAM, SOUTH OF GETTYSBURG-ASHLAN

Hazard(s) Addressed: Flood

Issue/Background: Dog Creek has been identified in the Fresno Metropolitan Flood Control District's (FMFCD) Rural Streams Program as a facility that needs master planned drainage improvements to adequately convey rural stream floodwaters. The FMFCD requires all development within rural stream areas to provide and construct the necessary channel improvements. The channel improvements required of Dog Creek include relocation/reconstruction of the existing channels geometry to allow a flow of 315 cubic feet per second to be passed. In order to meet this flow capacity, Dog Creek must have geometry of approximately 60 feet in width and 12 feet in depth.

Other Alternatives: No action

Responsible Office: City of Clovis Planning and Development Services Department, Fresno Metropolitan Flood Control District

Priority (High, Medium, Low): High

Cost Estimate: \$700,000

Potential Funding: California Department of Water Resources Grants and Loans, FMA

Benefits (Avoided Losses): The project goals and objectives are to improve flood management of Dog Creek for future development, as planned for in the area, thus minimizing the potential of rural stream flows to flood urbanized areas. Development activity in the City of Clovis is managed through

the FMFCD for both urbanized development and rural stormwater flows. FMFCD policy does not allow for the mixing of urban and rural flows in the same channel.

Schedule: Estimate completion in 2038

Status: 2009 project, implementation in progress

8. IMPROVE FLOW DESIGN PARAMETERS FOR BIG DRY CREEK AND THE ENTERPRISE CANAL*

Hazard(s) Addressed: Flood

Issue/Background: In order to meet the Fresno Metropolitan Flood Control District's flow design parameters for Big Dry Creek and the Enterprise Canal, the existing siphon at the confluence of the two waterways needs to be replaced with a similar type structure. The new structure will have enhanced flow measurement and control for both the Big Dry Creek and Enterprise Canal and would incorporate a walkway to accommodate a path along Big Dry Creek for the general public.

The primary purpose of the project is to provide for the long term integrity of the siphon to pass Big Dry Creek and Enterprise Canal flows. The existing structure on the Enterprise Canal (located beneath Dry Creek) was constructed in the early 1900s (estimated 1915). The replacement of this structure is essential to the reliable delivery of water over the long term. The existing structure consists of a box culvert with an integrally constructed weir. Material strength testing was conducted at the siphon, which included two concrete cores and rebar mapping of the top slab. This testing determined that the concrete compressive strength was a minimum of 4,300 pounds per square inch. Several large cracks were found in the center culvert wall approximately ¼ inch wide by 10 feet long. The cut-off wall located at the end of the apron extending from the weir structure had significant damage where rebar has been exposed and pieces of concrete have broken off.

Other Alternatives: No action

Responsible Office: City of Clovis Planning and Development Services Department, City of Clovis Public Utilities Department, Fresno Irrigation District, Fresno County, City of Fresno, Fresno Metropolitan Flood Control District

Priority (High, Medium, Low): High

Cost Estimate: \$845,000

Potential Funding: California Department of Water Resources Grants and Loans, FMA

Benefits (Avoided Losses): The project goals and objectives are to provide for the long-term integrity of the siphon to carry Dry Creek and Enterprise Canal flows.

Schedule: Estimate completion in 2038

Status: 2009 project, implementation in progress

9. IMPROVE CITY'S FLOODPLAIN MANAGEMENT PROGRAM AND APPLY TO COMMUNITY RATING SYSTEM*

Hazard (s) Addressed: Flood

Issue/Background: Seek Community Rating System (CRS) classification improvements within the capabilities of City programs, including adoption and administration of FEMA-approved ordinances and flood insurance rate maps.

Other Alternatives: No action

Responsible Office: City of Clovis Fire Department—Emergency Preparedness

Priority (High, Medium, Low): Medium

Cost Estimate: \$300,000

Potential Funding: General fund, or FEMA Emergency Management Performance Grant (EMPG), FMA

Benefits (Avoided Losses): Participation in the CRS and improvements outlined by the system will translate into improved flood mitigation and reduced flood insurance rates for local citizens. Ultimately, it will prevent the loss of human life and economic and property losses.

Schedule: Estimate completion in 2038

Status: 2009 project, implementation in progress

10. ENFORCE MASTER DRAINAGE PLAN REQUIREMENTS*

Hazard(s) Addressed: Flood

Issue/Background: The City of Clovis requires a master drainage plan as part of the approval process for all specific plans and large development projects as determined by the City's Public Works director. The master drainage plan requirements consider cumulative regional drainage and flooding mitigation. The intent of a master drainage plan is to ensure that the overall rate of runoff from a project does not exceed pre-development levels. If necessary, this objective shall be achieved by incorporating run-off control measures to minimize peak flows and/or assistance in financing or otherwise implementing comprehensive drainage plans. Enforcement will include review of development during and after construction to ensure that drainage requirements have been implemented as proposed.

Other Alternatives: No action

Responsible Office: City of Clovis Fire Department—Emergency Preparedness

Priority (High, Medium, Low): Low

Cost Estimate: Developer-based funding under specific plan requirements

Potential Funding: Developer Impact Fees or General Fund

Benefits (avoided Losses): This will prevent the loss of human life and economic and property losses and addresses flood mitigation with future development. Enforcement of these requirements ensures

that the overall rate of runoff from a project does not exceed pre-development levels, thus prevents making stormwater flooding worse.

Schedule: Estimate completion in 2038

Status: 2009 project, implementation in progress

11. INSTALL A SYSTEM OF SURFACE WATER HAZARD DETECTION

Hazard(s) Addressed: Hazardous materials

Issue/Background: The City operates a surface water treatment plant that supplies water to a community of over 95,000 people. The water is delivered to the plant via an open canal that travels approximately 30 miles from the source to the plant. There have been several incidents where items have been dumped into the canal, requiring the plant to shut down. The City is concerned that the dumping of hazardous chemicals could occur and, without some advance notification, that the chemicals could get through the treatment plant and into the distribution system, making customers sick. Equipment is available that can be installed upgradient from the plant that will sample the water, analyze the water on-site, and provide notification to the plant prior to it reaching the plant.

Other Alternatives: Continue patrolling the canal on a daily basis.

Responsible Office: City of Clovis Public Utilities Department Water Division

Priority (High, Medium, Low): High

Cost Estimate: \$100,000

Potential Funding: City of Clovis Water Operations Fund

Benefits (Avoided Losses): This will prevent the loss of human life, illness, customer confidence, and revenue.

Schedule: Estimate completion in 2038

Status: 2009 project, implementation in progress

12. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought

Issue/Background: The Kings subbasin underlays the City of Clovis and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Clovis has become a joint power authority of the North Kings Groundwater Sustainability Agency, other members

of the Agency include the County of Fresno, City of Kerman, City of Fresno Biola Community Services District, Garfield Water District and International Water District. As a member of the North Kings GSA, the City of Clovis is required to participate in the development and implementation, no later than January 31, 2020, of a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the North Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: City Engineer and North Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with California Department of Water Resources Grants and Loans.

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: 2018 Project; implementation in progress

Annex B: City of Coalinga





PARTICIPATION

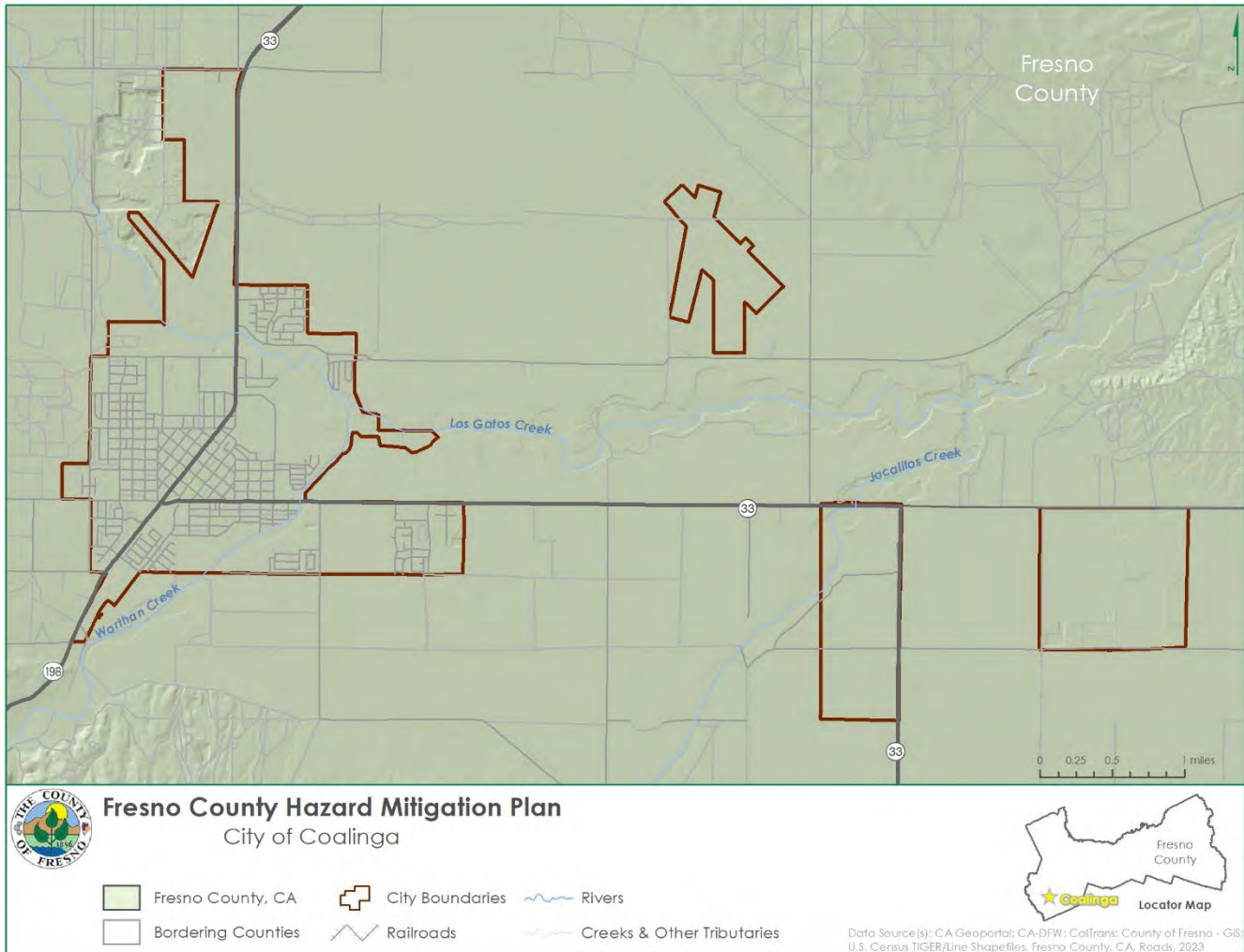
To update the City of Coalinga jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of Coalinga input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of Coalinga did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee. These stakeholders are identified in Appendix B. The City also plans to engage with the public when the plan update is complete.



COMMUNITY PROFILE

Figure 1. City of Coalinga displays a map and the location within Fresno County of the City of Coalinga.

Figure 1. City of Coalinga



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads 2023



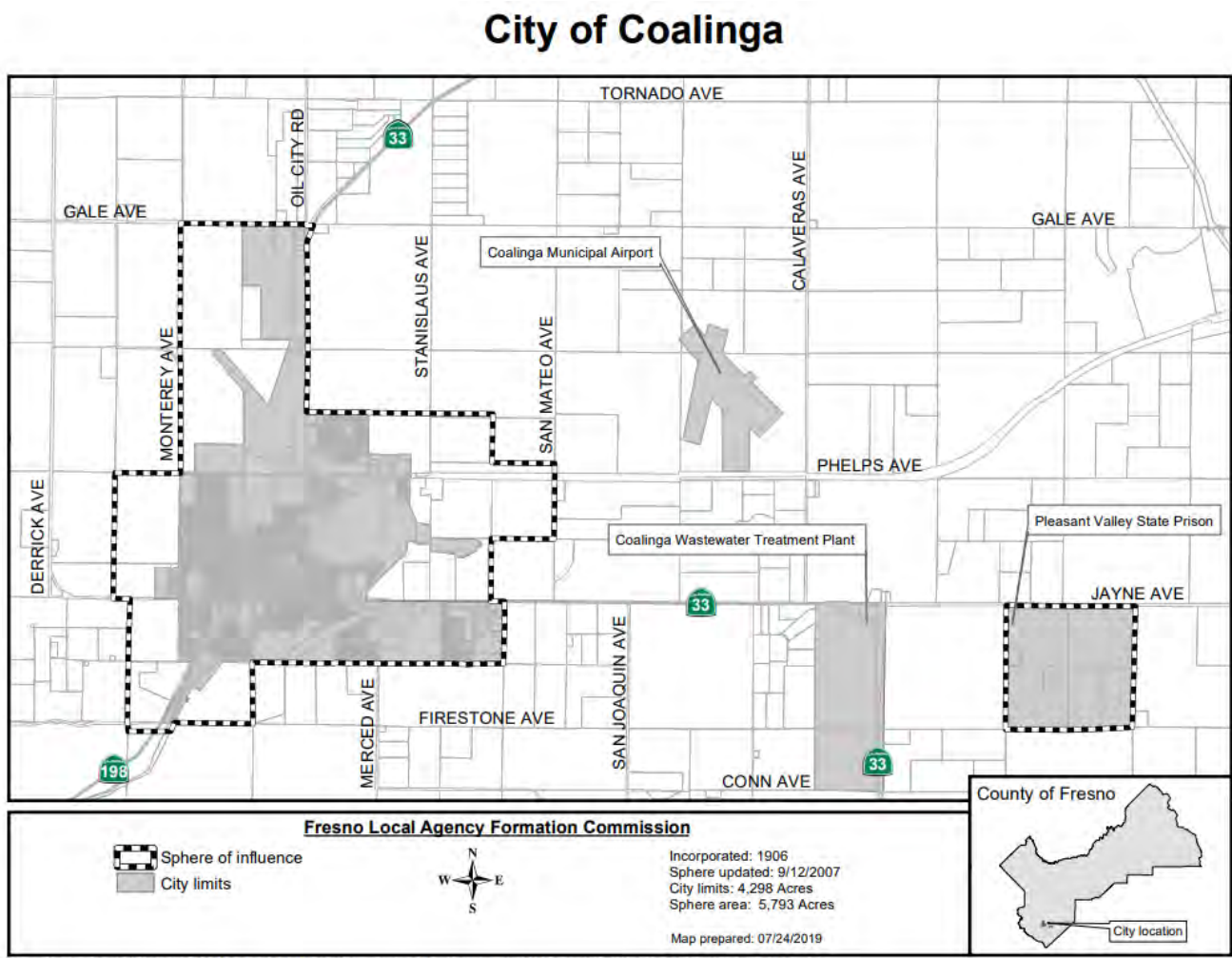
GEOGRAPHY AND CLIMATE

The City of Coalinga is located in the southwestern portion of the San Joaquin Valley in an area known as Pleasant Valley. Over the past decade, the City boundaries have not changed, but the City did annex land southeast of State Route 33, outside the current Sphere of Influence. The City and its Sphere of Influence cover 5,793 acres, 4,298 acres of which are within the City limits, shown in **Figure 2. City of Coalinga Limits and Sphere of Influence**. Access to Coalinga is by State Routes 198 and 33. Interstate 5 is located approximately 13 miles to the east. Existing development in the City is characterized by residential neighborhoods with commercial uses concentrated along State Routes 198 and 33 and Polk Street.

The City of Coalinga lies over or near more than one earthquake fault and lateral or blind thrust fault. It is approximately 29 miles from the Town of Parkfield, which is located on the San Andreas fault and has been the site of an earthquake study since the late 1970s.

The climate is mild and damp in the winter and hot and dry in the summer. The mean high temperature is 59.7°F in January and 100.8°F in July. The mean low temperatures average 38.2°F in January and 68.8°F in July. The annual precipitation is 8.2 inches. **Figure 3. City of Coalinga Monthly Normal for Precipitation and Temperature (1991-2020)** shows the monthly precipitation and temperature normal for the closest National Weather Service (NWS) weather station which is in the City of Coalinga.

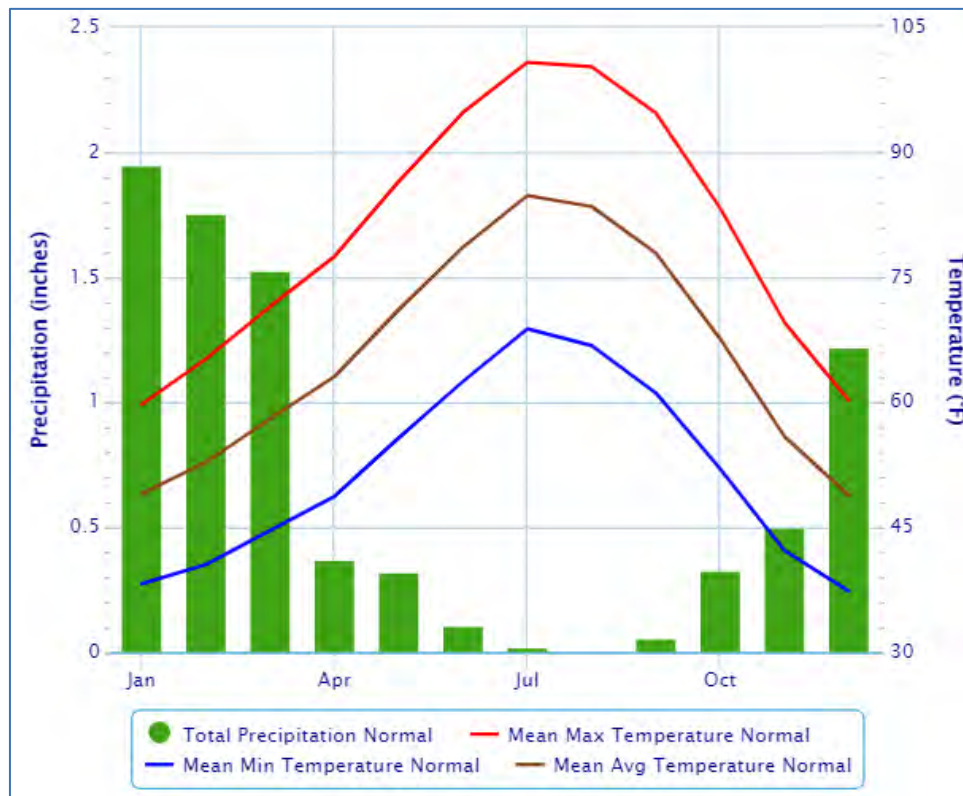
Figure 2. City of Coalinga Limits and Sphere of Influence



Document path: G:\LAFCO WORKING FILES\GIS Layers and Maps\00-LAFCo Maps\Cities\Coalinga\Coalinga_021519.mxd

Source: Source: Fresno Local Agency Formation Commission,
https://www.fresnolafco.org/files/35221eec1/Coalinga_072319.pdf

Figure 3. City of Coalinga Monthly Normal for Precipitation and Temperature (1991-2020)



Source: NWS

HISTORY

The following history of Coalinga is from the City of Coalinga General Plan Update, 2014:

For many centuries, numerous tribes of Native Americans, all belonging to the Yokut, inhabited the San Joaquin Valley. Although it is not clear when the first people made their way to Coalinga, it is known that the Tache (Tachi), one of the largest of all the Yokut tribes, found a permanent water supply at a place called Posa Chanet near the City's present site. From this encampment, the Tache scoured the hills for trade goods. They discovered oil seeps and thick tar. Oil was an important item to early inhabitants of the Pleasant Valley. Seepages in the area provided asphalt used to line baskets and was a good traded among other tribes. Eventually, Spaniards and Basques, who wanted the land for its cattle and sheep grazing potential, displaced the Indians.

As new settlers came to the west seeking a new life and greater opportunities, interest in oil seepages inspired an oil rush in 1865. In 1867, a specialized oil-drilling rig, shipped from the east coast, began drilling for oil north of the present site of Coalinga. However, shipping problems caused early interest to die down; the world had not yet discovered the full potential of petroleum.

In the late 1800s, stories of shearherders who burned rocks at night to keep warm drew the attention of Messer's Robins and Rollins, English second sons. Excited by the promise of coal in the area, they established a mine in a slash of hillside where the Coalinga Rifle Range now exists. It was never profitable. The coal was actually shale. However, the potential of coal from the mine and in nearby



Priest Valley was enough to induce the Southern Pacific Railroad to extend its southern route. It crossed Huron and stretched slightly beyond the Coalinga area.

There is debate about how Coalinga got its name. The usual version is that while deposits of oil saturated shale, or “coal,” were being mined in the hills nearby “Coaling Station A,” “Coaling Station B,” and “Coaling Station C” were situated along the rail line for loading purposes. “Coaling Station A” was eventually shortened to “Coalinga.” This story does not stand close scrutiny, and a more likely explanation is that Coalinga was given the final “a” for musical effect. The truth may never be known, since the great quake and fire in San Francisco in 1906 destroyed the Southern Pacific Railroad’s office and all its records. Whatever the origin, “Coalinga” was in use fairly quickly after the rail line opened in July 1888.

The extension of the railroad coincided with a significant worldwide interest in oil production. A second oil rush occurred around 1890. By 1910, Coalinga was the third largest shipping point for the railroads in California with nearly all tonnage connected to oil production.

The town grew quickly in the late 1800s. In 1889, the Coalinga post office was established. In 1891, Southern Pacific Railroad purchased the 160-acre homestead of M.L. Curtis for \$900 and laid out the town site of Coalinga as a square cut diagonally by the railroad tracks. Street numbers from one to eight went north to south and the letters A to H from west to east. The Coalinga Women’s Improvement Society later changed the alphabetical names to botanical ones. A succession of historically important oil wells brought “boomers” into Coalinga by the thousands.

With over 15 years of continuous prosperity behind them, a handful of local citizens began the process of incorporation, which was completed in April 1906. In 1909, the Coalinga Chamber of Commerce was organized, and in its first report dated April 16, 1910, they excitedly spoke about the promise of the City. The Coalinga oil field was the largest in California. In September 1909, the Silver Tip well, located just one-half mile from the City limits, blew with the greatest gusher known in California at that time. This discovery caused enough excitement among the financiers of California that the Los Angeles Stock Exchange was closed on a Friday in November and a special excursion train traveled to Coalinga so potential investors could marvel at the sight.

During the early years of production, there were several important developments in Coalinga. In 1904, a six-inch oil pipeline was laid from Coalinga to Monterey on the coast (104 miles) to provide tanker oil for overseas buyers. The pipeline was built in 90 days and crossed two mountain ranges with maximum elevation of 2,000 feet. In 1916, Coalinga oilfield workers fought for and won the industry’s first eight-hour workday. In 1919, A&W Root Beer was formulated in downtown Coalinga. During World War II, Signal Hill oil in Long Beach was brought in. The supply was so great that the existing pipeline flow from Coalinga to the Los Angeles refineries was reversed and excess Signal Hill oil was stored in a massive tank farm called Caliola about 10 miles east of Coalinga. Coalinga’s oil fields produced some of the oil industry’s giants, including R.C. Baker, founder of Baker Oil Tools. His original buildings in Coalinga are now home of the R.C. Baker Memorial Museum, which focuses on oil as well as pioneer life in the Coalinga area.

From the outset, it was said that whiskey was easier to get than water in Coalinga. The natural well water had high amounts of dissolved minerals in it, making it suitable for only the most basic uses of washing and irrigating. To meet this challenge, Coalinga’s drinking water was imported. Until 1960, the major source of drinking water was Southern Pacific water wells in Armona. In time, a municipal water service was provided for the central area of town.

In 1960, Coalinga was selected for experimental systems to soften hard water and make it suitable for human consumption. The first of these was an ionic system that was later replaced by the reverse osmosis method. In April 1972, Coalinga received its first delivery of San Luis Canal water from the state water system.



ECONOMY

While oil was the staple of the local economy, agriculture always played an important role. Before 1972, agriculture was limited to cotton and other salt water resistant crops. With the arrival of canal water, the area has become a region of specialty crops, which include lettuce, tomatoes, asparagus, and a variety of nut and fruit trees.

While there was open speculation that Coalinga would not survive the May 1983 earthquake, the disaster became the catalyst that inspired revitalization. In 1988, the residents approved a bond issue for a new \$14 million community hospital facility to replace the one destroyed in the earthquake. Coalinga completed an 800-acre annexation to include Pleasant Valley State Prison and the new airport in the City limits in 1991. In 1994, the Department of Corrections located a major prison facility in Pleasant Valley. With this as an economic base, the City developed a 40- acre industrial park. To address concerns about proximity to schools and associated noise hazards, the airport was relocated four miles to the east. A brand new \$8 million airport facility was built in 1996. The Coalinga Regional Medical Center was completed in 2002, and construction of a new mental health facility, the Coalinga State Hospital, was completed in the spring of 2005. In the oilfields, a process of steam injection promises to produce \$2.3 billion more barrels of oil, perhaps as much as has already been mined.

Since the 1983 earthquake, significant efforts have been made to rebuild and revitalize the City. These efforts, combined with Coalinga's central geographical location and proximity to the busy Interstate 5 corridor, are expected to diversify the City's economy as state growth continues.

Select estimates of economic characteristics for the City of Coalinga from the American Community Survey (ACS) are shown in **Table 1. City of Coalinga's Economic Characteristics**.

Table 1. City of Coalinga's Economic Characteristics

Characteristic	City of Coalinga
Families below poverty level	13.5%
All people below poverty level	18.7%
Median family income	\$69,500
Median household income	\$68,976
Per capita income	\$23,456
Population in labor force	6,407
Population employed	5,653
Unemployment	11.8%

Source: U.S. Census Bureau American Community Survey 2018-2022

Table 2. City of Coalinga's Employment by Occupation and **Table 3. City of Coalinga's Employment by Industry** show how the City of Coalinga's labor force breaks down by occupation and industry based on 5-year estimates from the 2018-2022 American Community Survey.

Table 2. City of Coalinga's Employment by Occupation

Occupation	# Employed	% Employed
Management, Business, Science and Arts Occupations	1,352	23.92%



Occupation	# Employed	% Employed
Management, Business, and Financial Occupations	(421)	(31.14%)
Computer, Engineering, and Science Occupations	(98)	(7.25%)
Education, Legal, Community Service, Arts, and Media Occupations	(512)	(37.87%)
Healthcare Practitioner and Technical Occupations	(321)	(23.74%)
Sales and Office Occupations	1,119	19.79%
Service Occupations	1,428	25.26%
Natural Resources, Construction, and Maintenance Occupations	928	16.42%
Production, Transportation, and Material Moving Occupations	826	14.61%
Total	5,653	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022

Table 3. City of Coalinga's Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care, and Social Assistance	1,794	31.74%
Agriculture, Forestry, Fishing and Hunting, and Mining	739	13.07%
Public Administration	609	10.77%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	426	7.54%
Transportation and Warehousing, and Utilities	386	6.83%
Retail Trade	492	8.70%
Construction	378	6.69%
Other Services, Except Public Administration	117	2.07%
Professional, Scientific, and Management, and Administrative and Waste Management Services	255	4.51%
Manufacturing	178	3.15%
Information	41	0.73%
Finance and Insurance, and Real Estate and Rental and Leasing	102	1.80%
Wholesale Trade	136	2.41%
Total	5,653	100.00%

Source: U.S. Census Bureau American Community Survey 2022



POPULATION

According to the Census Bureau 2022 Population Estimate, the City of Coalinga has a population of 17,024. Select demographic and social characteristics for the City of Coalinga from the U.S. Census Bureau's 2018-2022 American Community Survey 5-year estimates are shown in **Table 4. City of Coalinga's Demographic and Social Characteristics**.

Table 4. City of Coalinga's Demographic and Social Characteristics

Characteristic	City of Coalinga
Gender/Age	
Male	59.7%
Female	40.3%
Median age	35.0
Under 5 years	4.6%
Under 18 years	23.6%
65 years and over	10.8%
Race/Ethnicity	
White	39.5%
Asian	2.1%
Black or African American	3.9%
American Indian/Alaska Native	2.3%
Hispanic or Latino (of any race)	63.1%
Education	
High school graduate or higher	70.0%
Disability Status	
Population 5 years and over	13.33%

Source: U.S. Census Bureau American Community Survey 2018-2022

HAZARD IDENTIFICATION AND SUMMARY

Coalinga's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the City (see **Table 6. City of Coalinga's - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Coalinga

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Coalinga's - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Minor	Small	12-24 hours*	Less than 24 hours*	Medium
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Unlikely	Minor	Negligible	Less than 6 hours	More than 1 week	Low
Drought	Possible	Limited	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Catastrophic	Large	Less than 6 hours	Less than 6 hours	High
Flood/Levee Failure	Possible	Limited	Moderate	More than 24 hours	Less than 1 week	Medium
Hazardous Materials	Highly Likely	Critical	Large	Less than 6 hours	Less than 1 week	Medium*
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Medium*
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Medium*
Soil Hazards						
Erosion	Possible	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Possible	Minor	Small	N/A	N/A	Low
Land Subsidence	Possible	No Data	Small	N/A	N/A	Low
Landslide	Unlikely	Limited	Negligible	12-24 hours*	Less than 6 hours*	Low
Volcano	Unlikely	Minor	Small	Less than 6 hours*	More than 1 week*	Low
Wildfire	Highly Likely	Limited	Moderate	12-24 hours*	More than 1 week*	High

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*



VULNERABILITY ASSESSMENT

The intent of this section is to assess Coalinga's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Coalinga's - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Coalinga's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

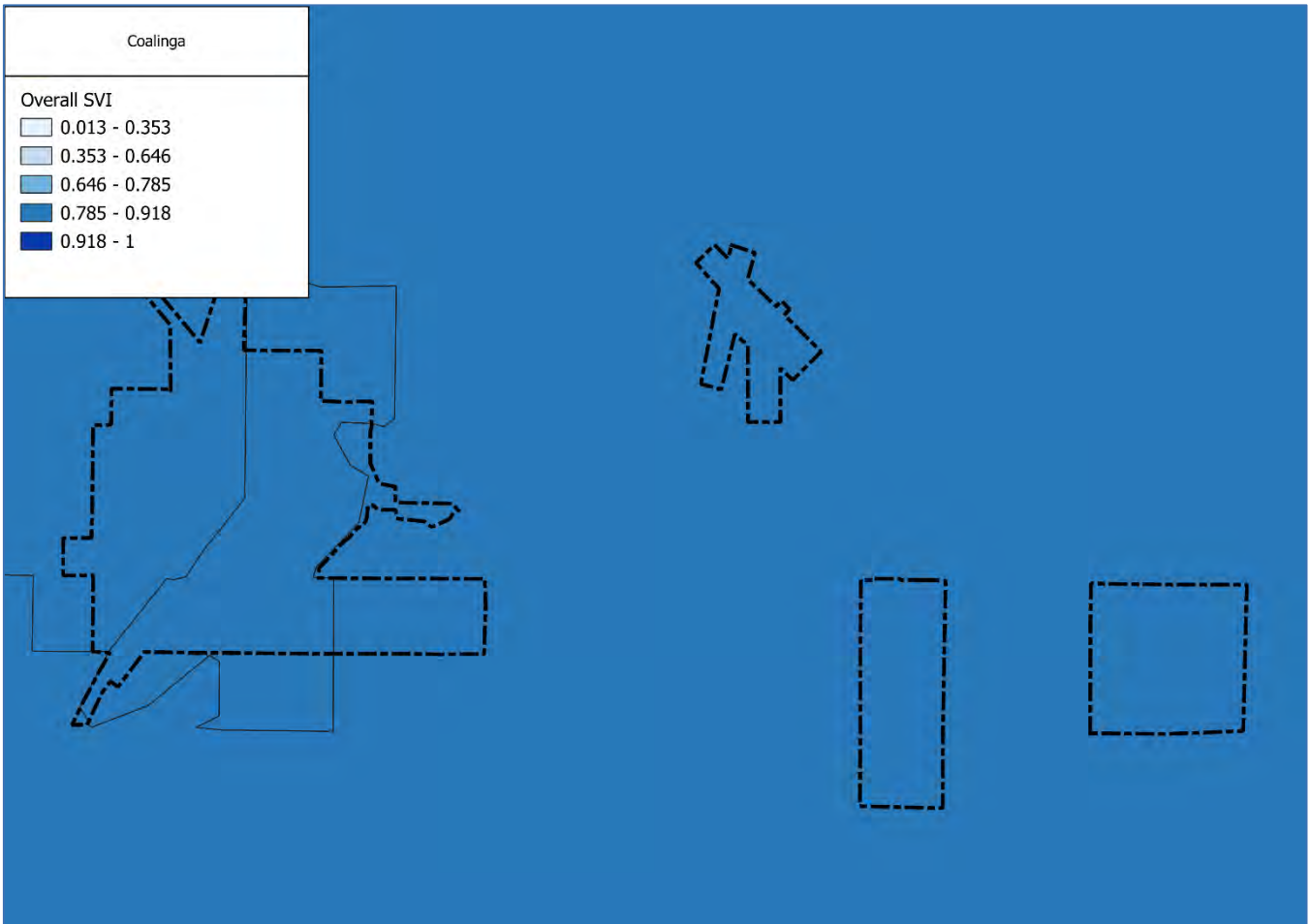
The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Coalinga, there is only one census tract that encompasses the City. The census tract is high between .785 to .918, as shown in **Figure 4. City of Coalinga Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.). ¹

Figure 4. City of Coalinga Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Coalinga City Boundary

ASSETS AT RISK

This section considers Coalinga's assets at risk, including population, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

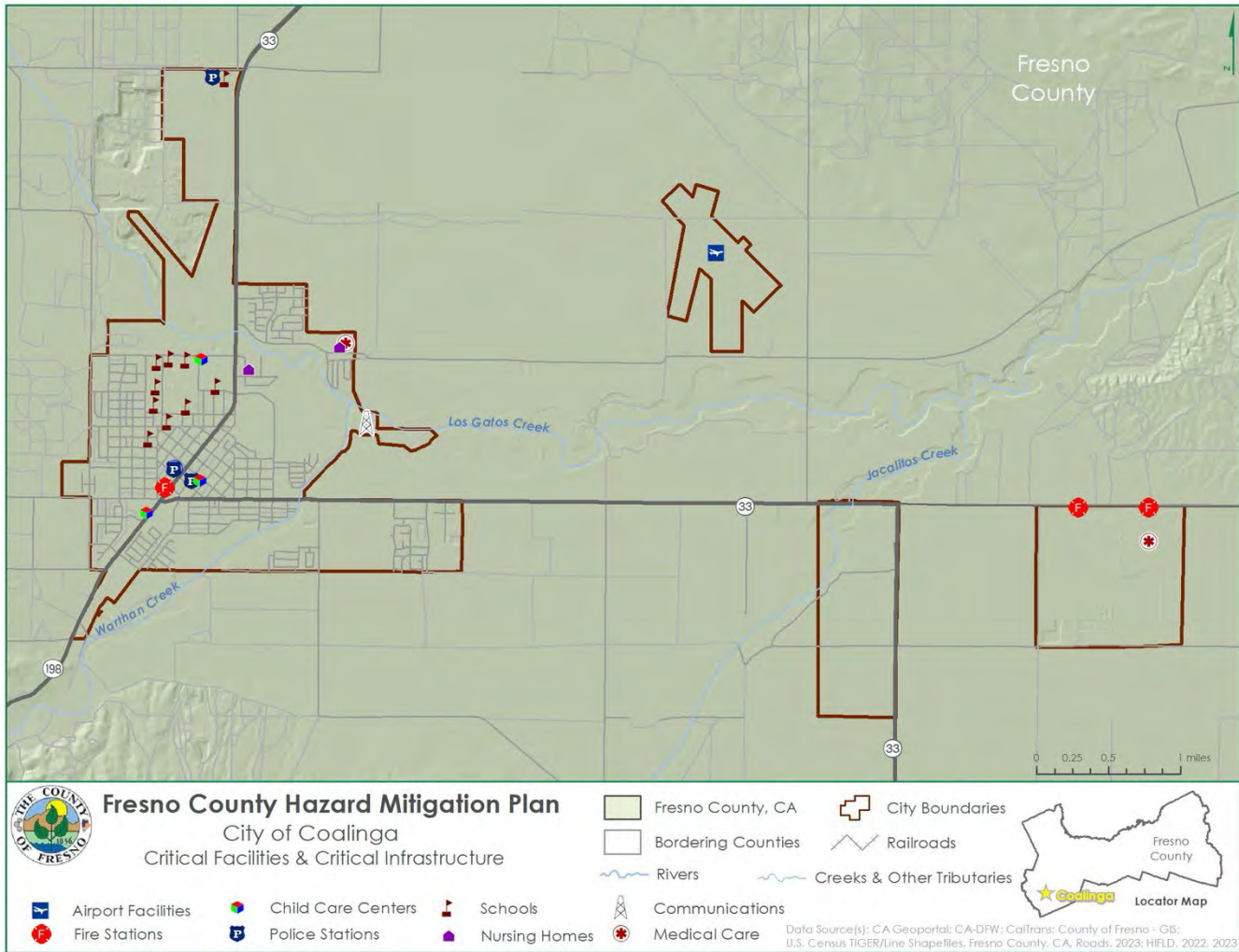
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Coalinga from Fresno County GIS is provided in **Table 7. City of Coalinga's Critical Facilities** and mapped in **Figure 5. City of Coalinga Critical Facilities**. This table reflects all critical facilities that have an address within Coalinga, including some facilities outside of the City's corporate boundaries.

Table 7. City of Coalinga's Critical Facilities

Critical Facilities Type	Number
Airport	1
Colleges & Universities	2
Communications	1
Electric Power	4
EOC	1
Fire Station	5
Health Care	2
Police	3
School	8
Total	27

Source: Fresno County, HAZUS Critical Facilities 2023

Figure 5. City of Coalinga Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads, 2023; HIFLD, 2022, 2023



Table 8. Specific Critical Facilities and Other Community Assets lists critical facilities and other community assets (in addition to those identified above from Fresno County GIS) identified by Coalinga's planning team as important to protect in the event of a disaster. This list reflects facilities that are within the jurisdiction of or under the control of the City.

Table 8. Specific Critical Facilities and Other Community Assets

Name of Asset	Replacement Value (\$)	Occupancy/Capacity #
City Hall Building (Building Expansion), 155 W. Durian Avenue	4,901,358	21,060
Corporation Yard, 135 Sacramento	33,101	1,600
Coalinga Airport Facility	6,602,127	
Coalinga Police Department 270 North 6 th Street	Not Available	
Fire Station 300 West Elm Avenue	1,421,543	12,254
Palmer Ave, Repeater Station, Emergency Communications	9,198	
Waste Water Treatment Facility, 60500 Jayne Ave	528,000	
Water Filtration Plant, 25034 W. Palmer Avenue	6841332	
Water System, Palmer Avenue Tank	188,515	250,000 gallons
Water System, Oil King Tank	377,029	500,000 gallons
Water System, Derrick Avenue Tank	3,198,468	8,000,000 gallons
Water System, Palmer Avenue Tank	1,421,543	3,000,000 gallons
Water System, Calaveras Avenue Tank	1,444,290	5,000,000 gallons

Source: Fresno County GIS

GROWTH AND DEVELOPMENT TRENDS

Table 9. City of Coalinga's Change in Population and Housing Units, 2017-2022 illustrates how the City has grown in terms of population and number of housing units between 2017 and 2022.

Table 9. City of Coalinga's Change in Population and Housing Units, 2017-2022

2017 Population	2022 Population Estimate	Estimated Percent Change 2017- 2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017- 2022
16,612	17,488	+5.72%	4,653	4,483	-3.65%

Source: U.S. Census Bureau



More general information on growth and development in Fresno County as a whole can be found in “Growth and Development Trends” in Fresno County Vulnerability and Assets at Risk section of the main plan.

ESTIMATING POTENTIAL LOSSES

Fresno County’s assessor’s data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Impacts of past events and vulnerability to specific hazards are further discussed below in accordance with the criteria identified under Vulnerability Assessment section. (See the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County).

EARTHQUAKE (HIGH)

There are several faults in the vicinity of Coalinga that could cause problems in the future. These include the Nuñez fault, located about ten kilometers northwest of Coalinga; the Coalinga fault, located five kilometers northeast of Coalinga; and the New Idria fault, located approximately 21 miles northwest of Coalinga. The U.S. Geological Survey is predicting an earthquake in Parkfield in Monterey County, approximately 15 miles southwest of Coalinga. Coalinga is the only urban area in the County directly affected by earthquake-related settlement.

Two earthquakes of note that occurred in or near Coalinga are described below:

- **May 2, 1983:** In Coalinga, a surface rupture occurred along the Nuñez fault. The main shock was magnitude 6.7 on the Richter scale. Approximately 800 buildings were destroyed, and 1,000 people left homeless. No deaths resulted, but 200 people were injured. Private homeowner losses exceeded \$25 million. Public agency losses are approximately \$6 million. The commercial section of Coalinga was heavily damaged; however, most schools and the hospital received only slight damage. Production in nearby oil fields was shut down. The City was left with numerous vacant parcels and city-owned lots. Local, state, and federal disaster declarations resulted.
- **August 4, 1985:** A magnitude 6.0 earthquake occurred that was centered about 10.5 kilometers east of Coalinga.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.



EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Coalinga's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (MEDIUM)

According to FEMA's 2016 Flood Insurance Study (FIS), Coalinga's principal flood problems are associated with Los Gatos Creek and Warthan Creek. The Los Gatos Creek headwaters are approximately 22 miles northwest of the City in the eastern foothills of the Coast Range. The creek enters the northern portion of the City flowing east-southeast. The creek flows just north of the sewage treatment plant. The Warthan Creek headwaters are located approximately 16 miles southwest of the City in the eastern foothills of the Coast Range. Warthan Creek enters Coalinga from the south and flows through the southeastern portion of the City before leaving just north of the intersection of East Polk Street and Alicia Avenue. From there, the creek continues for less than a mile to its confluence with Los Gatos Creek just northwest of the sewage treatment plant. Some areas in the City are subject to shallow overland flooding caused by insufficient channel capacity of Los Gatos Creek or insufficient levee height on Warthan Creek.

According to the 2016 FIS, floods occurred in or around Coalinga in 1952, 1958, 1962, 1966, 1969, 1976, and 1978. Details on some of these events follow:

- **April 1958:** Flooding affected mainly agricultural lands and public facilities, such as roads and bridges.
- **December 1966:** Flooding caused extensive road and bridge damage in the upper reaches of Los Gatos and Warthan Creeks. East of the City, sewage treatment facilities and the levees along Warthan Creek were damaged, the Los Gatos Creek channel was severely eroded, and there was extensive damage to utilities and agricultural land. Damage totaled approximately \$570,000, and floodwater inundated 4,500 acres.
- **February 1969:** The largest and most damaging flood in Coalinga's recorded history occurred when floodwater from Los Gatos and Warthan Creeks covered 16,600 acres and caused approximately \$4.5 million in damage. Flooding extended from the foothills west of the City to the valley east of the City. Bridges and roads were washed out, agricultural land was eroded, farm and ranch improvements and petroleum installations were damaged and destroyed, areas were isolated, traffic was disrupted, and residential and commercial areas in the northwest and southeast portions of the City were damaged.
- **February 1978:** Flooding occurred along Los Gatos Creek from the foothills to the valley floor and damaged agricultural lands, roads and bridges, and utilities. An estimated 4,500 acres were flooded. Damage totaled \$160,000.

Recent flood occurrences are described in more detail below.

- **5/09/2023:** An upper trough moved across Central California on May 9. This system provided for enough instability for scattered thunderstorms to break out along the West Side Hills and the Sierra Nevada during the afternoon. One thunderstorm produced heavy rainfall near Coalinga which

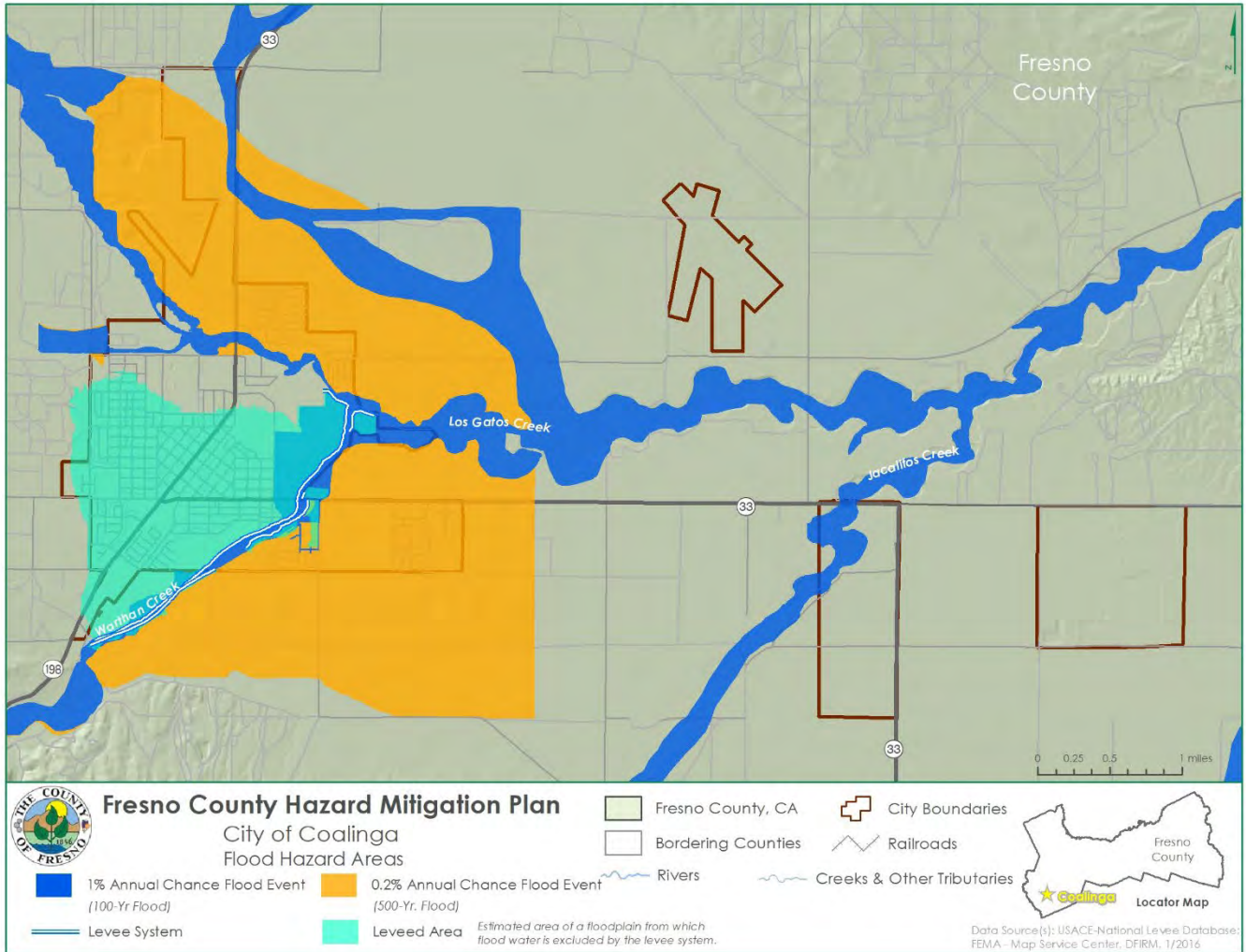


resulted in a brief closure of SR 198 just to the southwest of Coalinga as rocks and mud impacted the highway.

VALUES AT RISK

A flood map for the City of Coalinga was created (see **Figure 6. City of Coalinga Flood Hazard Areas**) and **Figure 7. City of Coalinga Flood Hazard Area Buildings at Risk** describes flood hazard areas and buildings at risk within the flood hazard area. **Table 10. City of Coalinga Parcels Within the 100-Year Floodplain**, **Table 11. City of Coalinga Parcels within the 500-Year Floodplain**, **Table 12. City of Coalinga Buildings Within the 100-Year and 500-Year Floodplain** summarize the values at risk in the City's 100-year and 500-year floodplain, respectively. These tables also detail loss estimates for each flood.

Figure 6. City of Coalinga Flood Hazard Areas



CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database; FEMA, DFIRM, 1/2016;

Table 10. City of Coalinga Parcels Within the 100-Year Floodplain

Property Type	Parcel Count	Improvement Value	Land Value	Total Assessed Value
Primary Use Not Designated	2	\$0	\$0	\$0
Single-Family Residence	12	\$2,599,806	\$661,896	\$3,261,702
Vacant	26	\$0	\$696,660	\$696,660
Unknown	161			
Coalinga Total	201	\$2,599,806	\$1,358,556	\$3,958,362

Source: City of Coalinga parcel data; National Flood Insurance Program Flood Mapping Data

Table 11. City of Coalinga Parcels within the 500-Year Floodplain

Property Type	Parcel Count	Improvement Value	Land Value	Total Assessed Value
Single-Family Residence	158	\$36,385,943	\$8,887,904	\$45,273,847
Vacant	59	\$976,557	\$1,373,156	\$2,349,713
Coalinga Total	217	\$37,362,500	\$10,261,060	\$47,623,560

Source: City of Coalinga parcel data; National Flood Insurance Program Flood Mapping Data

Table 12. City of Coalinga Buildings Within the 100-Year and 500-Year Floodplain

Leveed Area	100-Year Flood Hazard Area	500-Year Flood Hazard Area	Total Building in Flood Hazard Areas by Jurisdiction
3,360	215	868	4,443

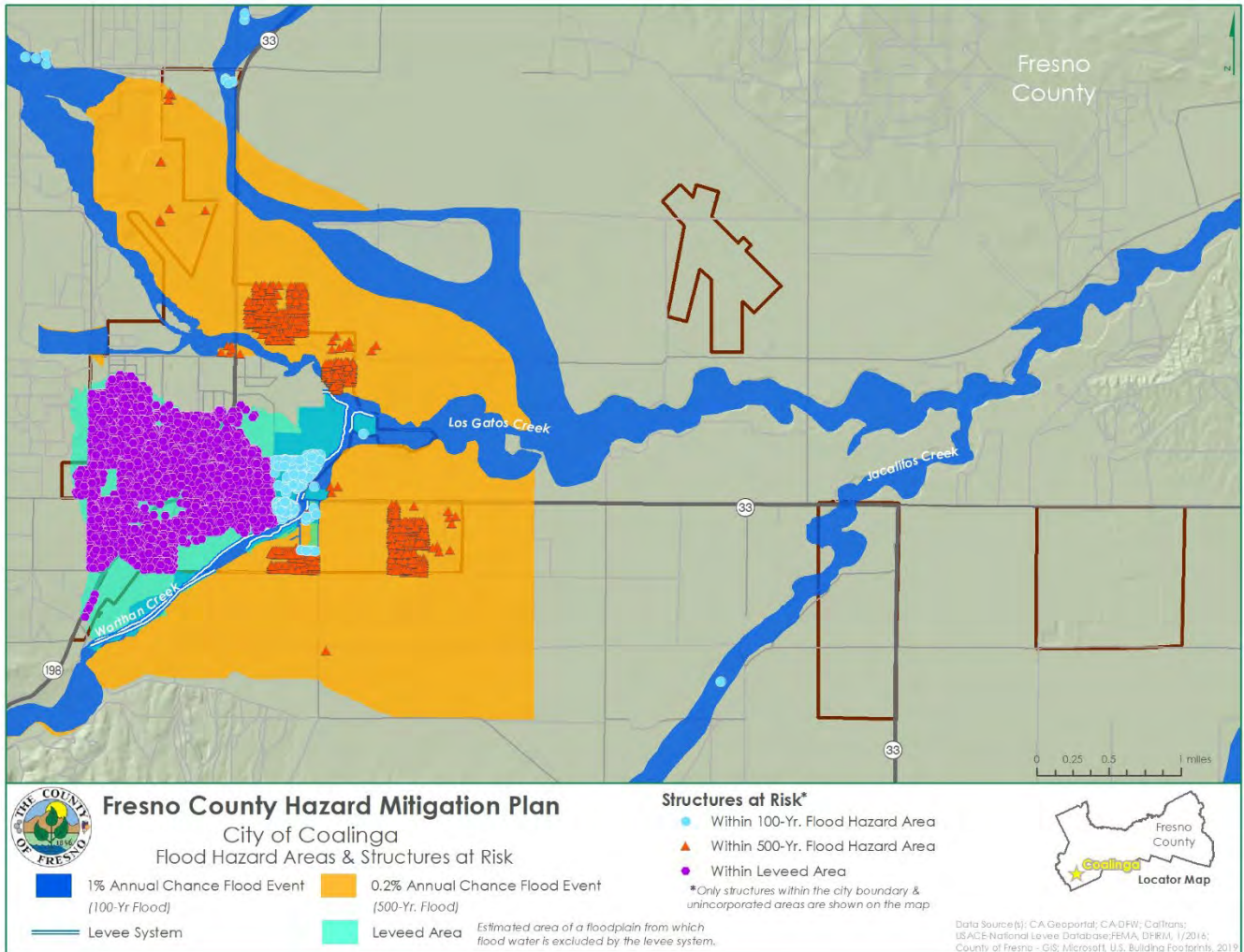
Source: City of Coalinga parcel data; National Flood Insurance Program Flood Mapping Data

Based on this analysis, the City of Coalinga has significant assets at risk of the 100-year and greater floods. There are 201 parcels within the 100-year floodplain for a total assessed value of roughly \$4 million and within the 500-year floodplain, there are 217 parcels for a total assessed value of \$47.6 million. Additionally, there are 4,443 buildings in the flood hazard area.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Properties at risk to flooding are shown in relation to the floodplain in the figure below.

Figure 7. City of Coalinga Flood Hazard Area Buildings at Risk



Source: CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database, FEMA, DFIRM, 1/2016; County of Fresno – GIS, Microsoft, U.S. Building Footprints, 2019



POPULATION AT RISK

For the population estimates, two analyses were completed: weighted and unweighted. For the weighted population analysis, the percentage area of each of the flood zones were identified for each of the census tracts then multiplied this percent by the total population for the census tract.

Note: Population is not evenly distributed within the census tract, however the analysis was conducted to provide a perspective of an estimated population at risk of flooding.

The unweighted analysis calculated the total population for any census tract that intersected any of the flood zones, including the 100-year and 500-year floodplain. The following are at risk to flooding in the City of Coalinga:

Weighted Analysis

- 100-year flood – 2,148 people
- 500-year flood – 3,835 people

Unweighted Analysis

- 100-year flood – 18,513 people
- 500-year flood – 18,513 people

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.²

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Coalinga joined the National Flood Insurance Program (NFIP) on August 23, 1982. NFIP Insurance data indicates that as of March 19, 2024, there were 43 flood insurance policies in force in the City with \$2,308,030 of total premium or total paid. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties located in the jurisdiction. There have been no historical claims for flood losses.

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. **Table 13. Critical Facilities in the 100-Year and 500-Year Floodplain** lists the critical facilities in the City's 100- and 500-year floodplains.



Table 13. Critical Facilities in the 100-Year and 500-Year Floodplain

Critical Facility Type	100-year Floodplain	500-Year Floodplain
Communication Facilities	1	\$118,000
Schools	1	\$10,203,670
Total	2	\$10,321,670

Source: City of Coalinga parcel data; National Flood Insurance Program Flood Mapping Data

HAZARDOUS MATERIALS INCIDENT (MEDIUM)

Hazardous materials likely to be involved in a spill or release within the City include herbicides, pesticides, chemicals in gas, liquid, solid, or slurry form; flammables; explosives; petroleum products; toxic wastes; and radioactive substances. The County Health Department is the designated administering agency for the Fresno County area hazardous material monitoring program. A total of 22 incidents have occurred in the City of Coalinga between 2009 and 2022, including five fixed site incidents, five storage tank/platform/pipeline (not specified), six pipeline, and one mobile vehicle incident. Four incidents were related to oil spills, with one unknown material spill. No property damage and no injuries were reported.³ There is one identified CalARP hazardous materials facilities located in the City of Coalinga.

SEVERE WEATHER: EXTREME COLD/FREEZE AND EXTREME HEAT (MEDIUM)

Cold/Freeze

The City of Coalinga does not have a record of past severe weather events, but significantly low temperatures have occurred in the City. Extreme cold can be exacerbated by winds, as the most common wind condition in Coalinga is caused by severe winter storms. The following chronicles historic periods of extreme cold in the City of Coalinga.

Below 20 Degrees Fahrenheit

- January 2007
- January 1949
- January 1963
- January 1960
- January 1950
- December 1990
- December 1967
- December 1998
- December 1963

³ 2024 Fresno County Hazard Mitigation Plan
 California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>



Extreme Heat

The City of Coalinga has experienced very high temperatures. High temperatures have exceeded 110°F and resulted in loss of crops, livestock, and wages (workers were sent home) as well as the temporary closure of schools. Very high temperatures in August 1997 contributed to five deaths. Also, during California's fire season, high temperatures have hampered firefighting efforts. The following chronicles historic periods of extreme heat in the City of Coalinga.

Above 110 Degrees Fahrenheit

- May 2009
- June 2021
- June 2013
- June 1961
- June 2009
- June 2008
- June 1950
- June 2017
- July 2001
- July 2017
- July 1950
- July 1961
- July 2013
- July 1975
- July 1990
- July 2007
- July 1942
- July 1972
- July 1960
- July 1991
- July 1991
- August 2017
- August 1996
- August 1950
- August 2010
- August 1998
- August 2021



- August 2014
- August 2015
- August 2012
- September 1955

Above 115 Degrees Fahrenheit

- July 2021
- July 2009
- September 2017

WILDFIRE (HIGH)

Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a fire map for the City of Coalinga was created (see **Figure 8. City of Coalinga Wildfire Hazard Severity Zones**).

An analysis was performed using GIS software to determine where populations, values at risk, and critical facilities are located within wildfire threat zones. **Table 14. City of Coalinga Buildings at Risk to Wildfire (High Threat)** show the values at risk in the high and moderate wildfire threat zones (there are no values at risk in the very high threat zone). In total, there are 1,191 building at risk to Wildfire and around. There are no critical facilities within the Wildfire Hazard Severity Zone.

Table 14. City of Coalinga Buildings at Risk to Wildfire (High Threat)

Influence Zone				Interface Zone		Intermix Zone			Not WUI Zone		
Not FHSZ	Moderate	High	Very High	Moderate	High	Moderate	High	Very High	Moderate	High	Very High
60	45	35		643	360	34			14		

Source: City of Coalinga parcel data; CAL FIRE

POPULATION AT RISK

For the population estimates, two analyses were completed: weighted and unweighted. For the weighted population analysis, the percentage area of each of the wildfire hazard severity zones were identified for each of the census tracts then multiplied this percent by the total population for the census tract.

Note: Population is not evenly distributed within the census tract, however the analysis was conducted to provide a perspective of an estimated population at risk of flooding.

The unweighted analysis calculated the total population for any census tract that intersected any of the wildfire hazard severity zones. Within the Coalinga, Unincorporated area, there are thousands of individuals at risk, living within the Wildfire Hazard Severity Zone, shown in **Table 15. City of Coalinga Population at Risk of Wildfires (Weighted)** and **Table 16. City of Coalinga Population at Risk of**



Wildfires (Unweighted). In total, there are an estimated 7,410 (unweighted) to 37,585 (Unweighted) individuals within the Wildfire Hazard Severity Zone.

Table 14. City of Coalinga Population at Risk of Wildfires (Weighted)

Jurisdiction	Wildfire Hazard Severity Zones		
	Moderate	High	Very High
Coalinga; Unincorporated Fresno County	1,411	4,064	1,935

Source: City of Coalinga parcel data; CAL FIRE

*Based on Census Tract population values from the 2020 U.S. Census, if the fire severity zone intersected the census tract all population with that census tract was considered at risk

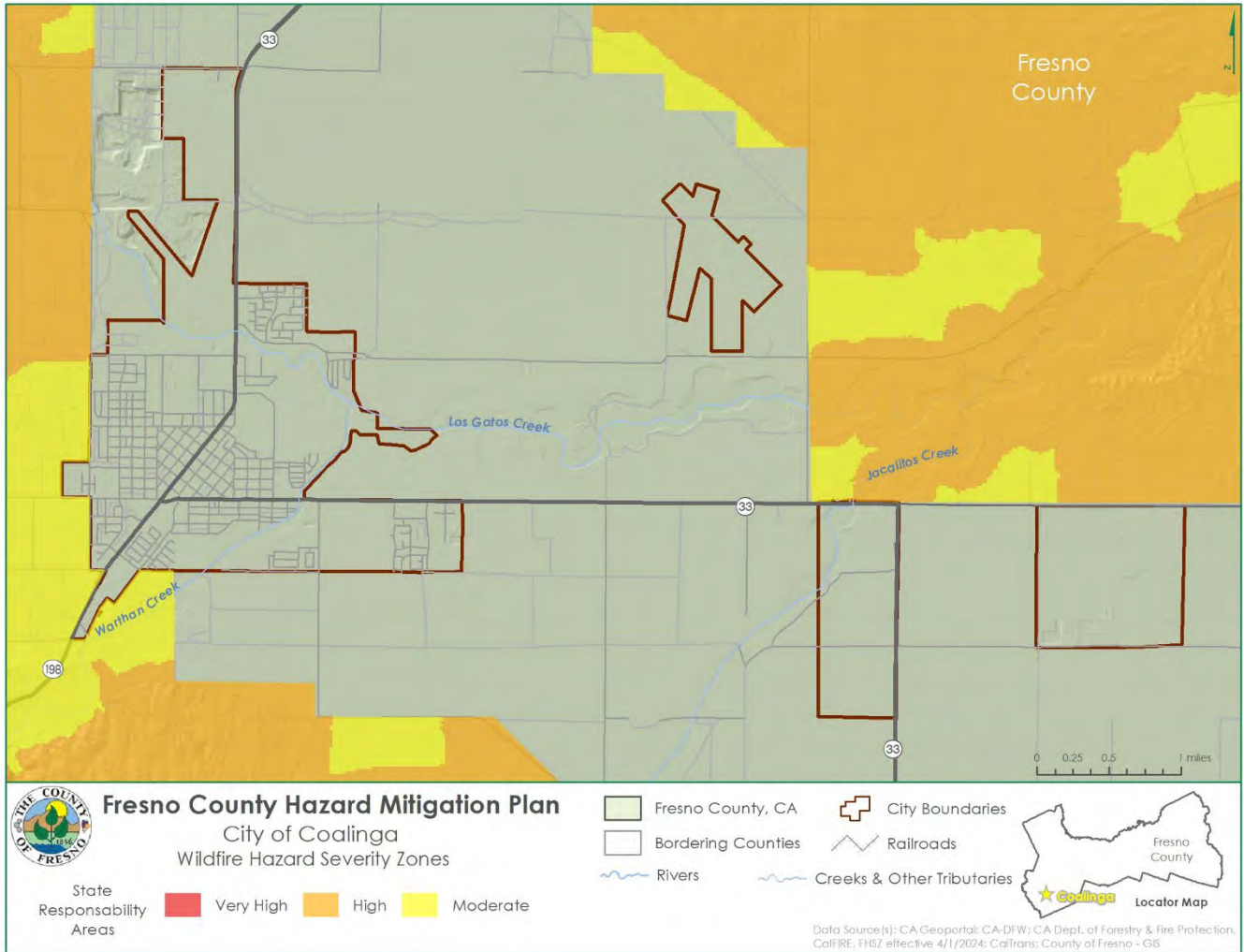
Table 15. City of Coalinga Population at Risk of Wildfires (Unweighted)

Jurisdiction	Wildfire Hazard Severity Zones		
	Moderate	High	Very High
Coalinga; Unincorporated Fresno County	18,513	11,995	7,077

Source: City of Coalinga parcel data; CAL FIRE

*Based on Census Tract population values from the 2020 U.S. Census, if the fire severity zone intersected the census tract all population with that census tract was considered at risk

Figure 8. City of Coalinga Wildfire Hazard Severity Zones



Source: CA Geoportal; CA-DFW; CA Department of Forestry and Fire Protection, CalFIRE, FHSZ effective 4/1/2024; CalTrans: County of Fresno - GIS



Previous wildfire events within and near the City of Coalinga are described in more detail below.

- **July 1, 2016:** The Curry Fire was a major wildland fire that burned 2,944 acres in Coalinga, CA. Though no crop, property or infrastructure damage or personal injury occurred, it did result in several road closures.
- **August 8, 2016:** The Mineral Fire was a major wildland fire which burned 7,05 acres in Coalinga, CA. Though no crop, property or infrastructure damage or personal injury occurred, it did result in several road closures.
- **July 9, 2017:** The Garza Fire was a major wildland fire igniting in Monterey County (Coalinga, CA), and spreading to Kings and Fresno Counties. Although the fire burned 48,888 acres, no personal injuries or damage to crops, buildings or infrastructure were reported. However, it did result in several road closures.
- **June 25, 2017:** The Creek fire began off Los Gatos Creek Rd, west of Derrick, or 13 miles northwest of Coalinga, CA in Fresno County. The cause is under investigation. It burned 357 acres before being contained on June 28, 2017. There was one residence and 3 sheds destroyed. The cost of containment was \$1.5 million.
- **July 13, 2020:** The Mineral fire was first spotted around 5 PM, with nearly 1000 acres burned by days end. The next several days resulted in significant fire growth and numerous evacuation notices within the region. Highway 198 between Coalinga and Monterey County was closed which impacted commerce, though the greatest impact was the loss of seven structures. Full containment of the fire was seen on 26th, though growth ended days prior.
- **August 15, 2020:** The Hills Fire started in the foothills about 9 miles south of Coalinga, CA. It grew to 2,121 acres before being contained on 8/25/2020. The cause was under investigation. The cost of containment was \$3.9 million. No structures were destroyed or damaged. Tragically, a helicopter pilot was killed on August 18 when his helicopter crashed while making water drops over the fire.
- **2023:** Throughout 2023, Fresno County in California faced a series of wildfires across various locations, each notable for their swift containment. The Crane Fire and Rodeo Fire, both near Squaw Valley, and the Juniper Fire to the west of Coalinga were among the smaller incidents, affecting areas of 24 and 15 acres each. Larger fires like the Orange Fire near Orange Cove and the Panoche Fire north of Little Panoche Rd, burned through 108 and 65 acres, respectively. The Pistol Fire near Auberry Road, and the extensive Slough Fire near San Joaquin, which spanned a vast 640 acres, were also brought under control promptly. Meanwhile, the Wildcat Fire occurred around Forest Service Road 10S069 and Trimmer Springs Road, near Pine Flat, and was managed by the US Forest Service-Sierra National Forest. The investigation into the causes of these wildfires was ongoing as the fire season progressed.

The City of Coalinga directly borders the Wildfire Hazard Severity Zone (WHSZ). Communities that border the WHSZ may still be affected by wildfires and be at risk due to the close proximity of the hazard area. Populations and communities disproportionately at risk of wildfires include Black, Native American and Hispanic neighborhoods, families in poverty, those over 65 years of age, people with access and functional needs, those with limited access to transportation, or have comprised physical health.⁴

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and planning mitigation capabilities. Each jurisdiction filled out a worksheet to assess the four capabilities listed above. The results of the self-assessment the jurisdictions filled out were used to update this section of the plan. To develop this capability assessment, the jurisdictional planning representatives reviewed policies, plans, or programs were in place that supported mitigation activities and reduced overall risk.

During the plan update process, the Witt O' Brien's consultant team reviewed the self-assessments to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Coalinga's updated capabilities are summarized below in **Table 17. City of Coalinga Mitigation Capability Assessment**.

Table 16. City of Coalinga Mitigation Capability Assessment

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Fiscal Capability	X		
Available Staff	X		
Political Support/Interest	X		
Community Support	X		

REGULATORY MITIGATION CAPABILITIES

Table 18. City of Coalinga Regulatory Mitigation Capabilities lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Coalinga. Tables 18-25 describe policies related to regulatory capabilities.

Table 17. City of Coalinga Regulatory Mitigation Capabilities

Regulatory Tool	Adopted/Updated Yes/No	Under Development Yes/No	Comments
Building Codes (please indicate UCC or IBC and Year)	Yes	No	2019 updated/adopted
Community Emergency Response Team (CERT)	No	Yes	Expected to implement 7/1/2024
Community Rating System (CRS Program of the NFIP)	No	No	



Regulatory Tool	Adopted/Updated Yes/No	Under Development Yes/No	Comments
Emergency Management Accreditation Program	No	No	
Fire Code	Yes	No	2022 updated/adopted
Firewise Community	No	No	
Floodplain Management Flood Damage Prevention Ordinance	Yes	No	Floodplain management done by County
Land Use/Development Planning	No	Yes	Expected to implement 2025
National Flood Insurance Program (NFIP)	No	No	
Post Disaster Redevelopment/Reconstruction Plan/Ordinance	No	No	
Storm Ready	No	No	
Stormwater Management Plan/Ordinance	Yes	No	Adopted 2023
Subdivision Regulations/Ordinance	No	No	
Two Weeks Ready	No	No	
Unified Development Ordinance	No	No	
Zoning Ordinance	Yes	No	Adopted 2023

Safety, Air, and Noise

Table 18. Safety, Air, and Noise Policies

Policy Number	Policy Description
S1	A safe community that ensures the protection and well-being of its residents.
S1-1	The City shall maintain its emergency preparedness, including evacuation procedures, to address potential manmade and natural disasters in order to guarantee the safety of, and accessibility to, all its residents. Procedures shall be developed in coordination with local, State, and Federal emergency operations and Plans.
S1-1.2	Following the completion of the Emergency Preparedness Plan and Network, prepare public information notices in English and Spanish to disseminate information to the community, including school children and people with disabilities, to improve awareness of geologic, seismic, and flooding hazards as well as hazardous materials and direct what to do in the event of an emergency.
S1-2.1	The City should consider mechanisms such as funds redevelopment assistance funds and/or plans to assist with public and private rebuilding efforts, the provision of housing for displaced residents, damage assessment, repair of critical infrastructure and resumption of service, business and government functions.

Natural and Man-Made Hazards

Table 19. Natural and Man-Made Hazards Capabilities

Policy Number	Policy Description
S2	Minimize loss of life, structures and environmental that may result from natural and man-made hazards
S2-1	The City shall ensure that developments, structures, and public facilities are sited with consideration to safety.
S2-2	The City shall ensure that developments, structures, and public facilities adequately address geologic and seismic hazards.
S2-2.1	Within one (1) year of adoption of the General Plan, work with Federal, State and local agencies including the USGS, California Department of Conservation Division of Mines and Geology and Fresno County to refine and update the City's earthquake maps to accurately identify ground shaking hazards in the Coaling area
S2-2.2	Within two (2) years of adoption of the General Plan, incorporate guidelines from the Seismic Hazards Mapping Act into the Zoning Ordinance and other City policy documents, codes and guidelines.
S2-2.3	The City shall require geotechnical studies for development in areas identified on the City's earthquake maps as having high seismic hazard risks and those sites with moderate to high liquefaction potential, or other soil limitations. These reports should include analysis of seismic ground shaking, subsidence, settlement and fault displacement potential and specify appropriate mitigation.
S2-2.4	The City shall require soils reports for development in areas identified on the City's earthquake maps as having moderate to very high seismic hazards or where soil stability may be an issue.
S2-2.5	As a component of the public information effort described in Implementation Measure S1- 1.2, promote public awareness of earthquake hazards and ways to reinforce buildings and prevent damage including bolting homes to their foundations and securing furniture personal belongings within the home.

Geologic and Seismic Hazards

Table 20. Geologic and Seismic Hazards Policies

Policy Number	Policy Description
S2-3	The City shall ensure that developments, structures, and public facilities adequately address flooding hazards.
S2-3.1	An engineered floodplain and hydrologic analysis shall be prepared for new development projects within or directly adjacent to known 100-year flood plains
S2-3.2	The City shall prohibit development within the FEMA-identified 100-year flood plain unless maps are revised and accepted by FEMA based on changes to flood control improvements; or, base elevations are raised to a level sufficient to protect new development from flooding.
S2-3.3	Develop and implement a plan to stabilize, protect and repair the streambeds, with emphasis on Warthan and Los Gatos Creeks, and correct storm drainage system deficiencies.
S2-3.4	Adopt standard erosion control mitigation measures to ensure that impacts are consistently mitigated

Flooding

Table 21. Flooding Policies

Policy Number	Policy Description
S2-4	The City shall seek to reduce the potential for exposure of hazardous substances to humans and the environment.
S2-4.1	The City shall support, jointly with other Fresno counties and the City of Fresno, the Household Hazardous Waste Disposal Program. The program shall be periodically reviewed to ensure that regular household hazardous waste disposal programs are sponsored to enable residents to bring backyard pesticides, cleaning fluids, paint cans, and other common household toxics to a centralized collection center for proper disposal.
S2-4.2	Vigorously prosecute unlicensed dumping of toxic or hazardous materials into the ground or the water in Coalinga. Encourage citizens to report illegal dumping when they see it.
S2-4.3	Support efforts to enforce state "right to know" laws, which outline the public's right to information about local toxics producers. Require monitoring and reporting as a condition of approval, for new businesses that generate hazardous wastes, to ensure compliance with approved disposal procedures.
S2-4.4	Require new and existing land uses involved in production, storage, transport, handling, and/or disposal of hazardous materials to locate or relocate a safe distance from other land uses that may be adversely affected by these activities.
S2-4.5	Periodically inspect City emergency shelters to ensure that equipment and supplies are available and operational.

Hazardous Materials

Table 22. Hazardous Materials Policies

Policy Number	Policy Description
S2-5	The City shall ensure new development in high fire risk areas is carefully sited and configured.
S2-5.1	New development shall be required to cluster lots and buildings where feasible to reduce the need for multiple response teams during fires.
S2-5.2	The Fire Department shall be required to review subdivision design to ensure adequate fire flows, access for emergency vehicles, construction standards and vegetation clearance.
S2-5.3	The use of fire resistant material shall be required in building construction.
S2-5.4	Within one (1) year the City shall develop regulations to increase the defensible area around homes and include the regulations as requirements in building review and approval.
S2-5.5	The City shall periodically assess the impact of incremental increases in development and traffic congestion on fire hazards and emergency response time.
S2-5.6	Within one (1) year the City shall develop an emergency evacuation program for the neighborhoods in the West Hills that are subject to high fire hazards.

Drainage, Erosion, and Sedimentation

Table 23. Drainage, Erosion, and Sedimentation Policies

Policy Number	Policy Description
S3	Prevention of unnecessary drainage, erosion and sedimentation
S3-1	Prevent unnecessarily intensive drainage, erosion and sedimentation.



Policy Number	Policy Description
S3-1.1	Require new development to demonstrate through plans and other supportive documentation that drainage patterns and flow rates will not be significantly modified from pre-disturbance flows.
S3-1.2	Require new development to demonstrate through plans and other supportive documentation that drainage patterns and flow rates will not be significantly modified from pre-disturbance flows.
S3-1.2	Require new development proposed within a designated flood zone to use site planning techniques to ensure that structures are elevated at least one foot above the 100-year flood zone consistent with Implementation Measure S2-3.2.
S3-1.3	Require the preparation of sedimentation and erosion control plans for new development located on steep slopes, or in or near the floodplain.
S3-1.4	Require new development to avoid building in the 100 year floodplain to the extent feasible, consistent with Implementation Measure S2-3.2.

Air Quality

Table 24. Air Quality Policies

Policy Number	Policy Description
AQ1	Effective communication, cooperation and coordination in developing and operating community and regional air quality programs
AQ3	Minimize exposure of the public to toxic air pollutant emissions and noxious odors from industrial, manufacturing and processing facilities.
AQ4	A reduction in particulate, fugitive dust and other emissions.

PLANNING MITIGATION CAPABILITIES

Table 26. City of Coalinga Planning Capabilities identifies the plans related to mitigation and loss prevention in Coalinga.

Table 25. City of Coalinga Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	No	No	
Climate Resiliency or Adaptation Plan	No	No	
Community Wildfire Protection Plan (CWPP)	No	No	
Comprehensive Emergency Management Plan	Yes	No	Comprehensive Emergency Management Planning done by County
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No	Yes	Expected to implement 2025
Continuity of Operations Plan (COOP)	No	No	
Disaster Recovery Plan	No	No	
Economic Development Plan	No	No	
Emergency Operations Plan (EOP)	Yes	No	Adopted/updated 2021
Evacuation Plan	Yes	No	Adopted/updated 2021
Flood Response Plan	Yes	No	Flood Response Plan done by County
Floodplain Management Plan/Flood Mitigation Plan	Yes	No	Floodplain Management Plan/Flood Mitigation Plan done by County
Hazard Mitigation Plan	Yes	No	Hazard Mitigation Plan done by County
Historic Preservation Plan	No	No	
Natural Resources Protection Plan (NRPP)	No	No	
Open Space Management Plan (Parks and Rec/Greenway Plan)	No	No	
Threat Hazard Identification and Risk Assessment	Yes	No	Threat Hazard Identification and Risk Assessment done by County

STORM DRAIN SYSTEM MASTER PLAN

In 2002, the City authorized Boyle Engineering to prepare a Storm Drainage Master Plan to identify existing storm drain system deficiencies and recommend necessary improvements. Proposed

improvements to the existing storm drain system include the construction of new facilities that parallel existing facilities or new facilities in those areas that currently do not have any storm drain service. In general, the proposed improvements aim towards providing storm drainage in those portions of the City currently without any storm drain facilities. The proposed improvements will be designed to convey stormwater to the east towards the existing West Hills Basin, which will ultimately provide storage capacity for the majority of Coalinga. The storm drain pipes will be designed to have capacity for the 10-year storm event. To be consistent with the Fresno Metropolitan Flood Control District (FMFCD) basin design criteria, which is commonly used in Fresno County, the basins will be sized for a 100-year, 10-day storm event.

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 27. City of Coalinga's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Coalinga.

Table 26. City of Coalinga's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Emergency Manager	Yes	Single	City Manager
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Yes	Single	Building Inspector
Fiscal Management or Procurement Specialists	Yes	Department	Finance Department
Floodplain Manager	Yes	Single	Assistant City Manager
Land Surveyors	No		
Land Use/Management/Development Planning	Yes	Single	Assistant City Manager
Planners or engineers with an understanding of natural and/or human caused hazards	Yes	Single	Assistant City Manager
Resource Development Staff or Grant-writing	Yes	Single	3 rd party
Scientists familiar with the hazards of the community	No		
Staff experienced with Geographic Information Systems (GIS) or HAZUS	Yes	Single	Public Works Utility Coordinator
Staff with education or expertise to assess the community's vulnerability to hazards	Yes	Department	Fire Department

FISCAL MITIGATION CAPABILITIES

Table 28. City of Coalinga's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 27. City of Coalinga's Fiscal Mitigation Capabilities

Financial Resources	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming	X			
Community Development Block Grants (CDBG)			X	
Special Purpose Tax (or taxing districts)			X	
Gas/Electric Utility Fees			X	
Water/Sewer			X	
Stormwater Utility Fees	X			
Development Impact Fees			X	
General Obligation, Revenue, and/or Special Tax Bonds			X	
Partnering Agreements or Intergovernmental Agreements			X	
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)			X	
Homeland Security Grants (HSGP)		X		
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			

MITIGATION OUTREACH AND PARTNERSHIPS

The City of Coalinga partnered with the Coalinga-Huron Unified School District in the development of the Coalinga-Huron Unified School District Natural Hazards Mitigation Plan, which was completed in 2005.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of Coalinga has several existing mechanisms in place that already help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. Additional opportunities for enhancement of the City's



mitigation program remain the same and are related to the city's identified mitigation actions. These include:

- Develop a Stormwater Management Program. One opportunity of enhancement for the City is to build of its existing Storm Water Master Plan, approved in 2008, and create a stormwater management program with staff to help implement and enforce the existing Master Plan as well as develop an update for the plan.
- Develop a Drought Contingency Plan that will help to create a framework for drought response and mitigation in the City of Coalinga.

MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Coalinga adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Community Development Department, which is comprised of the Planning, Engineering, and Building and Code Enforcement divisions, may utilize the hazard information when reviewing site plans or building permit applications. The City of Coalinga used the 2018 Fresno County Hazard Mitigation Plan to assist in updating the City's Emergency Operations Plan (EOP), and future updates to the EOP may be done with information contained in this 2024 plan update. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Coalinga will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1982. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.

COMPLETED 2009 MITIGATION ACTIONS

The City of Coalinga completed two mitigation actions identified in the 2009 plan. These completed actions are:

- Inventory At-Risk Buildings
- Improve Nonstructural Earthquake Mitigation in Public Buildings

Completing these actions has reduced the City of Coalinga's vulnerability to hazards and increased the City's capability to implement additional mitigation actions.



COMPLETED 2018 MITIGATION ACTIONS

The City of Coalinga has continued to seek opportunities for implementing the actions set forth in the 2018 plan, and the process is still ongoing. The City of Coalinga has indicated its desire to continue working towards completion of 2018 actions, and the 2018 actions have been carried over to this 2024 plan.

MITIGATION ACTIONS

The planning team for the City of Coalinga identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are included.

In addition to implementing the mitigation actions below the City of Coalinga will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program, with an emphasis on drought, earthquake, and wildfire. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi- Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.



1. PLAN FOR ALTERNATIVE WATER SOURCES FOR THE WATER SYSTEM

Hazard(s) Addressed: drought, earthquake, wildfire

Issue/Background: The City of Coalinga currently receives its water from the California Aqueduct. This canal system is approaching 50 years old and is likely to need some major repairs in the future. The current water system is capable of supplying water to the city for 4-5 days in the event water from the aqueduct is lost. Having wells as a backup water supply will also help mitigate drought by providing a reliable source in case of low water supply in the California Aqueduct.

Ideas for Implementation: Construct two new wells as backup water sources for the City.

Other Alternatives: Rely on truck delivery of water as the only alternative

Responsible Office: City of Coalinga Public Works

Priority (High, Medium, Low): High

Cost Estimate: \$300,000 (\$150,000 per well. Two wells needed. One at water treatment plant and one in town)

Potential Funding: Water enterprise funds/bond, General Fund

Benefits (Avoided Losses): The City will have an alternative water source in the event that the California Aqueduct is not able to provide sufficient supply.

Schedule: Preliminary engineering and design completed. Construction timeline uncertain.

Status: 2018 Project; implementation ongoing

2. PLAN FOR WATER SYSTEM SUSTAINABILITY IN THE EVENT OF LONG TERM POWER FAILURE

Hazard(s) Addressed: Drought, earthquake, severe weather, wildfire, flood

Issue/Background: The City of Coalinga currently receives its water from the California Aqueduct and the Pleasant Valley Canal system. Water that has been treated at the Water Treatment Plant (WTP) is pumped uphill with electric water pumps to Palmer Tank, and the water gravity feeds from that location to the remainder of the water system. If there is a loss of power, the main link of the water system is removed. This project would evaluate the cost/benefit of installing an emergency generator which would keep the plant operational during this loss of power.

Ideas for Implementation: Install an emergency generator to power the Water Treatment Plant during power outages.

Other Alternatives: Rely on truck delivery of water as the only alternative

Responsible Office: City of Coalinga Public Works

Priority (High, Medium, Low): High

Cost Estimate: \$150,000

Potential Funding: Water enterprise funds/bond, General Fund

Benefits (Avoided Losses): The Water Treatment Plant will not be vulnerable to power outages.



Schedule: 1-3 years

Status: 2018 Project; implementation in progress

Annex C: City of Firebaugh





PARTICIPATION

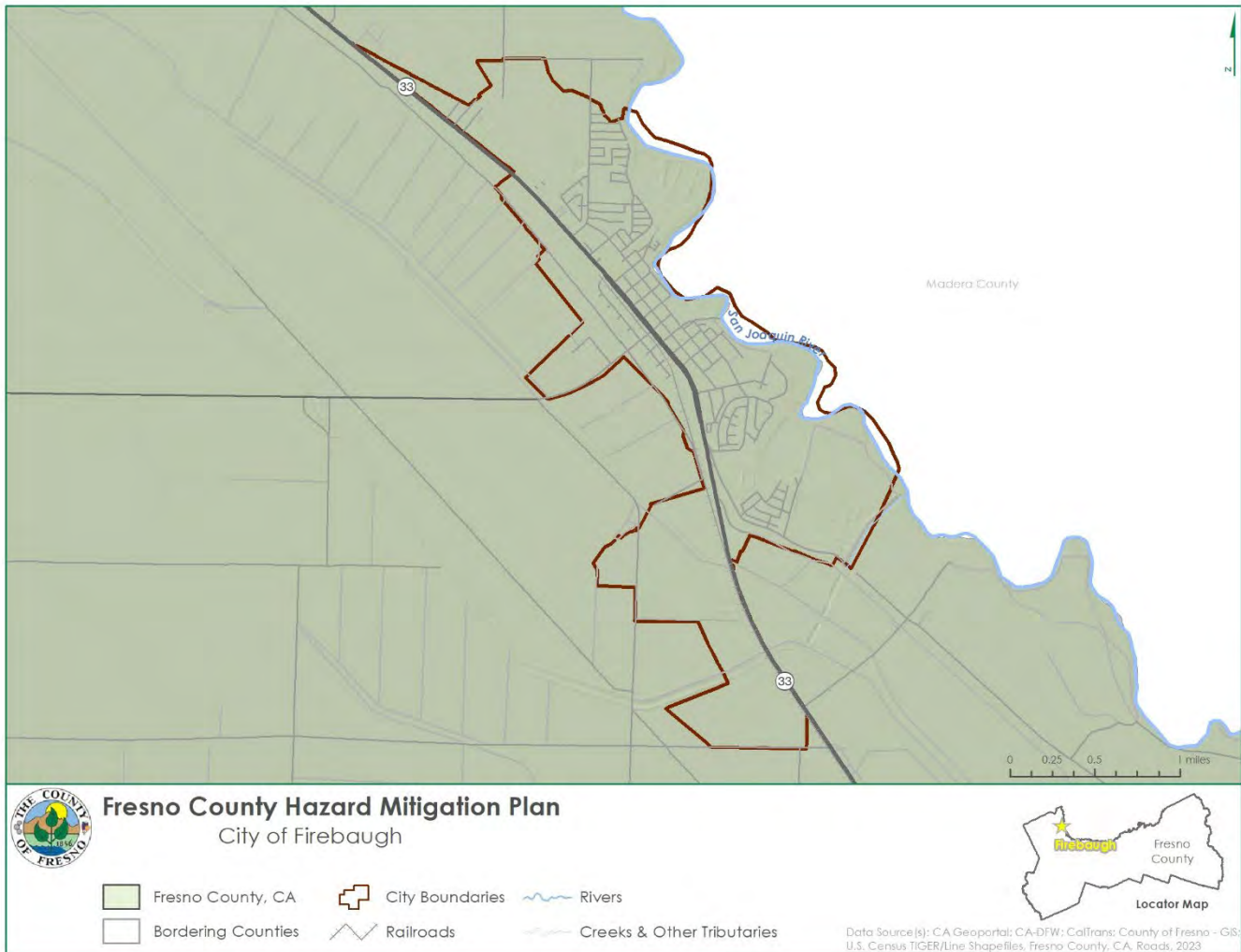
To update the City of Firebaugh's jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of Firebaugh's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. To update the annex, the City engaged with local stakeholders including the Firebaugh Fire Department, Police Department, Public Works, and the Firebaugh Las Deltas School District.



COMMUNITY PROFILE

Figure 1. The City of Firebaugh Map displays a map and the location within Fresno County of the City of Firebaugh and its Sphere of Influence.

Figure 1. City of Firebaugh Map



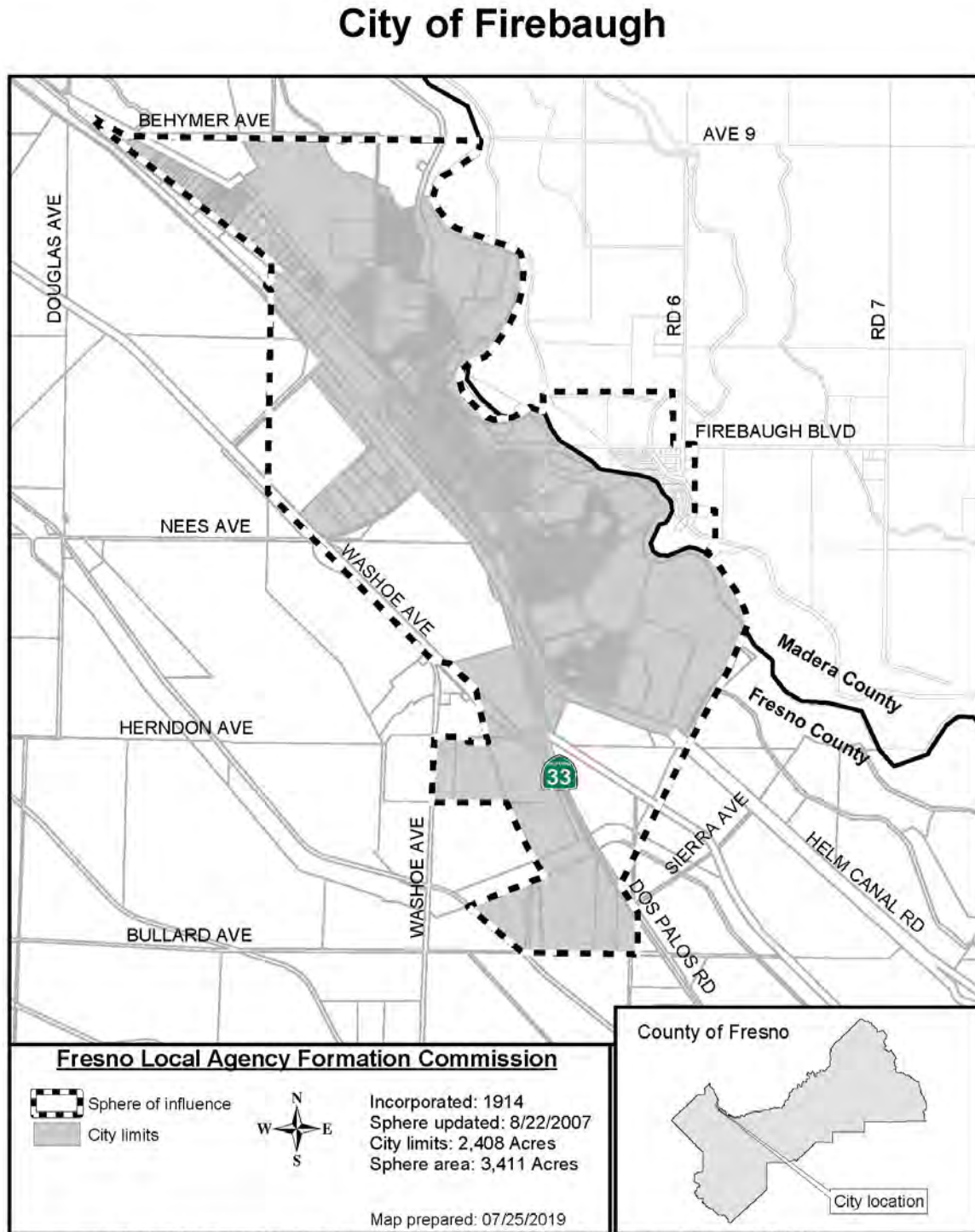
Source: CA-Geoportal; CA-DFW; CalTrans; County of Fresno - GIS



GEOGRAPHY AND CLIMATE

Firebaugh is situated in western Fresno County along the Madera County border, approximately 38 miles west of the City of Fresno. The City sits on the west bank of the San Joaquin River. As of February 2006, Firebaugh's city limits contained 2,408 acres. As of February 2006, Firebaugh's SOI contained approximately 3,411 acres, shown in **Figure 2. City of Firebaugh Limits and Sphere of Influence**. San Joaquin Valley Railroad passes through downtown Firebaugh, as does State Route 33, which connects the City with the Mendota, approximately 7 miles to the south. **Figure 3. Madera Municipal Airport Monthly Normals for Precipitation and Temperature (1991-2020)** shows the monthly temperature and precipitation normals for the nearest National Weather Service station in Madera.

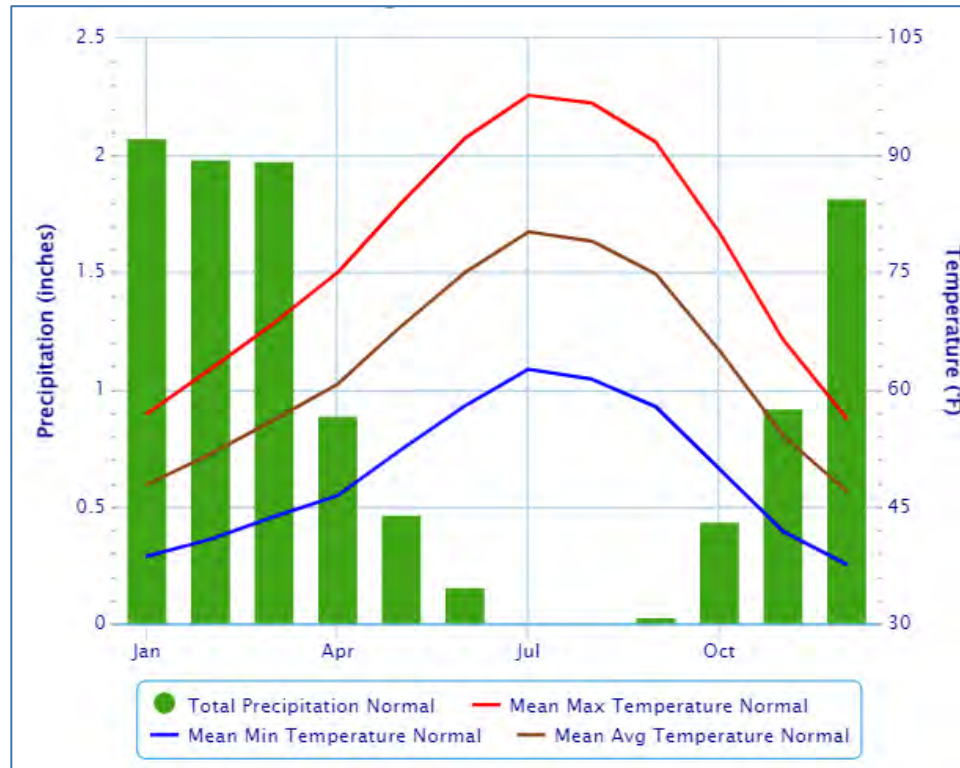
Figure 2. City of Firebaugh Limits and Sphere of Influence



Document path: G:\LAFCO WORKING FILES\GIS Layers and Maps\00-LAFCo Maps\Cities\Firebaugh\Firebaugh07162019.mxd

Source: Fresno Local Agency Formation Commission,
<https://www.fresnolafco.org/files/c6779ee38/Firebaugh07162019.pdf>

Figure 3. Madera Municipal Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: NWS

HISTORY

In 1854, Andrew Firebaugh established a trading post and ferry on the San Joaquin River. Known as Firebaugh's Ferry, it was a station on the great Butterfield Overland Stage Route. Andrew Firebaugh also built the first road over Pacheco Pass, and in 1872, he was one of the founders of "The Academy," Fresno County's first secondary school. When he died in 1875, he was buried on his homestead some ten miles above there on the Tollhouse Road. Firebaugh is one of the oldest historical towns on the Westside of the San Joaquin River, and Firebaugh's Ferry was the major crossing for prospectors heading for gold country. The City of Firebaugh was incorporated in 1914.

ECONOMY

Select estimates of economic characteristics for the City of Firebaugh are shown in **Table 1. City of Firebaugh's Economic Characteristics**.

Table 1. City of Firebaugh's Economic Characteristics

Characteristic	City of Firebaugh
Families below Poverty Level	37.8%
All People below Poverty Level	43.3%



Characteristic	City of Firebaugh
Median Family Income	\$36,413
Median Household Income	\$36,078
Per Capita Income	\$13,768
Population in Labor Force	2,896
Population Employed	2,365
Unemployment	18.3%

Source: U.S. Census Bureau American Community Survey 2018-2022

Table 2. City of Firebaugh's Employment by Occupation and Table 3. City of Firebaugh Employment Industry how the City of Firebaugh labor force breaks down by occupation and industry based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Firebaugh's Employment by Occupation

Occupation	# Employed	% Employed
Natural Resources, Construction, and Maintenance Occupations	978	41.35%
Service Occupations	301	12.73%
Production, Transportation, and Material Moving Occupations	812	34.33%
Management, Business, Science, and Arts Occupations	97	4.10%
Sales and Office Occupations	177	7.48%
Total	2,365	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022

Table 3. City of Firebaugh Employment Industry

Industry	# Employed	% Employed
Agriculture, Forestry, Fishing and Hunting, and Mining	964	40.76%
Educational Services, and Health Care and Social Assistance	315	13.32%
Other Services, Except Public Administration	106	4.48%
Transportation and Warehousing, and Utilities	122	5.16%
Manufacturing	343	14.50%
Professional, Scientific, and Mgmt., and Administrative and Waste Mgmt. Services	34	1.44%
Wholesale Trade	95	4.02%
Finance and Insurance, and Real Estate and Rental and Leasing	13	0.55%



Industry	# Employed	% Employed
Retail Trade	134	5.67%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	35	1.48%
Construction	117	4.95%
Public Administration	87	3.68%
Information	0	0.00%
Total	2,365	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022

POPULATION

According to the U.S. Census Bureau's 2022 Population Estimates, the City of Firebaugh has a population estimate of 8,418. Select demographic and social characteristics for the City of Firebaugh from the 2018-2022 ACS are shown in **Table 4. City of Firebaugh Demographic and Social Characteristics**.

Table 4. City of Firebaugh Demographic and Social Characteristics

Characteristics	City of Firebaugh
Gender/Age	
Male	50.1%
Female	49.9%
Median Age	32.2
Under 5 Years	7.8%
Under 18 Years	35.0%
65 Years and Over	12.6%
Race/Ethnicity	
White	32.7%
Asian	0.0%
Black or African American	0.0%
American Indian/Alaska Native	0.6%
Hispanic or Latino (of any race)	97.2%
Education	
High school graduate or higher	43.7%
Disability Status	
Population 5 years and over with a disability	8.8%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Firebaugh's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Firebaugh (see **Table 6. City of Firebaugh - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Firebaugh.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Firebaugh - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Small	12 to 24 hours*	Less than 24 hours*	High
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours*	High
Drought	Possible	Limited	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Critical	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Likely	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Possible	Critical	Moderate	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week*	Medium*
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Medium
Soil Hazards						
Erosion	Likely	Limited	Moderate	N/A	N/A	Medium
Expansive Soils	Possible	Minor	Moderate	N/A	N/A	Low
Land Subsidence	Possible	Limited	Large	N/A	N/A	Medium
Landslide	Unlikely	Minor	Negligible	12 to 24 hours*	Less than 6 hours*	Low
Volcano	Unlikely	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Likely	Limited	Small	Less than 6 hours*	More than 1 week*	Medium*

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*



VULNERABILITY ASSESSMENT

The intent of this section is to assess City of Firebaugh's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Firebaugh - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Firebaugh's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table 6 reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

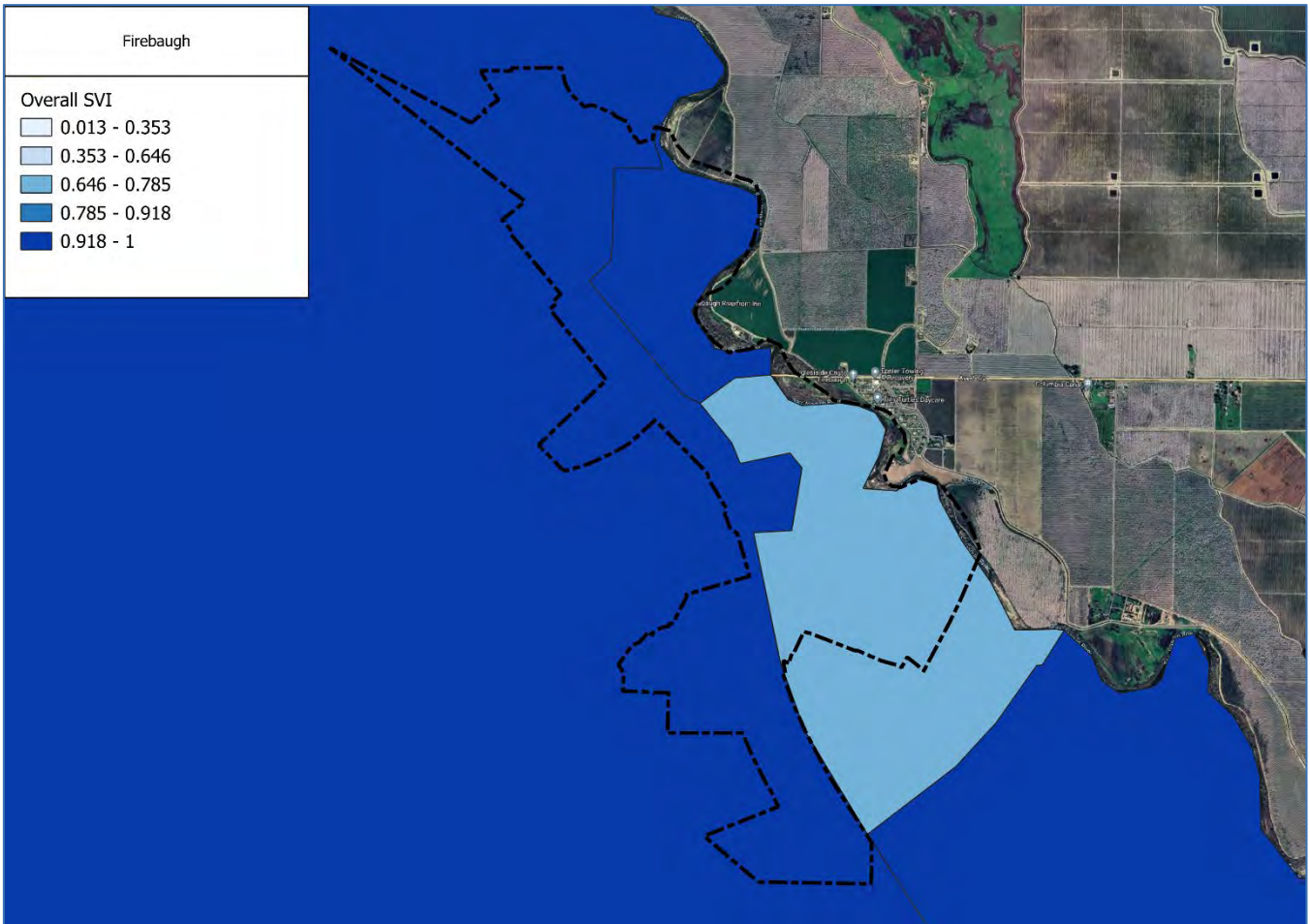
POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Firebaugh, census tracts with a higher SVI, .918 to 1, are in the northern and western portion of the City, as shown in **Figure 4. City of Firebaugh Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.).¹

¹ CDC/ATSDR Social Vulnerability Index (SVI) | Place and Health | ATSDR
https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html

Figure 4. City of Firebaugh Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Firebaugh City Boundary



ASSETS AT RISK

This section considers Firebaugh's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation.

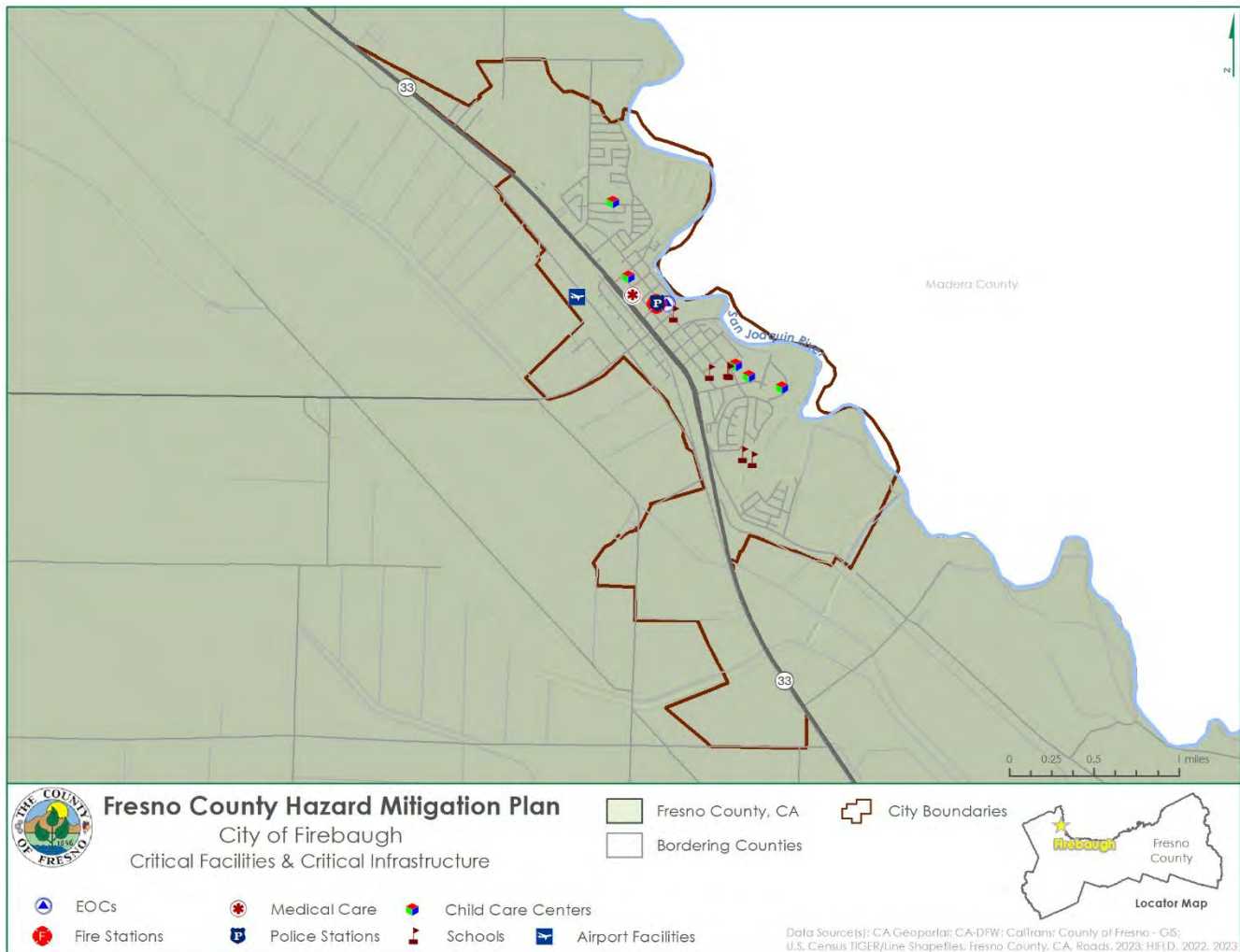
An inventory of critical facilities in the City of Firebaugh is provided in **Table 7. City of Firebaugh's Critical Facilities** and mapped in **Figure 5. City of Firebaugh Critical Facilities**.

Table 7. City of Firebaugh's Critical Facilities

Critical Facility Type	Count
Airport	1
CalARP	1
Electric Facilities	5
Fire Station	1
Police	1
School	6
Total	15

Source: Fresno County

Figure 5. City of Firebaugh Critical Facilities



Source: CA Geoportal; CA-DFW; Caltrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA Roads, 2023; HIFLD, 2022, 2023

HISTORIC RESOURCES

The City of Firebaugh does not have any properties listed on the National Register of Historic Places. However, the City is home to a historical jail. Completed around 1885, this jail is one of only two Lincoln-log style jails still in existence in California. This unique type of construction has no frame and uses square nails and wood plank floors. The partially restored jail had been placed at various locations throughout Firebaugh before being moved to its final resting place at the Firebaugh Rodeo Grounds, which is east of its original site on the northwest corner of P and 13th Street.

ECONOMIC ASSETS

Often referred to as the Hub of the Great West Side, Firebaugh is probably best known as an important agricultural area. Major crops grown in the area include fruits, vegetables, nuts and fiber crops including tomato, garlic, cantaloupes, and cotton. Along with agriculture, diversity has been developing Firebaugh; new growth in manufacturing, packing and processing plants has enhanced Firebaugh's economic outlook.

GROWTH AND DEVELOPMENT TRENDS

The City's 2030 General Plan Proposed Land Use Map is shown in **Figure 6. City of Firebaugh Land Use**. For the City's Sphere of Influence, the General Plan proposes mostly industrial uses in the southwest as well as some expansion of residential, park, open space, and agricultural uses to the east.

Table 8. City of Firebaugh's Change in Population and Housing Units, 2017-2022 illustrates how the City has grown in terms of population and number of housing units between 2017 and 2022. As of 2022, the population of Firebaugh was 8,139 with an average growth rate of -1.64 percent.

Table 8. City of Firebaugh's Change in Population and Housing Units, 2017-2022

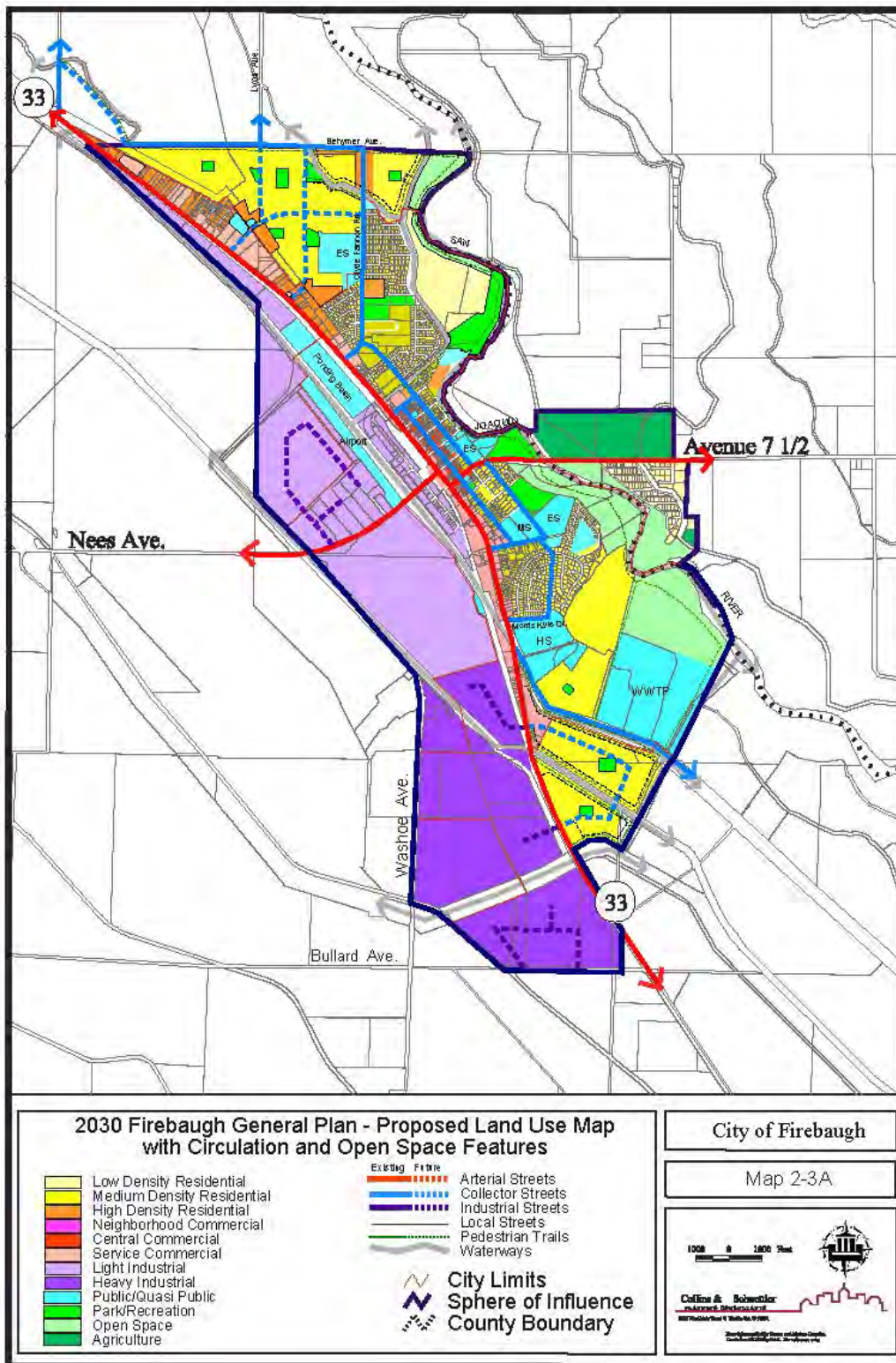
2017 Population	2022 Population Estimate	Estimated Percent Change 2017-2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017-2022
8,275	8,139	-1.64%	2,246	2,355	+4.85%

Source: U.S. Census Bureau

Of the 2,246 housing units in Firebaugh, 48.2 percent are owner occupied which is about 4 percent less than noted in 2010-2015. As the population has slightly decreased in the past several years, the number of housing units has increased.

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk of the main plan.

Figure 6. City of Firebaugh Land Use





ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Regarding these types of structures, there are currently 592 parcels in the 100-Year floodplain and 173 parcels in the 500-year floodplains in the City of Firebaugh. Impacts of past events and vulnerability to specific hazards are further discussed below (see Chapter the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County as a whole).

AGRICULTURAL HAZARDS (HIGH)

Given that agriculture is the predominant industry in the City of Firebaugh, agricultural hazards such as pests and blight, as well as other natural hazards like extreme heat, drought, and flood, which can have secondary adverse effects on crop production, are significant hazards in the City.

DAM FAILURE (HIGH)

The City of Firebaugh is downstream from the Mendota Diversion dam, which could cause flooding in the event of a failure. Additionally, the HMPC reported that due to Firebaugh's location on the San Joaquin River and the size of the Friant Dam impoundment on Millerton Lake, the City could also be impacted in the event of a failure of that structure.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Firebaugh's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (HIGH)

The most recent FEMA Flood Insurance Rate Map (FIRM) affecting the City of Firebaugh was updated in February 2009. According to the FIRM, large portions of the planning area are subject to 100-year (or 1-percent-annual-chance) flooding by the San Joaquin River and areas in the south of the planning area are subject to flooding by the Panoche Creek. According to FEMA's 2016 Flood Insurance Study (FIS), damaging floods occurred in Firebaugh and the surrounding area in 1958, 1969, and 1983. Details on some of these events follow:

- **April 1958:** The Panoche Creek flooded 9,700 acres and estimated damages totaled \$457,000. Losses consisted of damage to crops and farm equipment, erosion, deposition of debris, and the costs of levee and road repairs. Saturated levees were reinforced to protect against possible flooding.
- **February 1969:** Panoche Creek flooded 18,400 acres in 1969 resulting in \$1,797,000 in damages.



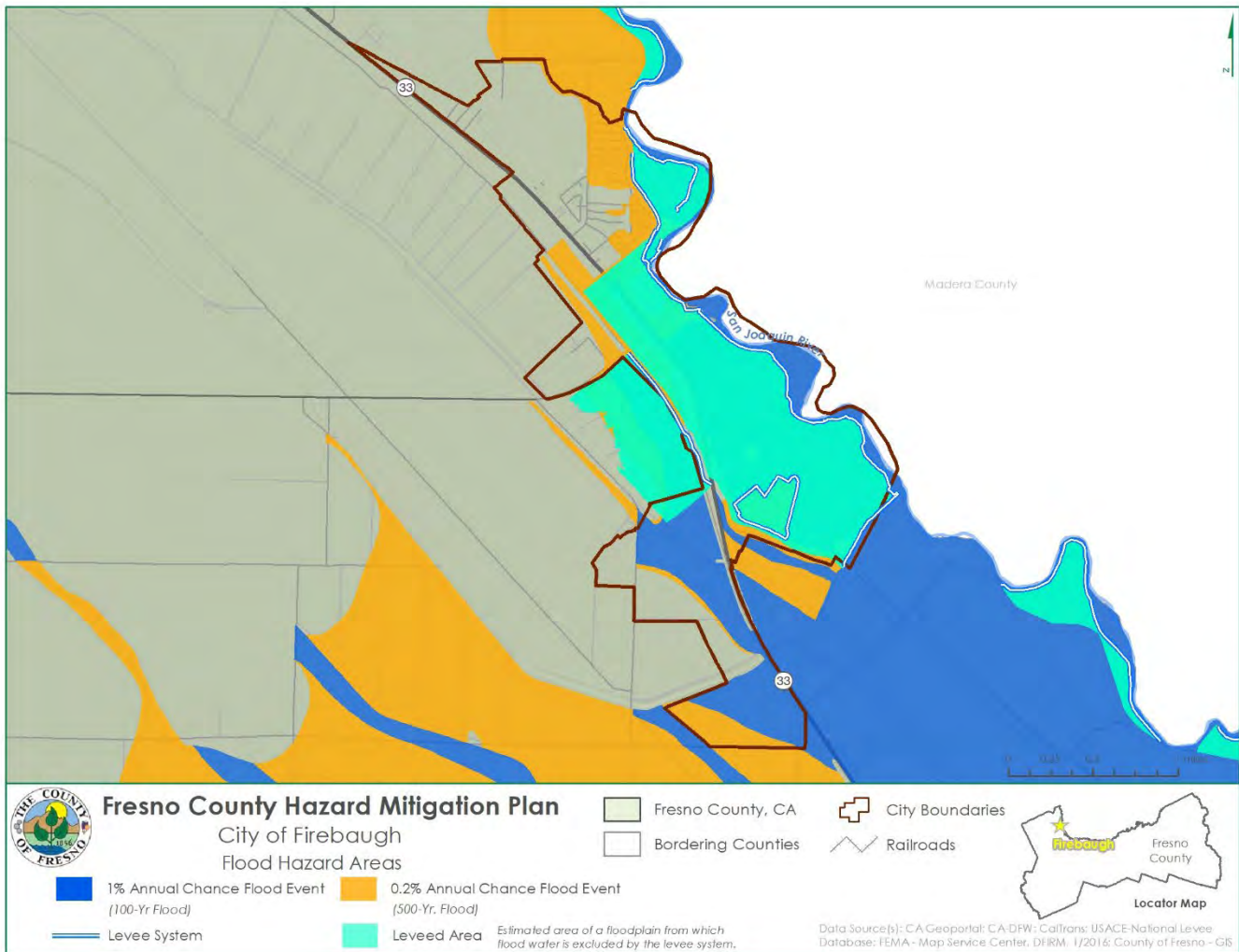
- **1983:** Ponding due to seepage occurred at the local high school. Levee freeboard was less than 3 feet at this time. Flood losses were limited to bank erosion and costs of flood fighting.

The City of Firebaugh is also vulnerable to levee failure. Portions of Firebaugh fall within both National Levee Inventory leveed areas and State leveed areas. See Chapter 4 Risk Assessment for a map of leveed areas in Fresno County.

VALUES AT RISK

A flood map for the City of Firebaugh was created (see **Figure 7. City of Firebaugh Flood Hazard Areas**). **Table 9. City of Firebaugh Parcels within the 100-Year Floodplain**, **Table 10. City of Firebaugh within the 500-Year Floodplain**, **Table 11. City of Firebaugh Buildings within the 100-Year and 500-Year Floodplain**, and **Figure 8. City of Firebaugh Flood Hazard Area Buildings at Risk** summarize the values at risk in the City's 100-year and 500-year floodplain, respectively.

Figure 7. City of Firebaugh Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS

Table 9. City of Firebaugh Parcels within the 100-Year Floodplain

Property Type	Parcel Count	Improvement Value	Land Value	Total Assessed Value
Agriculture	6	\$4,798	\$720,991	\$725,789
Apartments	2	\$970,404	\$124,323	\$1,094,727
Primary Use Not Designated	13	\$0	\$0	\$0
Single-Family Residence	125	\$12,479,460	\$4,326,641	\$16,806,101
Vacant	9	\$0	\$464,039	\$464,039
Unknown	437			
Firebaugh Total	592	\$13,454,662	\$5,635,994	\$19,090,656

Source: City of Firebaugh parcel data; National Flood Insurance Program Flood Mapping Data

Table 10. City of Firebaugh within the 500-Year Floodplain

Property Type	Parcel Count	Improvement Value	Land Value	Total Assessed Value
Agriculture	4	\$2,144	\$1,540,253	\$1,542,397
Apartments	1	\$238,942	\$34,133	\$273,075
Primary Use Not Designated	166	\$0	\$0	\$0
Single-Family Residence	1	\$248,474	\$56,280	\$304,754
Vacant	1	\$0	\$110,325	\$110,325
Firebaugh Total	173	\$489,560	\$1,740,991	\$2,230,551

Source: City of Firebaugh parcel data; National Flood Insurance Program Flood Mapping Data

Table 11. City of Firebaugh Buildings within the 100-Year and 500-Year Floodplain

Leveed Area	100-Year Flood Hazard Area	500-Year Flood Hazard Area	Total Building in Flood Hazard Areas by Jurisdiction
1,134	656	818	2,608

Source: City of Firebaugh parcel data; National Flood Insurance Program Flood Mapping Data

Based on this analysis, the City of Firebaugh has significant assets at risk of 100-year and greater floods. There are 592 parcels that are within the flood hazard area which includes the 100-year floodplain with a total assessed value of \$19,090,656 and 173 parcels with a total assessed value of \$2,230,551. Additionally, there are a total of 2,608 buildings in the 100-year and 500-year floodplain.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are likely below the actual market values. Thus, the actual value of assets at risk may be higher than those included herein.

Fresno County Hazard Mitigation Plan
City of Firebaugh
Flood Hazard Areas & Structures at Risk

Legend:

- 1% Annual Chance Flood Event (100-Yr Flood)
- 0.2% Annual Chance Flood Event (500-Yr Flood)
- Leveed Area
- Levee System

Structures at Risk*

- Within 100-Yr. Flood Hazard Area
- Within 500-Yr. Flood Hazard Area
- Within Leveed Area

*Only structures within the city boundary & unincorporated areas are shown on the map.

Estimated area of a floodplain from which flood water is excluded by the levee system.

Data Source(s): CA Geospatial; CAGRP; CalTrans; USACE-National Levee Database/FEMA, DWRRA, 1/2014; County of Fresno - GIS; Microsoft, U.S. Building Footprints, 2011

2024 Fresno County Hazard Mitigation Plan
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POPULATION AT RISK

For the population estimates, two analyses were completed: weighted and unweighted. For the weighted population analysis, the percentage area of each of the flood zones were identified for each of the census tracts then multiplied this percent by the total population for the census tract.

Note: Population is not evenly distributed within the census tract, however the analysis was conducted to provide a perspective of an estimated population at risk of flooding.

The unweighted analysis calculated the total population for any census tract that intersected any of the flood zones, including the 100-year and 500-year floodplain. The following are at risk to flooding in the City of Firebaugh:

Weighted Analysis

- 100-year flood – 2,860 people
- 500-year flood – 2,292 people

Unweighted Analysis

- 100-year flood – 8,564 people
- 500-year flood – 8,564 people

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.²

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Firebaugh joined the National Flood Insurance Program (NFIP) on August 23, 1982. NFIP Insurance data indicates that as of March 19, 2024, there were 105 flood insurance policies in force in the City with \$73,588 in total premium or total paid. There have been six claims that have totaled \$8,649.28. According to the FEMA Community Information System accessed March 19, 2024 there are no Repetitive Loss or Severe Repetitive Loss properties located in the jurisdiction.

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. **Table 12. Critical Facilities in the 100- and 500-Year Floodplain: City of Firebaugh** lists the critical facilities in the City's 100- and 500-year floodplains. The impact to the community could be great if these critical facilities are damaged or destroyed during a flood event.

² Ermagun, A., Smith, V. & Janatabadi, F. High urban flood risk and no shelter access disproportionally impacts vulnerable communities in the USA. *Commun Earth Environ* 5, 2 (2024). <https://doi.org/10.1038/s43247-023-01165-x> 24



Table 12. Critical Facilities in the 100- and 500-Year Floodplain: City of Firebaugh

Critical Facility Type	100-Year Floodplain	500-Year Floodplain
School	4	1
Airport Facilities		1
EOCs		1
Total	4	3

Source: City of Firebaugh parcel data; National Flood Insurance Program Flood Mapping Data

HAZARDOUS MATERIALS (HIGH)

There has been 1 fixed hazardous materials incident from 2017-2022 that has occurred in the City of Firebaugh. There were no injuries, fatalities, or property damage during the time period.³ There is one CalARP facility within the City of Firebaugh.

WILDFIRE (MEDIUM)

The Wildfire Hazard Severity Zone is categorized as “Moderate” under the State Responsibility Area (SRA). SRA is a legal term defining the area where the state has financial responsibility for wildland fire protection and prevention. Incorporated cities and federal ownership are not included. Within the SRA, CAL FIRE is responsible for fire prevention and suppression. There are more than 31 million acres in SRA, with an estimated 1.7 million people and 800,000 existing homes.⁴ There have been no known fires that have occurred in the past several years. According to **Table 13. Building Counts within the Wildland Urban Interface Zones** there is a total of 243 buildings at Risk of Wildfires.

Table 13. Building Counts within the Wildland Urban Interface Zones

Influence Zone				Interface Zone		Intermix Zone			Not WUI Zone		
Not FHSZ	Moderate	High	Very High	Moderate	High	Moderate	High	Very High	Moderate	High	Very High
1				239		2			1		

Source: City of Firebaugh parcel data; CAL FIRE

³ 2024 Fresno County Hazard Mitigation Plan May 2024
California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/> 25

⁴ 2022 FHSZ FAQs (July 27 2023) (azureedge.net) <https://34c031f8-c9fd-4018-8c5a-4159cdff6b0d-cdn-endpoint.azureedge.net/-/media/osfm-website/what-we-do/community-wildfire-preparedness-and-mitigation/fire-hazard-severity-zones/2022-fhsz-faqs-july-27-2023.pdf>

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Firebaugh's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 14. City of Firebaugh Mitigation Capability Summary**.

Table 14. City of Firebaugh Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Fiscal Capability	X		
Available Staff	X		
Political Support/Interest	X		
Community Support		X	

REGULATORY MITIGATION CAPABILITIES

Table 15. City of Firebaugh's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Firebaugh.

Table 15. City of Firebaugh's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X					



Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Community Emergency Response Team (CERT)		X				
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X				
Fire Code	X					
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance		X				
Land Use/Development Planning		X				
National Flood Insurance Program (NFIP)		X				
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready		X				
Stormwater Management Plan/Ordinance		X				
Subdivision Regulations/Ordinance		X				
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance	X					

The primary goal of the General Plan is to facilitate a well-planned community. Firebaugh's success in fulfilling this goal will depend on how well the City adheres to the General Plan. In this regard, the General Plan:

- guide City staff, the Planning Commission and City Council on land use, circulation, and capital improvement decisions.
- inform the public where certain types of development will occur in the community.
- educate the public on how Firebaugh's resources will be managed.
- provide the private sector with a document upon which it can base investment decisions.

The General Plan contains seven of the eight mandated elements that pertain to specific aspects of the development of the community. The general plan includes nine state mandated elements including land use, circulation, housing, conservation, noise, open space, safety, air quality and environmental justice. However, the City of Firebaugh's plan has not been updated since 2006 and does not include the environmental justice element. Relevant elements and information to the hazard mitigation plan are outlined in **Table 18. Seismic Safety Policies**, **Table 19. Fire Safety Goals**, **Table 20. Flooding Policies**, **Table 21. Hazardous Land Use Policies** below.

SAFETY ELEMENT

Seismic Safety

Table 16. Seismic Safety Policies

Policy Number	Policy Description
1	The City shall ensure that all new and rehabilitated structures are constructed to meet adequate building standards.
1a.	The City of Firebaugh shall continue to update/adopt building code standards for Seismic Zone III as described in the Uniform Building Code.
1b.	The City shall continue the abatement/rehabilitation of unreinforced masonry buildings.
2	The City shall review the State Mining and Geology Board's publications which define Special Studies Zones for areas along fault lines, and incorporate information into local regulations, as appropriate.
3	The City of Firebaugh shall continue the abatement/rehabilitation of dangerous buildings as defined by the Uniform Housing Code.
3a.	The building department shall identify dangerous buildings and target them for abatement or rehabilitation, through the process outlined in the Uniform Housing Code.

Fire Safety

Table 17. Fire Safety Goals

Policy Number	Policy Description
Goal 1:	The City of Firebaugh shall endeavor to provide the highest level of fire suppression and safety for the community.
Goal 2:	The Fire Department shall work to provide prevention and public education to residents

Flooding

Table 18. Flooding Policies

Policy Number	Policy Description
Goal 1:	Minimize the danger to people and property from flooding
1.	For existing undeveloped areas in flood zones, encourage uses that are not susceptible to flood damage. For uses that are susceptible to flood damage, require mitigation measures such as elevation of floors, anchoring of buildings, maintenance of floodways, etc.
1a.	Adoption of the Land Use map helps to implement the foregoing objective. To the extent practical, the Land Use map has been designed to preclude sensitive land uses from being located within flood zones.
1b.	The City should review its flood zone regulations (and if necessary amend them) to ensure they comply with current federal flood regulations.



Hazardous Land Use

Table 19. Hazardous Land Use Policies

Policy Number	Policy Description
Goal 1:	Minimize the potential for hazardous land use relationships through proper land use planning
1.	Residential development in close proximity to industrial zones and the wastewater treatment plant shall be avoided.
1a.	Adoption and implementation of the Land Use Element prevents residential development from encroaching too close to industrial zones and the wastewater treatment plant.
Goal 2:	Review the zoning ordinance (and amend as necessary) to ensure adequate safeguards are in place to reduce/eliminate hazardous relationships.
2a.	The City Planner shall work with the Planning Commission to review the Zoning Ordinance's standards as they pertain to minimizing hazardous land use relationships and initiate the process to make any necessary amendments.
Goal 3:	Businesses that use, produce, or generate any type of hazardous materials shall be conducted in a safe manner.

PLANNING MITIGATION CAPABILITIES

Table 20. Flooding Policies identifies the plans related to mitigation and loss prevention in Firebaugh.

Table 20. City of Firebaugh Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes	No	
Climate Resiliency or Adaptation Plan	No	No	
Community Wildfire Protection Plan (CWPP)	No	No	
Comprehensive Emergency Management Plan	No	No	
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No	No	
Continuity of Operations Plan (COOP)	No	No	
Disaster Recovery Plan	No	No	
Economic Development Plan	No	No	
Emergency Operations Plan (EOP)	No	No	
Evacuation Plan	No	No	
Flood Response Plan	No	No	
Floodplain Management Plan/Flood Mitigation Plan	No	No	
Hazard Mitigation Plan	Yes	Yes	



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Historic Preservation Plan	No	No	
Natural Resources Protection Plan (NRPP)	No	No	
Open Space Management Plan (Parks and Rec/Greenway Plan)	No	No	
Threat Hazard Identification and Risk Assessment	No	No	

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 21. City of Firebaugh's Administrative and Technical Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Firebaugh.

Table 21. City of Firebaugh's Administrative and Technical Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X			
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X			
Fiscal Management or Procurement Specialists		X		
Floodplain Manager		X		
Land Surveyors		X		
Land Use/Management/Development Planning		X		
Planners or engineers with an understanding of natural and/or human-caused hazards		X		
Resource Development Staff or Grant-writing		X		
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)		X		
Staff with education or expertise to assess the community's vulnerability to hazards		X		



FISCAL MITIGATION CAPABILITIES

Table 22. City of Firebaugh's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 22. City of Firebaugh's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming		X		
Community Development Block Grants (CDBG)		X		
Special Purpose Taxes (or taxing districts)		X		
Gas/Electric Utility Fee		X		
Water/Sewer Fees		X		
Stormwater Utility Fees		X		
Development Impact Fees				
General Obligation, revenue, and/or Special Tax Bonds		X		
Partnering Agreements or Intergovernmental Agreements		X		
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)		X		
Homeland Security Grants (HSGP)	X			
USDA Rural Development Agency Grants		X		
US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			
City Funding			X	



OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of Firebaugh has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. Some of the possible opportunities for enhancement of the City's existing mitigation program are listed below.

- Ensuring existing warning systems for levees are up to date and working efficiently
- Developing an Evacuation Plan in partnership with the County and specific to levee failure
- Develop a Drought Contingency Plan that will help to create a framework for drought response and mitigation in the City of Firebaugh



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Firebaugh adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The City of Firebaugh did not identify any specific planning mechanisms into which information from the 2018 Fresno County Hazard Mitigation Plan was incorporated. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies such as the City's Emergency Operations Plan (EOP). The Public Works Department may utilize the hazard information when implementing Capital Improvement projects and the Community Development Department may utilize the hazard information when reviewing a site plan or other type of development application. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Firebaugh will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1982. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.



MITIGATION ACTIONS

The planning team for the City of Firebaugh identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included.

In addition to implementing the mitigation action below the City of Firebaugh will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program, with an emphasis on drought. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.



1. ASSESS LEVEE SYSTEM FOR NECESSARY IMPROVEMENTS

Hazard(s) Addressed: Flood

Issue/Background: Firebaugh is located along the San Joaquin River and as a result has had to deal with flooding issues/dangers due to high river flows, low levees, and levee failures along the San Joaquin River. This project would assess the levee system for needed improvements to provide protection for the 100-year flood event. Specific repairs and enhancements would be completed as a result of the assessment.

Other Alternatives: None

Responsible Office: City of Firebaugh Public Works

Priority (High, Medium, Low): Medium

Cost Estimate: \$2,000,000

Potential Funding: General Fund

Benefits (Avoided Losses): This will reduce risk of flooding in the City of Firebaugh and prevent property damage.

Schedule: Routine activity

Status: Complete, continuing to assess the levee

2. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought, Agricultural Hazards

Issue/Background: The Delta-Mendota subbasin underlays the City of Firebaugh and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Firebaugh being a local agency (as defined by §10723 of the Water Code) which overlays the Delta-Mendota basin, the City has become a GSA for the portion of the basin which the city boundaries overlays. The Firebaugh GSA is required to develop and implement a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. The Firebaugh GSA is part of a multi-agency GSP that is being prepared by the San Joaquin River Exchange Contractors Water Authority. The City of Firebaugh and Firebaugh GSA will actively participate in the development and implementation of the planning process. The development of the City of Firebaugh GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Firebaugh.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.



Responsible Office: City Engineer, and Firebaugh GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with grant funding opportunities from the State.

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources. is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Schedule: Project is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: Completed, continuing to work on sustainability

3. PUBLIC EDUCATION AND AWARENESS

Hazard(s) Addressed: Multi-Hazard

Issue/Background: To minimize risks associated with natural and technological hazards and to ensure the safety of the public, the City will conduct public awareness campaigns and engage in community preparedness activities.

Other Alternatives: N/A

Responsible Office: Firebaugh Police Department, Director of Emergency Services

Priority (High, Medium, Low): Medium

Cost Estimate: \$5,000 per year

Potential Funding: General Fund

Benefits (Avoided Losses): Avoid losses

Schedule: Continuous, outreach education at public events with information pamphlets and presentations

Status: New action 2024

Annex D: City of Fowler





PARTICIPATION

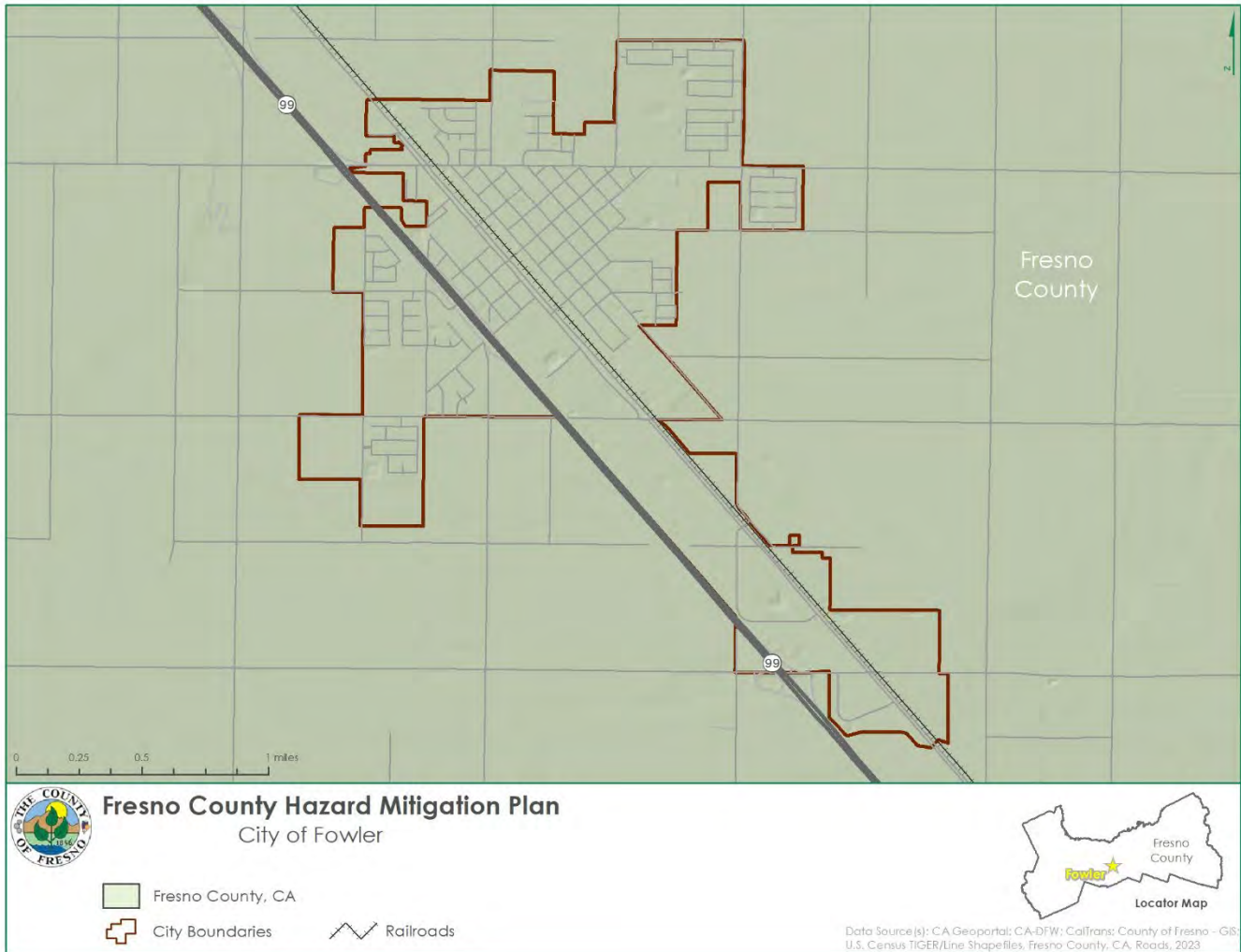
To update the City of Fowler's jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of Fowler's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. To update the annex, the City engaged with local stakeholders including the Fresno County Fire Protection District.



COMMUNITY PROFILE

Figure 1. The City of Fowler displays a map and the location within Fresno County of the City of Fowler.

Figure 1. City of Fowler Boundaries



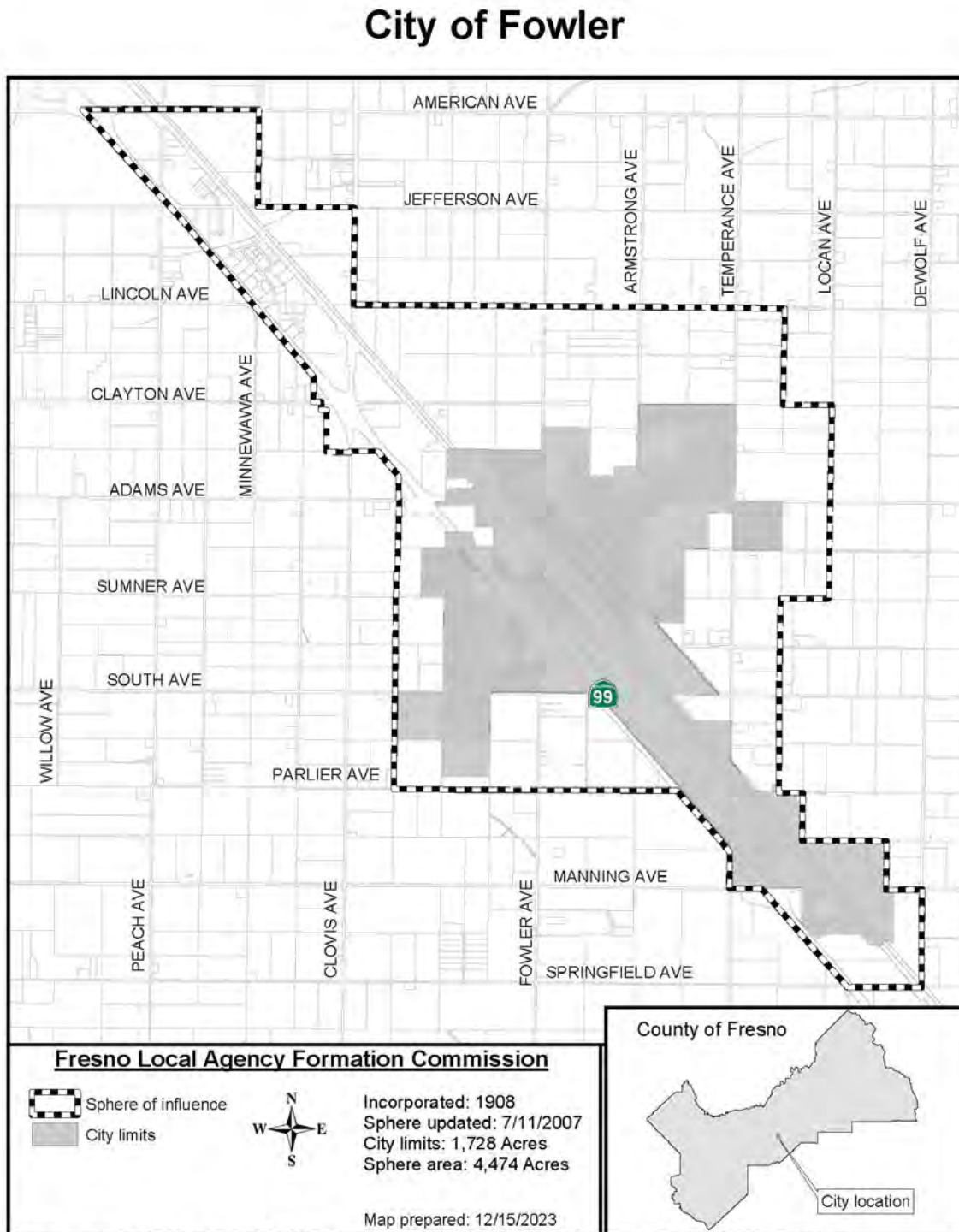
Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads, 2023



GEOGRAPHY AND CLIMATE

The City of Fowler is located in central Fresno County, approximately 10 miles south of the City of Fresno and 3 miles north of the City of Selma. The City sits along State Highway 99, which connects to major points north and south, but is otherwise surrounded by agricultural land. This entire area is referred to as the General Plan planning area and encompasses approximately 5,690 acres, or roughly nine square miles, inclusive of public rights-of-way. The planning area includes the existing City limit, the SOI, and approximately 1,195 acres beyond the SOI. The City limits encompasses 4,474 acres and 1,728 acres of SOI, shown in the following figure. The figure below shows the monthly temperature and precipitation for the nearest NWS weather station at the Fresno-Yosemite International Airport.

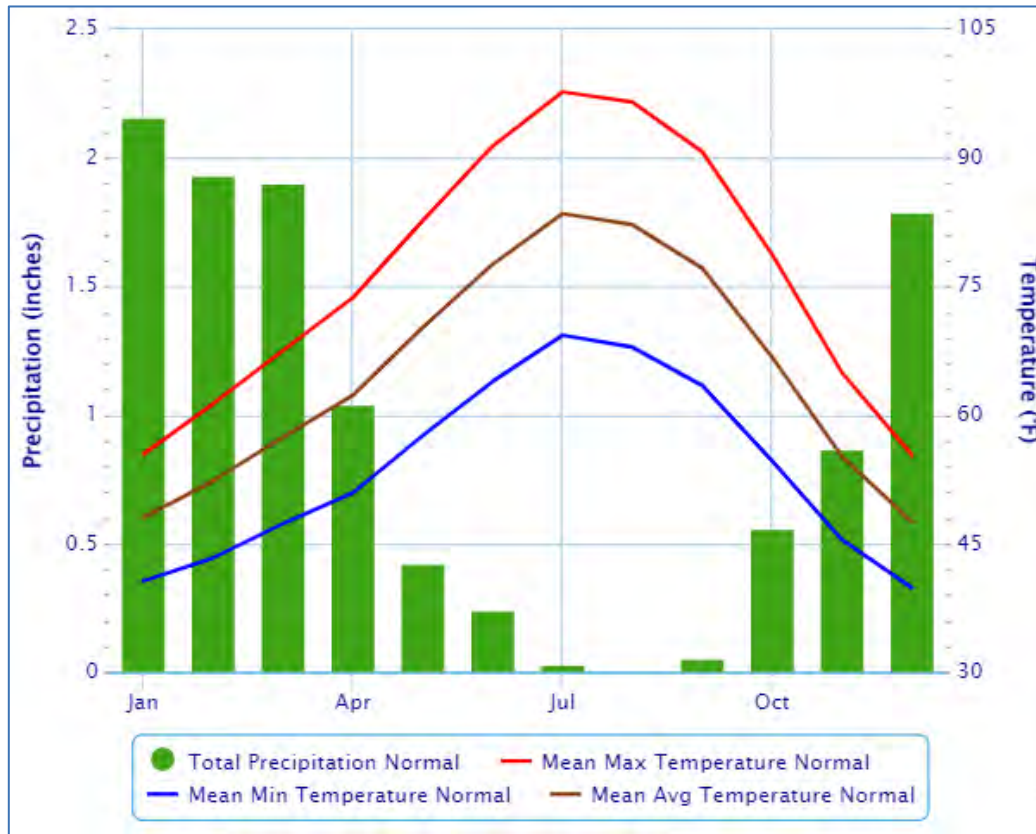
Figure 2. City of Fowler Limits and Sphere of Influence



Document path: G:\LAFCO WORKING FILES\GIS Layers and Maps\00-LAFCo Maps\Cities\Fowler\Fowler07062021_Portrait.mxd

Source: Fresno County Agency Formation Commission,
https://www.fresnolafco.org/files/b7ed078fc/Fowler12152023_Portrait.pdf

Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: NWS

HISTORY

The community of Fowler was established in 1872 when State Senator Thomas Fowler implemented the “Fowler Switch” along the southern extension of the Central Pacific Railway. In its early years the community was a center for the cattle ranching industry, and activity surrounded the railroad tracks within the historic core. The city was incorporated in 1908. The Sanborn Company produced Fire Insurance maps in the early years of Fowler’s development which provide insight on how the community grew and changed. In 1896 the city was contained largely within a 16- block area bordered by Mariposa Street to the north, the Southern Pacific railway tracks to the west, Fifth Street to the east, and Fresno Street to the south. Blocks were laid out in a uniform grid that measured 400’ long by 320’ wide and included north-south alleys measuring 20’ in width. Despite the small size of the community, Merced Street east of the railroad had already become a center of commercial activity, with several buildings lining the public right-of-way. By 1945 the city had expanded all the way to Adams Avenue to the north but had not grown much past Vine Street to the south. Although the gridiron pattern of rectangular blocks continued, the town remained compact and walkable in form. Merced Street east of the railway tracks continued as a commercial center, adding new businesses and institutions along its route.¹



ECONOMY

Select estimates of economic characteristics for the City of Fowler are shown in **Table 1. City of Fowler's Economic Characteristics**.

Table 1. City of Fowler's Economic Characteristics

Characteristic	City of Fowler
Families below Poverty Level	18.5%
All People below Poverty Level	21.0%
Median Family Income	\$81,463
Median Household Income	\$56,410
Per Capita Income	\$26,623
Population in Labor Force	2,793
Population Employed	2,556
Unemployment	8.5%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Fowler's Employment by Occupation and **Table 3. City of Fowler's Employment by Industry** detail how the City of Fowler labor force breaks down by occupation and industry based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Fowler's Employment by Occupation

Occupation	# Employed	% Employed
Service Occupations	357	13.97%
Sales and Office Occupations	476	18.62%
Management, Business, Science, and Arts Occupations	881	34.46%
Production, Transportation, and Materials Moving Operations	463	18.12%
Natural Resources, Construction, and Maintenance Occupations	379	14.83%
Total	2,556	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Fowler's Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care and Social Assistance	814	31.85%
Retail Trade	249	9.74%
Professional, Scientific, and Management, and Administrative and Waste Management Services	129	5.05%



Industry	# Employed	% Employed
Agriculture, Forestry, and Hunting, and Mining	138	5.40%
Public Administration	139	5.44%
Manufacturing	242	9.47%
Arts, Entertainment, and Recreation and Accommodation, and Food Services	286	11.19%
Construction	152	5.95%
Wholesale Trade	43	1.68%
Other Services, Except Public Administration	97	3.79%
Transportation and Warehousing, and Utilities	207	8.10%
Finance and Insurance and Real Estate and Rental and Leasing	28	1.10%
Information	32	1.25%
Total	2,556	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

POPULATION

According to the U.S. Census Bureau's 2022 Population Estimate, the City of Fowler is estimated at 7,154. Select demographic and social characteristics for the City of Fowler from the 2022 ACS are shown in **Table 4. City of Fowler Demographic and Social Characteristics**.

Table 4. City of Fowler Demographic and Social Characteristics

Characteristics	City of Fowler
Gender/Age	
Male	46.5%
Female	53.5%
Median Age	34.1%
Under 5 Years	6.8%
Under 18 Years	29.6%
65 Years and Over	13.8%
Race/Ethnicity	
White	53.4%
Asian	14.7%
Black or African American	0.4%
American Indian/Alaska Native	0.3%
Hispanic or Latino (of any race)	65.9%
Education	
High school graduate or higher	77.6%



Characteristics	City of Fowler
Disability Status	
Population 5 years and over with a disability	12.6%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Fowler's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Fowler (see **Table 6. City of Fowler - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Fowler.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Fowler - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Likely	Limited	Small	12 to 24 hours*	Less than 24 hours*	Medium
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Minor	Negligible	Less than 6 hours	Less than 24 hours	Low
Drought	Possible	Critical	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Limited	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Possible	Limited	Large	More than 24 hours	Less than 1 week	Medium
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
Hazardous Materials	Possible	Limited	Large	Less than 6 hours	Less than 1 week	Medium*
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Low*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Soil Hazards						
Erosion	Unlikely	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Unlikely	Minor	Negligible	N/A	N/A	Low
Landslide	Possible	Minor	Negligible	12 to 24 hours*	Less than 6 hours	Low
Land Subsidence	Possible	Limited	No Data	N/A	N/A	Low
Volcano	Unlikely	Limited	Negligible	Less than 6 hours*	Less than 1 week*	Low
Wildfire	Possible	Minor	Negligible	12 to 24 hours*	More than 1 week*	Low

*Rated on an average basis. For example, warning time for agricultural hazards by vary by the type of hazard (When under the Warning Time and Duration column).



**Hazard “Overall Risk” column differs from the risk factor methodology used based on the jurisdiction’s Hazard Risk Assessment Worksheet. For example, the “Overall Risk” for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.*

Note: N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.



VULNERABILITY ASSESSMENT

The intent of this section is to assess Fowler's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Fowler - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Fowler's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

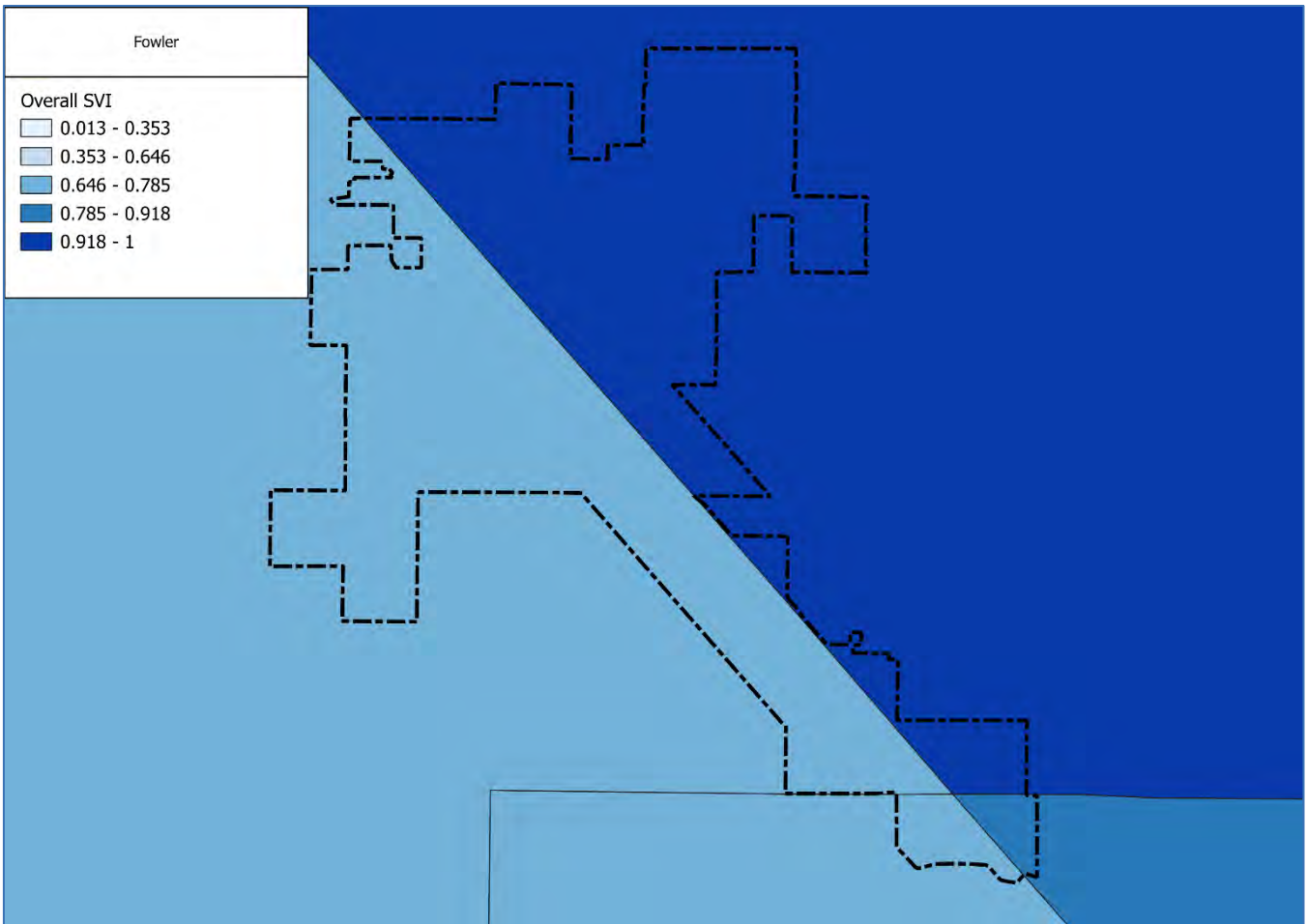
The hazard summaries reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Fowler, census tracts with a higher SVI, .646 to 1, are located near the eastern portion of the City, as shown in **Figure 4. City of Fowler Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.). ²

Figure 4. City of Fowler Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Fowler City Boundary

ASSETS AT RISK

This section considers Fowler's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation.

An inventory of critical facilities in the City of Fowler is provided in **Table 7. City of Fowler's Critical Facilities** and mapped in **Figure 5. City of Fowler Critical Facilities**.

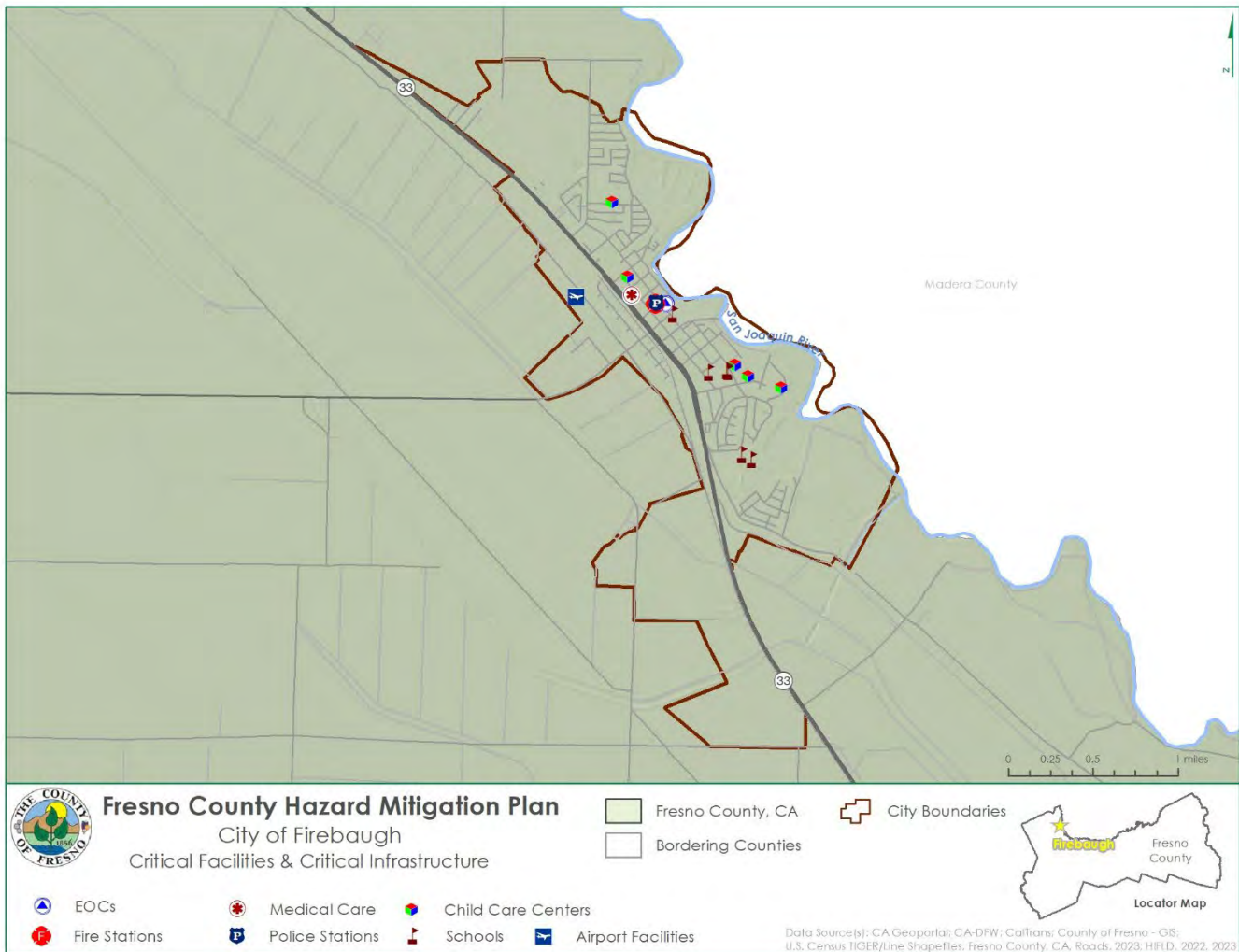
Table 7. City of Fowler's Critical Facilities

Critical Facility Type	Count
CalARP	2
Fire Station	1
Police	1
School	8
Communication Facilities	2
EOCs	1
Water Wells*	7
Lift Stations*	9
Total	31

Source: Fresno County

*facilities that are not mapped in Figure 5.

Figure 5. City of Fowler Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads, 2023; HIFLD, 2022, 2023



HISTORIC RESOURCES

The City of Fowler does not have any properties listed on the National Register of Historic Places.

ECONOMIC ASSETS

The City of Fowler does not have information to add in the economic assets section.

GROWTH AND DEVELOPMENT TRENDS

The City's 2025 General Plan Land Use Map is shown in **Figure 6. City of Fowler Land Use**. For the City's Sphere of Influence, the General Plan proposes a ring of agricultural use, along with heavy industrial uses north and south along the Highway 99 corridor as well as some expansion of residential uses to the east and west.

Table 8. City of Fowler's Change in Population and Housing Units illustrates how the City has grown in terms of population and has experienced an increase in the number of housing units between 2017 and 2022. As of 2022, the population of Fowler was 6,819 with an average growth rate of 9.98 percent.

Table 8. City of Fowler's Change in Population and Housing Units

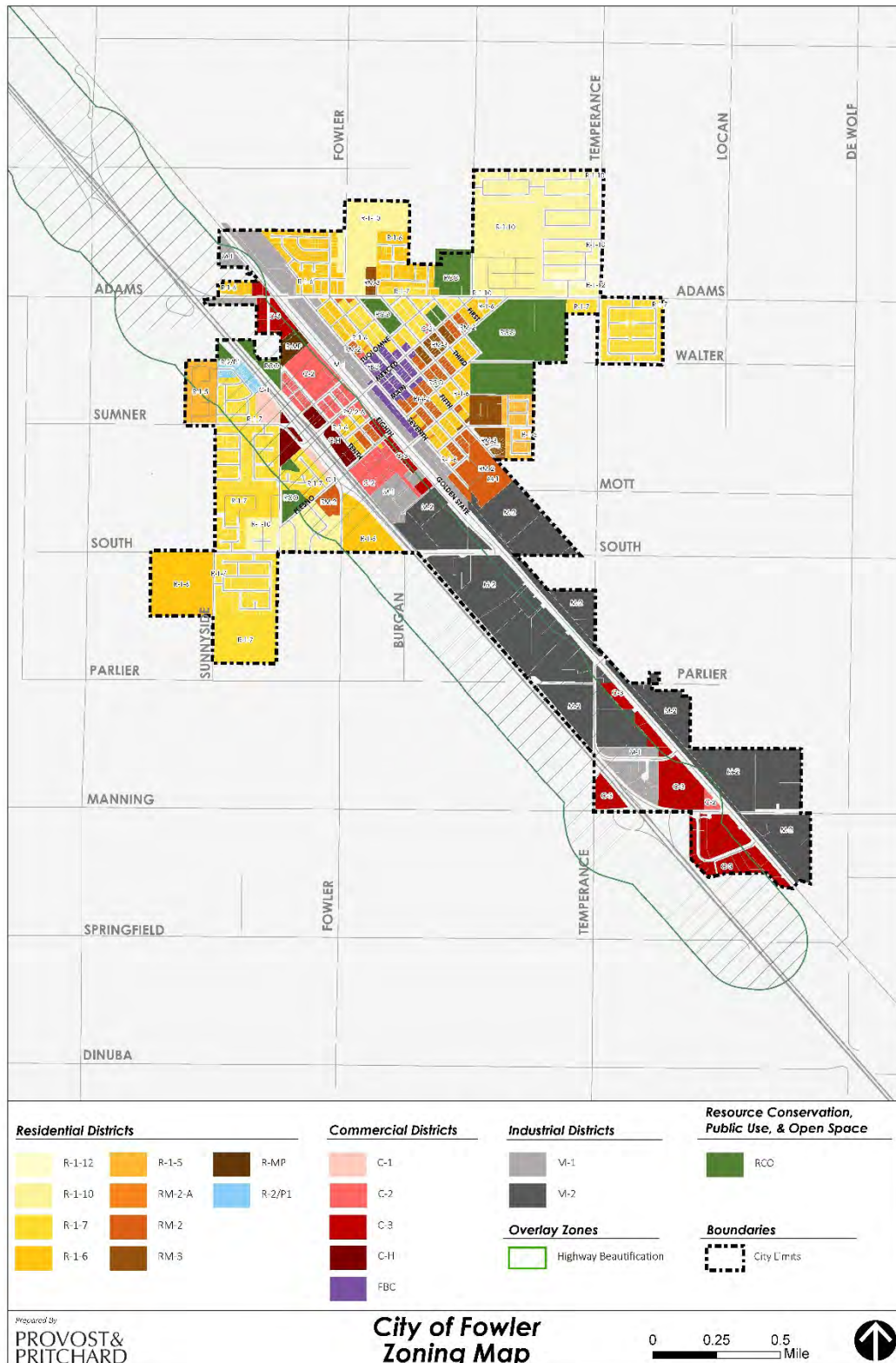
2017 Population	2022 Population Estimate	Estimated Percent Change 2017-2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017-2022
6,200	6,819	+9.98%	1,889	2,196	+16.25%

Source: American Community Survey 2018-2022 5-Year Estimates

Of the 1,889 housing units in Fowler, 56.5 percent are owner occupied which is much lower compared to other cities in Fresno County. The increase in population is followed by the increase in housing units within the City of Fowler.

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk section of the main plan

Figure 6. City of Fowler Land Use





ESTIMATING POTENTIAL LOSSES

Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. In regard to these types of structures, there are currently 74 parcels in the 100- and 500-year floodplains in the City of Fowler. No further information on vulnerable structures is available. Impacts of past events and vulnerability to specific hazards are further discussed below (see Section the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County as a whole).

DROUGHT (HIGH)

Due to the importance of agriculture, drought can have a significant impact on the local economy.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Fowler's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (MEDIUM)

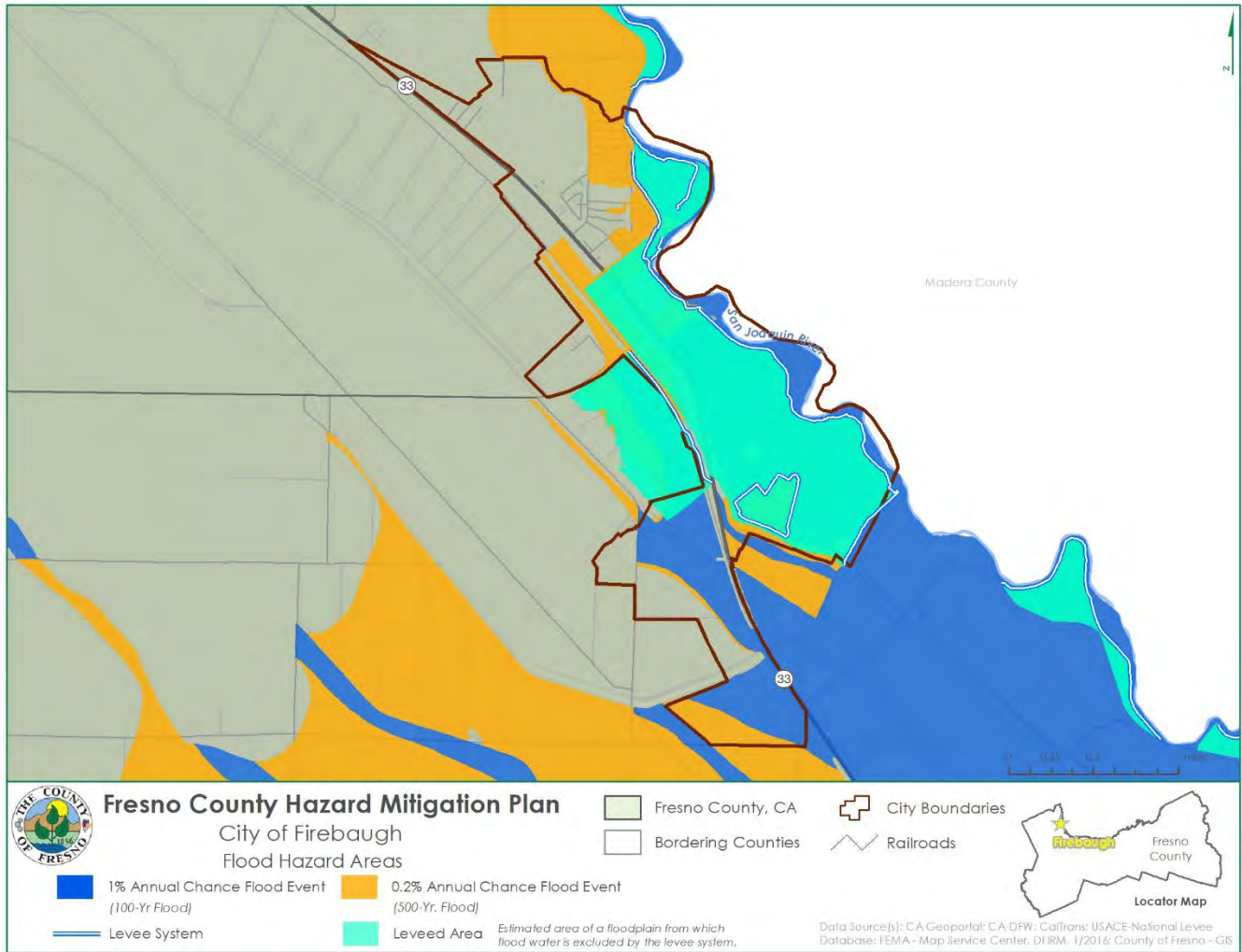
The most recent FEMA Flood Insurance Rate Map (FIRM) affecting the City of Fowler was updated in February 2009. According to the FIRM, small portions of the planning area along Highway 99 and the railroad are subject to 100-year (or 1-percent-annual-chance) and 500-year (0.2-percent-annual-chance) flooding.

Based on the description of principal flood problems around the City of Fowler in FEMA's 2016 Flood Insurance Study (FIS), damaging floods primarily occur as a result of heavy rains overwhelming the storm drainage system capacity.

VALUES AT RISK

Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a flood map for the City of Fowler was created (see **Figure 7. City of Fowler Flood Hazard Areas**). **Table 9. City of Fowler's Parcels within the 100-Year Floodplain and Figure 8. City of Fowler Flood Hazard Area Buildings at Risk** summarize the values at risk in the City's 100-year floodplain.

Figure 7. City of Fowler Flood Hazard Areas



Source: CA Geoportal; CA-DFW: CalTrans; USACE-National Levee Database; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS



Table 9. City of Fowler's Parcels within the 100-Year Floodplain

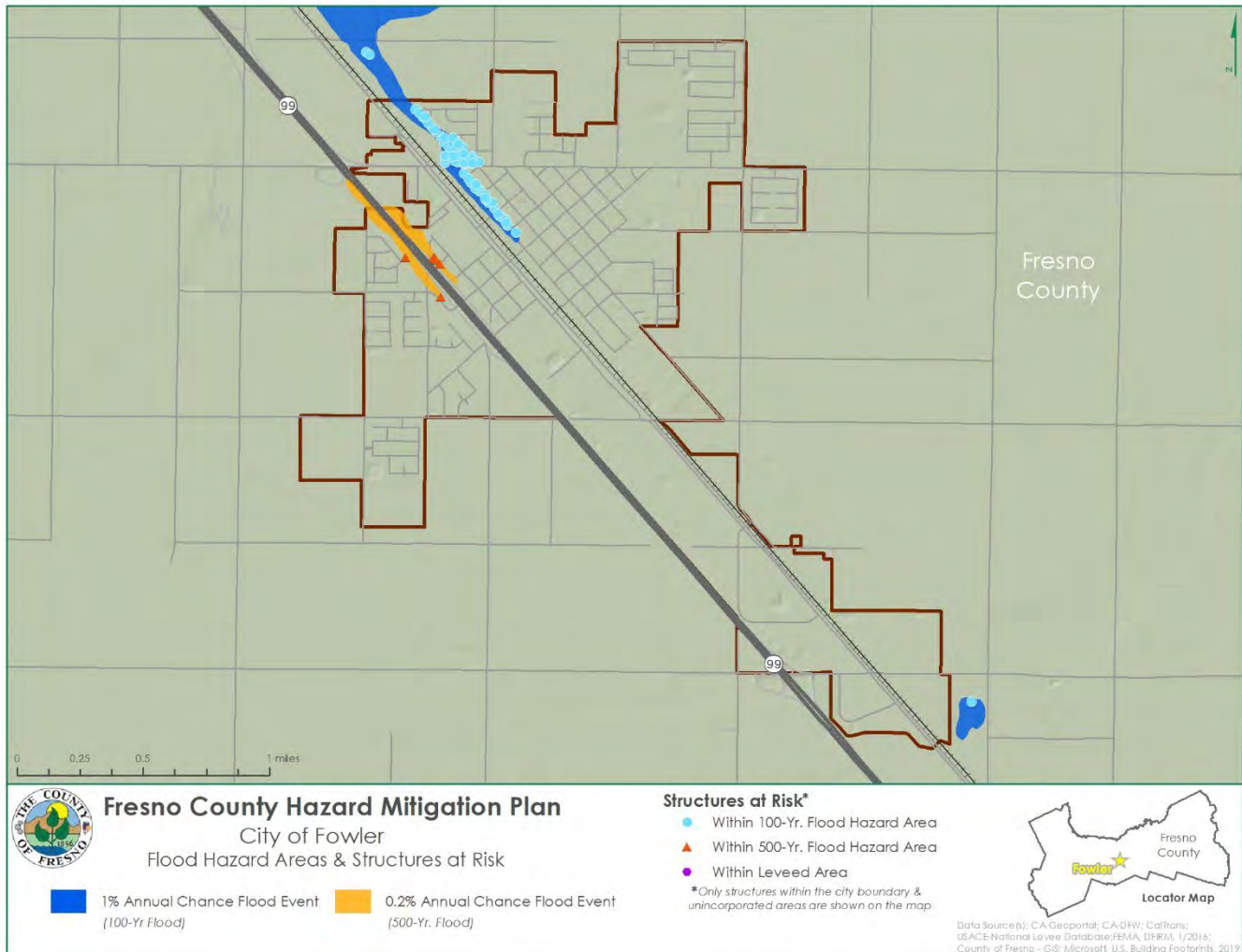
Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Unknown	74	Unknown	Unknown	Unknown	Unknown	Unknown
Total	74					

Source: Fresno County 2017 Parcel and Assessor data; FEMA 2009 FIRM

Based on this analysis, the City of Fowler has limited assets at risk to the 100-year flood, but nonetheless is vulnerable to flooding.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are likely below the actual market values. Thus, the actual value of assets at risk may be higher than those included herein.

Figure 8. City of Fowler Flood Hazard Area Buildings at Risk



Source: CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database; FEMA, DFIRM, 1/2016; County of Fresno – GIS; Microsoft, U.S. Building Footprints. 2019



POPULATION AT RISK

Using parcel data from the County, the digital flood insurance rate map, population at risk was calculated for the 100-year and 500-year floods based on the number of residential properties at risk and the U.S. Census Bureau 2016 estimate for the average number of persons per household (3.17). The following are at risk to flooding in the City of Fowler:

- 100-year flood—342 people
- 500-year flood—51 people
- Total flood—393 people

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Fowler joined the National Flood Insurance Program (NFIP) on September 24, 1984. NFIP Insurance data indicates that as of March 19, 2024, there were 5 flood insurance policies in force in the City with \$2,630 in total premium or total paid.

There has been three historical losses in the City of Fowler, which totaled \$3,197.94. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties located in the jurisdiction.

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. There are no critical facilities located in the 100- or 500-year floodplain in the City of Fowler.

HAZARDOUS MATERIALS (MEDIUM)

There have been 4 hazardous materials incidents from 2017-2022 that have occurred in the City of Fowler. Of the 4 incidents, there have been 2 fixed, 1 mobile, and 1 railroad non-release incident. There were no injuries or property damage during the time period, however, there was one fatality and 60 evacuees that needed to evacuate.³ There are two CalARP facilities within the City of Fowler.

³ California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O' Brien's consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Fowler's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 10. City of Fowler Mitigation Capability Summary**.

Table 10. City of Fowler Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Fiscal Capability			X
Available Staff			X
Political Support/Interest			X
Community Support			X

REGULATORY MITIGATION CAPABILITIES

Table 11. City of Fowler's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Fowler.

Table 11. City of Fowler's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X		Updated 2022			



Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Community Emergency Response Team (CERT)		X				
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X				
Fire Code	X		Updated 2022			
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance	X		Updated April 2023			
Land Use/Development Planning	X		Updated April 2023			
National Flood Insurance Program (NFIP)		X				
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready	X		Updated April 2023			
Stormwater Management Plan/Ordinance	X		Updated April 2023			
Subdivision Regulations/Ordinance	X		Updated 2022			
Two Weeks Ready		X				
Unified Development Ordinance	X		Updated July 2024			
Zoning Ordinance	X		Updated April 2023			

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 12. City of Fowler's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Fowler.

Table 12. City of Fowler's Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		Single Staff	Thomas Gaffrey
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Single Staff	Department, Provost & Pritchard
Fiscal Management or Procurement Specialists	X		Single Staff	Margarita Moreno



Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Floodplain Manager	X		Single Staff	Soo Ho Park
Land Surveyors	X		Single Staff	Department, Provost & Pritchard
Land Use/Management/Development Planning	X		Single Staff	Thomas Gaffery
Planners or engineers with an understanding of natural and/or human-caused hazards	X		Single Staff	Department, Provost & Pritchard
Resource Development Staff or Grant-writing	X		Single Staff	Department, various
Scientists familiar with the hazards of the community	X		Department	Fresno County Fire Protection District
Staff experienced with Geographic Information Systems (GIS)	X		Single Staff	Department, Provost & Pritchard
Staff with education or expertise to assess the community's vulnerability to hazards	X		Department	Fresno County Fire Protection District

PLANNING MITIGATION CAPABILITIES

Table 13. City of Fowler Planning Capabilities identifies the plans related to mitigation and loss prevention in Fowler.

Table 13. City of Fowler Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes		Budget
Climate Resiliency or Adaptation Plan	Yes		Updated April 2023
Community Wildfire Protection Plan (CWPP)	No		
Comprehensive Emergency Management Plan	Yes		2007
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes		Updated April 2023
Continuity of Operations Plan (COOP)	No		
Disaster Recovery Plan	Yes		2007
Economic Development Plan	Yes		Updated April 2023



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Emergency Operations Plan (EOP)	Yes		Policy
Evacuation Plan	Yes		2007
Flood Response Plan	No		
Floodplain Management Plan/Flood Mitigation Plan	Yes		Updated April 2023
Hazard Mitigation Plan	Yes		Partner with the county
Historic Preservation Plan	No		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	Yes		Updated April 2023
Threat Hazard Identification and Risk Assessment	Yes		Police Dept. yes, not city wide

FOWLER 2040 GENERAL PLAN

The City of Fowler was incorporated in 1908 and adopted its first comprehensive General Plan in 1976. In 2004, the City updated the Land Use and Circulation elements and added an Economic Development chapter. These changes were the first substantial updates to the General Plan document since its adoption. The City of Fowler General Plan is a policy document that sets the stage for future development in and around the City limits. The General Plan presents a framework of goals and policies that responds to issues of relevance to the community, strive to meet its imagined future, and maintain a high quality of life for its residents in the face of changing environmental, economic, and social circumstance. The general plan includes nine state mandated elements including land use, circulation, housing, conservation, noise, open space, safety, air quality and environmental justice. Relevant elements and information to the hazard mitigation plan are outlined below.

Community Resiliency & Emergency Management

Table 14. Community Resilience & Emergency Management

Policy Number	Policy Description
SAF-2	Continue to implement the Fresno County Multi-Hazard Mitigation Plan to address disasters such as earthquakes, drought, flooding, hazardous material spills, water contamination, epidemics, fires, extreme weather, major transportation accidents, and terrorism
SAF-2a	Review and revise, as necessary, the Municipal Code to ensure effective organization, responsiveness, and continuity of government during declared emergencies.
SAF-2b	Procure generators, or another suitable alternative, for back-up power at City Hall, the Police Department, the Fire Department, and all domestic water distribution infrastructure.
SAF-2d	Monitor potential risk from seismic and geologic hazards and implement actions identified by the Multi-Hazard Mitigation Plan to reduce these risks.
SAF-2e	Sponsor and support educational programs regarding emergency response, disaster preparedness protocols and procedures, and disaster risk reduction



Policy Number	Policy Description
SAF-2f	Sponsor and support cooling centers during extreme heat days.

Hazardous Materials

Table 15. Hazardous Materials Policies

Policy Number	Policy Description
SAF-8	Protect soils, surface water, and groundwater from contamination from hazardous materials
SAF-8a	Continue to provide household hazardous waste collection programs to encourage proper disposal of products containing hazardous materials or hazardous wastes
SAF-9	Cooperate with State agencies and the Fresno County Environmental Health Division efforts to identify hazardous materials users, implement hazardous materials plans, and minimize risks associated with hazardous cargoes, agricultural spraying, and electromagnetic fields.

Water Quality and Conservation Policies

Table 16. Water Quality and Conservation Policies

Policy Number	Policy Description
SAF-13	Conserve and, where feasible, create or restore areas providing water quality benefits such as undeveloped open space areas, basins, and drainage canals.
SAF-14	Maintain the domestic water system in accordance with applicable water quality standards.
SAF-15	Require new development to protect water quality through site design, pollution prevention, storm water treatment, runoff reduction measures, best management practices (BMPs), and Low Impact Development (LID) strategies.
SAF-16	Require the use of native, drought tolerant, or low water use landscaping in both public and private development to reduce or eliminate the need for landscape irrigation.
SAF-18	Explore the use of recycled water to irrigate landscape areas.
SAF-18a	Coordinate with Selma-Kingsburg-Fowler (SKF) County Sanitation District on what options are available to reuse recycled water.

Flooding

Table 17. Flood Policies

Policy Number	Policy Description
SAF-19	Require that new critical facilities are located outside of 100- and 200-year flood zones, or, where such location is not feasible, design the facilities to mitigate potential flood risk to ensure functional operation during a flood event.
SAF-20	Require that new developments within 100- and 200-year flood zones are designed and constructed in a manner that does not divert floodwaters onto adjacent property or increase flood hazards elsewhere.
SAF-21	Support a one-in-100-year level of flood protection for small communities, corresponding to the national Federal Emergency Management Agency (FEMA) standard of flood protection.



Policy Number	Policy Description
SAF-22	Require evaluation of potential flood hazards prior to approval of development projects to determine whether the proposed development is reasonably safe from flooding and consistent with the national Federal Emergency Management Agency (FEMA) standard of flood protection for 100-year areas and the Central Valley Flood Protection Plan for 200- year areas.
SAF-23	Work with the Consolidated Irrigation District (CID) and other responsible parties to ensure flood management facilities and structures (e.g., pump stations, canals) are properly maintained and/or improved.
SAF-24	Continue to implement a public outreach campaign to notify landowners and tenants of their flood status, options for flood insurance, and other related information.
SAF-25	Encourage low-impact development by allowing for alternative stormwater management techniques including the provision of vegetated areas, infiltration trenches, and dry wells.
SAF-25a	a Review and revise, as necessary, the Zoning Ordinance and other City standards to allow for low-impact stormwater management site design features.

Seismic Hazards

Table 18. Seismic Hazards Policies

Policy Number	Policy Description
SAF-26	Regularly review and enforce all seismic and geologic safety standards and require the use of best practices in site design and building construction methods.
SAF-27	Promote the upgrading, retrofitting, and/or relocation of all existing critical facilities and other important public facilities that do not meet current building code standards and are susceptible to seismic or geologic hazards.
SAF-27a	Evaluate critical facilities for risk from seismic and geologic hazards. Prioritize improvements based on level of expected risk.
SAF-28	Continue to use building codes as the primary tool for reducing seismic risk in structures.

Fire Hazards

Table 19. Fire Hazards Policies

Policy Number	Policy Description
SAF-29	Promote education programs related to fire safety, fire prevention, and emergency preparedness.
SAF-30	Consult the Fire Department during the review of development proposals to ensure projects adequately address safe design and comply with applicable fire and building codes.
SAF-31	Require property owners to remove excessive and/or overgrown vegetation to prevent and minimize fire risks to surrounding property.

PUBLIC FACILITIES

Groundwater Management



Table 20. Groundwater Management Policies

Policy Number	Policy Description
PF-21	Protect groundwater resources within the planning area. This includes protecting the occurrence of groundwater recharge, as well as the quality and quantity of available groundwater resources.
PF-24	Where feasible, require on-site systems that facilitate groundwater recharge and/or retention and reuse of water on-site.

FISCAL MITIGATION CAPABILITIES

Table 21. City of Fowler Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 21. City of Fowler Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)			X	
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fee			X	
Water/Sewer Fees			X	
Stormwater Utility Fees			X	
Development Impact Fees			X	
General Obligation, revenue, and/or Special Tax Bonds			X	
Partnering Agreements or Intergovernmental Agreements		X		
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)			X	
Homeland Security Grants (HSGP)			X	



Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
USDA Rural Development Agency Grants			X	
US Economic Development Administration Grants			X	
Infrastructure Investment and Jobs Act (IIJA)			X	

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of Fowler has several existing mechanisms in place that already help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Some of the possible opportunities for enhancement of the City's existing mitigation program are listed below.

- Develop a Drought Contingency Plan that will create a framework for drought response and mitigation. The City adopted a water shortage contingency plan in July 2023.⁴
- Develop a stormwater management program to identify problem areas and mitigation alternatives.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Fowler adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy. In the 2024 update, the City has proposed to consider adding two new goals which include (1) emergency backup power for critical sites and (2) identify an Emergency Operations Center (EOC) and set up necessary infrastructure.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The City of Fowler did not identify any specific efforts to incorporate information from the previous hazard mitigation plan into other planning mechanisms. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Public Works Department may utilize the hazard information when implementing Capital Improvement projects and the Community Development Department may utilize the hazard information when reviewing a site plan or other type of development application. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Fowler will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1984. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.



MITIGATION ACTIONS

The planning team for the City of Fowler identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included.

In addition to implementing the mitigation action below the City of Fowler will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program, with an emphasis on drought. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.



1. INSTALL BACK-UP POWER SYSTEM FOR CITY CRITICAL FACILITIES

Hazard(s) Addressed: Multi-Hazard: earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: The City Hall, Police Department, and Fire Department have no generators for back-up power. It is important that essential services remain operational in the event of a large-scale power outage that often is associated with major hazard impacts. This project would result in installation of emergency generators at each facility. Each facility would be assessed for proper generator sizing and hook-up.

Other Alternatives: None

Responsible Office: City of Fowler City Hall

Priority (High, Medium, Low): High

Cost Estimate: \$500,000

Potential Funding: General Fund

Benefits (Avoided Losses): Generators will keep operation ongoing during outages at these critical facilities

Schedule: 2029

Status: In Progress, 1-3 years

Comments: In progress for wells, generators, and power wall

2. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought, Agricultural hazard

Issue/Background: The Kings subbasin underlays the City of Fowler and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Fowler has become a joint power authority of the South Kings Groundwater Sustainability Agency, other members of the Agency include the City of Kingsburg, City of Parlier and City of Sanger. As a member of the South Kings GSA, the City of Fowler is required to participate in the development and implementation, no later than January 31, 2020, of a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the South Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Fowler.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.



Responsible Office: Public Works and South Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments, General Fund, and California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: Implementation in progress

Comments: The City of Fowler is part of the SKGSA plan and a member of the Groundwater Sustainability Plan

3. POLICING PLAN FOR CRITICAL INFRASTRUCTURE DURING A THREAT

Hazard(s) Addressed: All Hazards

Issue/Background: Protecting critical infrastructure from attack, vandalism, or non-man-made threats.

Other Alternatives: No

Responsible Office: City of Fowler Police Department

Priority (High, Medium, Low): High

Cost Estimate: Unknown

Potential Funding: DHS Preparedness Grants, Homeland Security Grant Program (HSGP)

Benefits: The prevention of loss of life and property

Schedule: 1-3 years

Status: New action in 2024

Annex E: City of Fresno





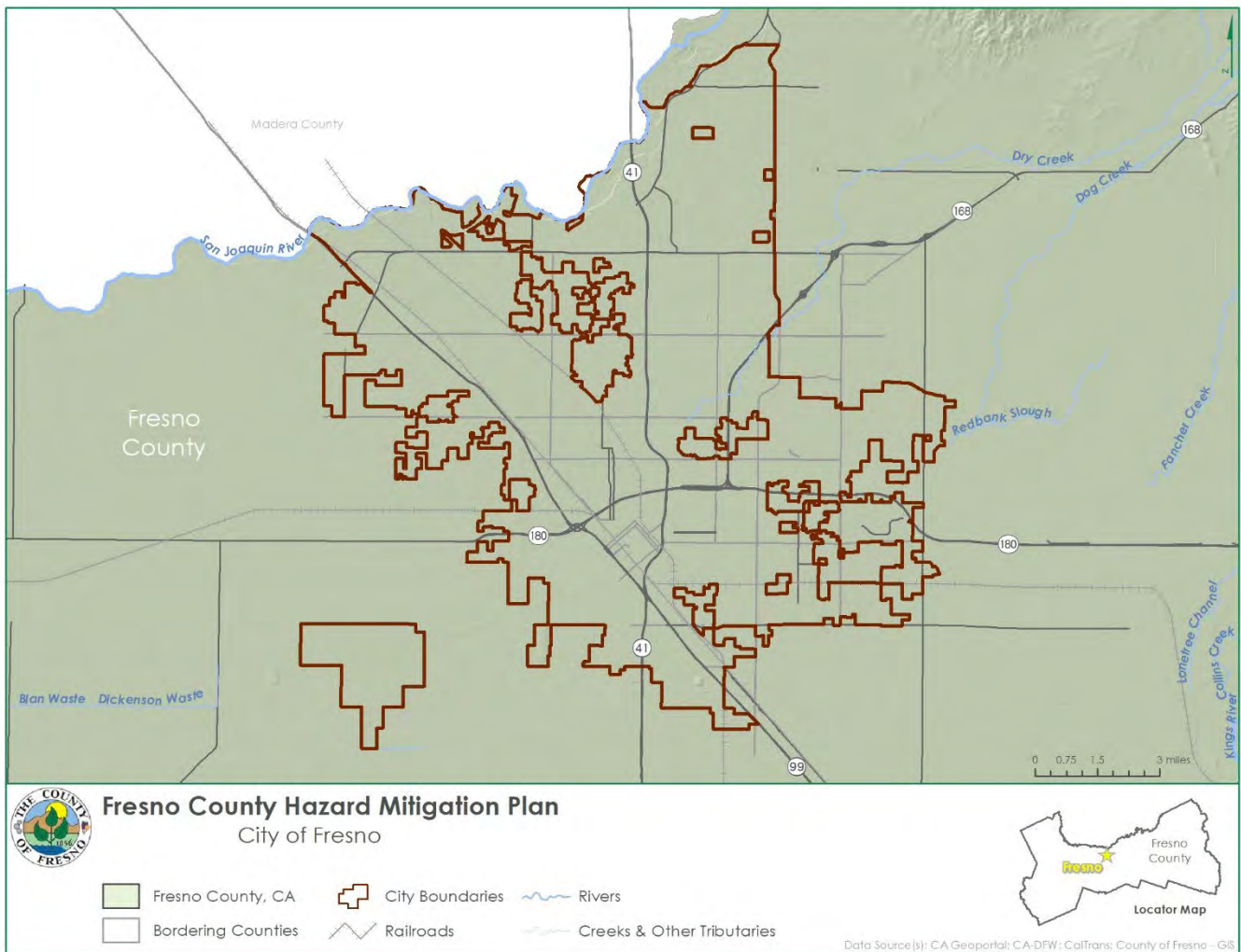
PARTICIPATION

To update the City of Fresno’s jurisdictional annex, the City of Fresno had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O’Brien’s consulting team provided opportunities for the City of Fresno’s input. Opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of Fresno did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee. These stakeholders are identified in Appendix B.

COMMUNITY PROFILE

Figure 1. City of Fresno City Boundaries displays a map and the location within Fresno County of the City of Fresno.

Figure 1. City of Fresno City Boundaries



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

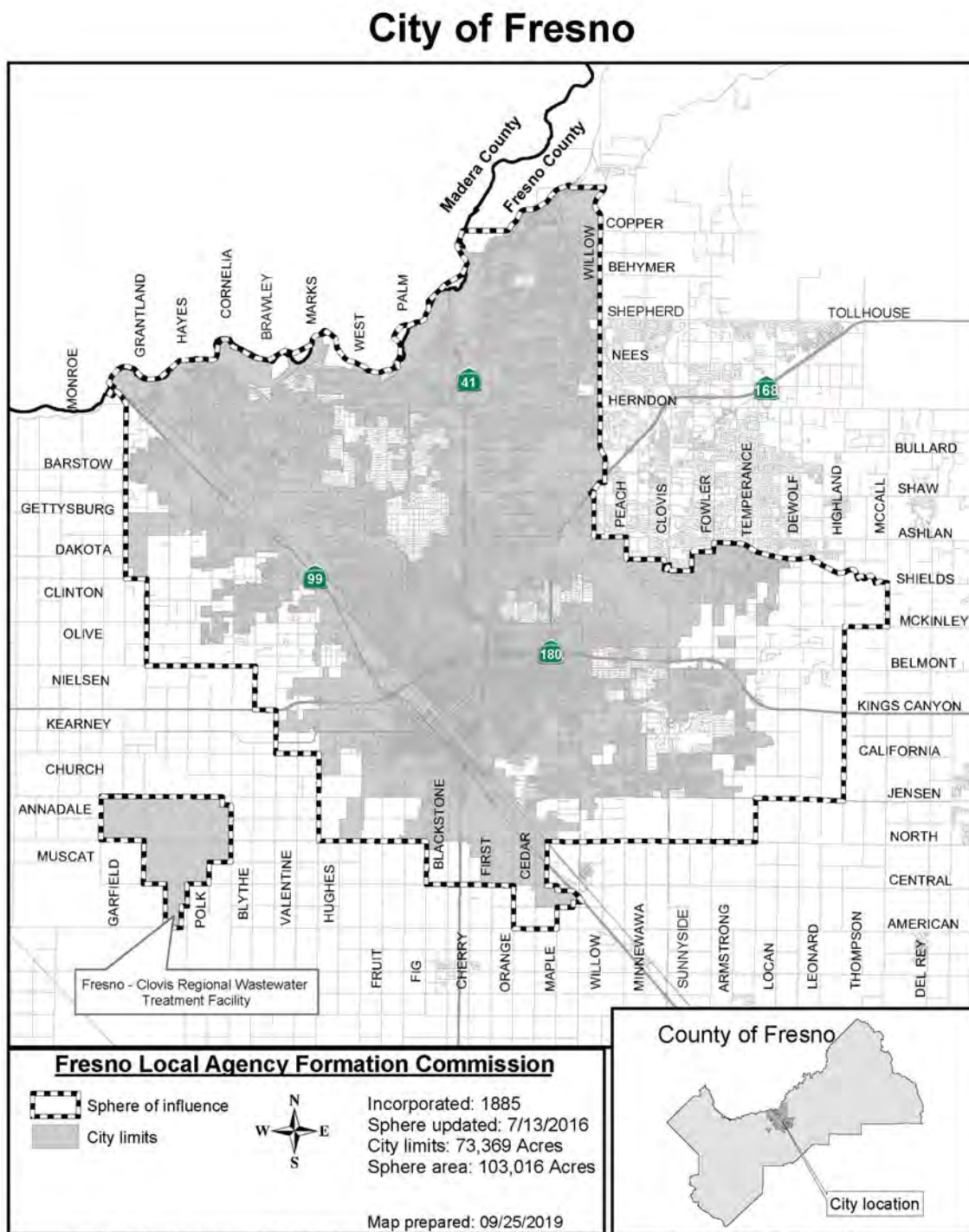


GEOGRAPHY AND CLIMATE

The City of Fresno, located in the Central Valley, covers an area of 113 square miles. The Sphere of Influence (SOI) encompasses 157 square miles in total, of which 44 square miles is unincorporated land. **Figure 2. City of Fresno Limits and Sphere of Influence** shows the SOI and City limits. Over the past decade, the City has expanded into the northern, northwestern, and eastern reaches of its Sphere of Influence.



Figure 2. City of Fresno Limits and Sphere of Influence



Document path: G:\LAFCO WORKING FILES\GIS Layers and Maps\00-LAFCo Maps\Cities\Fresno\Fresno092319_Portrait.mxd

Source: Fresno Local Agency Formation Commission,
https://www.fresnolafco.org/files/81063bbd7/Fresno092319_Portrait.pdf



Except for the deep channel of the San Joaquin River at the northern boundary of the City, Fresno's topography is generally level and slopes gently to the southwest. The upper San Joaquin River lies at the City's northerly boundary and has carved a deep channel, confining the river between steep bluffs that range from 20 to approximately 100 feet in height. Fresno has a Mediterranean climate, averaging over 300 sunny days per year and little or no measurable precipitation from June through September. Annual rainfall averages 11 inches and the City's prevailing winds are typically light and from the northwest.

Storms with strong weather disturbances (lightning and very agitated winds) may occur from autumn months through the spring, with the strength of the storm dependent upon temperature gradients between moving weather fronts.

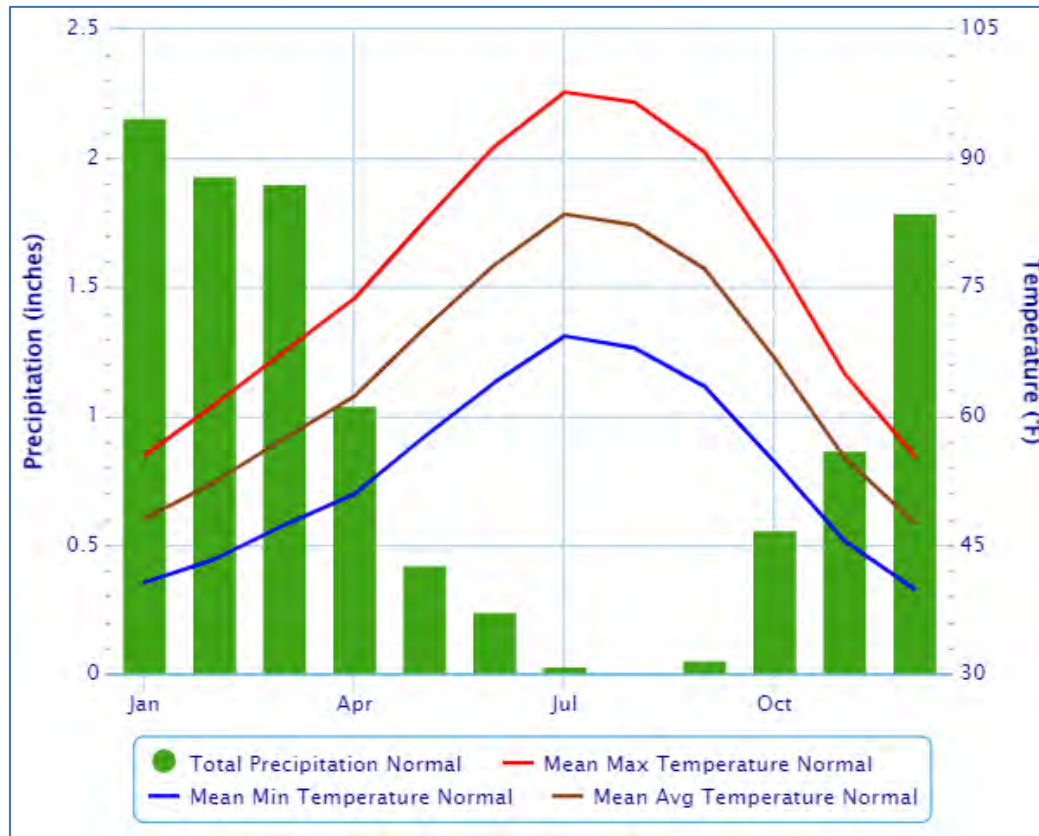
Winter mornings in December and January approach freezing but only rarely reach as low as, or below, 32°F; winter daytime high temperatures almost always approach or exceed 40°F. Snowfall is an extremely rare and transient phenomenon; the last recorded snowfall had trace amounts on December 11, 2005. The Tule fog, a thick ground fog that settles in the San Joaquin Valley from late fall through early spring, is the leading cause of weather-related accidents in California. In addition to causing visibility issues, "black ice" from precipitated fog may temporarily affect some roadways and bridges during the winter.

Summer daytime peak temperatures are high in Fresno. Some heat waves last over a week with daytime highs well over 100°F and issuance of health advisories. Summer evenings provide for some cooling of 10-15°F with the early morning daybreak hours cooling by 20-30°F, depending on humidity (low humidity allows for more radiant cooling). In 2021, the Fresno area experienced 69 days over 100 degrees – a record-breaking number of days, according to data from the National Weather Service.

¹**Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)** shows the monthly normal for temperature and precipitation at the Fresno Yosemite International Airport NWS weather station.

¹ Extreme heat in Fresno County affects health (fresnoland.org) <https://fresnoland.org/2022/08/26/fresno-county-heat-waves-will-last-longer-in-the-future-heres-what-that-means-for-your-health/>
2024 Fresno County Hazard Mitigation Plan
May 2024

Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: NWS

Geography and climate combine to create a general accumulation of air pollutants in the San Joaquin Valley (and in the City of Fresno) that occasionally result in unhealthy air quality conditions. Air quality problems are exacerbated by dust storms, human activities (e.g., vehicle emissions and fireplace and wood stove use), atmospheric photochemical processes, and forest fires from local and regional fires.

According to a report published by the American Lung Association, Fresno County is the dirtiest place in America for short-term particle pollution. The Fresno metro area saw a greater than 40 percent increase in the Lung Association's statistic for annual short-term exposure to PM_{2.5} particles.²

The City has chronically failed to attain some of the national and state ambient air quality standards, but due to the efforts of the California Air Resources Board and the regional San Joaquin Valley Unified Air Pollution Control District, progress toward attainment of ozone (oxidant) and particulate matter standards is being made. Carbon monoxide standards were deemed to have been attained in the 1990s.

² New report says Fresno region has dirtiest air in US. Experts call for critical change - FresnoLand

<https://fresnoland.org/2022/04/21/new-report-says-fresno-region-has-dirtiest-air-in-us-experts-call-for-critical-change>
 2024 Fresno County Hazard Mitigation Plan
 May 2024



HISTORY

Development of what today is the City of Fresno began in 1871, when the Central Pacific Railroad chose the Fresno Station for its San Joaquin Valley rail line. The City soon became the County seat and the shipping and distribution hub for the region's agricultural industry. An economic boom across California in the 1880s helped transform Fresno from a village to a city and helped drive its incorporation in 1885. Today, the City of Fresno is the center of trade, commerce, finance, and transportation for the San Joaquin Valley.

ECONOMY

The most comprehensive economic data available for the City of Fresno comes from the U.S. Census Bureau by way of the American Community Survey (ACS). Select estimates of economic characteristics for the City of Fresno are shown in **Table 1. City of Fresno's Economic Characteristics**.

Table 1. City of Fresno's Economic Characteristics

Characteristic	City of Fresno
Families below Poverty Level	15.1%
All People below Poverty Level	20.6%
Median Family Income	\$74,085
Median Household Income	\$64,196
Per Capita Income	\$30,533
Population in Labor Force	263,824
Population Employed	242,002
Unemployment	7.9%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Fresno's Employment by Occupation and **Table 3. City of Fresno's Employment by Industry** show how the City of Fresno's labor force breaks down by occupation and industry based on 5-year estimates from the 2018-2022 American Community Survey.

Table 2. City of Fresno's Employment by Occupation

Occupation	# Employed	% Employed
Management, Business, Science and Arts Occupations	80,046	33.08%
Management, Business, and Financial Occupations	(33,682)	(49.37%)
Computer, Engineering, and Science Occupations	(8,280)	(12.64%)



Occupation	# Employed	% Employed
Education, Legal, Community Service, Arts, and Media Occupations	(26,257)	(38.49%)
Sales and Office Occupations	48,846	20.18%
Service Occupations	54,667	22.59%
Production, Transportation, and Material Moving Occupations	36,666	15.15%
Natural Resources, Construction, and Maintenance Operations	21,777	8.99%
Total	242,002	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Fresno's Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care, and Social Assistance	55,512	22.94%
Retail Trade	25,233	10.43%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	26,632	11.00%
Professional, Scientific, and Management, and Administrative and Waste Management Services	24,980	10.32%
Manufacturing	16,051	6.63%
Public Administration	16,904	6.99%
Finance and Insurance, and Real Estate and Rental and Leasing	13,334	5.51%
Other Services, Except Public Administration	11,996	4.96%
Construction	14,154	5.85%
Agriculture, Forestry, Fishing, and Hunting, and Mining	8,625	3.56%
Transportation and Warehousing and Utilities	19,686	8.13%
Wholesale Trade	6,119	2.53%
Information	2,776	1.15%
Total	242,002	100.00%

Source: U.S. Census Bureau American Community Survey 2022 5-Year Estimates, www.census.gov/

With the depressed real estate and construction market and economic recession toward the end of the 2000–2010-decade, unemployment rates increased to a peak of 18.0 percent in 2010. Since then, the unemployment rate has steadily decreased. In recent years, unemployment sharply rose again, 17.4



percent in April 2020, during the COVID-19 as many businesses shut down and employees were laid off. The most recent annual data from the State of California Employment Development Department indicates that in 2022 there were 244,027 people employed in the City of Fresno labor force. The unemployment rate was 8.2 percent as of December 2023.

POPULATION

According to the U.S. Census Bureau 2022 Population Estimate, Fresno's population was estimated to be 545,567. Select demographic and social characteristics for the City from the U.S. Census Bureau's 2015 American Community Survey 5-year estimates are shown in **Table 4. City of Fresno's Demographic and Social Characteristics**.

Table 4. City of Fresno's Demographic and Social Characteristics

Characteristics	City of Fresno
Gender/Age	
Male	49.2%
Female	50.0%
Median Age	30.0
Under 5 Years	8.9%
Under 18 Years	29.5%
65 Years and Over	9.9%
Race/Ethnicity	
White	52.2%
Asian	13.0%
Black or African American	7.9%
American Indian/Alaska Native	1.1%
Hispanic or Latino (of any race)	48.5%
Education	
High school graduate or higher	75.2%
Disability Status	
Population 5 years and over with a disability	11.75%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

For information about how some of these demographics affect social vulnerability and how they compare to other Fresno County jurisdictions, California, and the United States, see "Social Vulnerability" in the Fresno County Vulnerability and Assets at Risk section of the main plan. A more in-depth look at the population of the City of Fresno, including the City's special needs populations, is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement).



HAZARD IDENTIFICATION AND SUMMARY

The City of Fresno's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Firebaugh (see **Table 6. City of Fresno - Hazard Summaries**). **Table 5. Risk Methodology** shows the methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Fresno.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
a hazard event? Are impacts localized or regional?	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Fresno - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Likely	Minor	Negligible	12 to 24 hours*	Less than 24 hours*	Low
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Unlikely	Catastrophic	Moderate	Less than 6 hours	Less than 24 hours	High
Drought	Possible	Limited	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Limited	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Possible	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Likely	Critical	Large	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Limited	Large	More than 24 hours	Less than 1 week	Medium*
Fog	Likely	Limited	Large	More than 24 hours	Less than 24 hours	Medium*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Low*
Soil Hazards						
Erosion	Highly Likely	Minor	Moderate	N/A	N/A	Low*
Expansive Soils	Possible	Minor	Negligible	N/A	N/A	Low
Land Subsidence	Possible	No Data	Limited	N/A	N/A	Low
Landslide	Likely	Limited	Small	12 to 24 hours*	Less than 6 hours	Low*
Volcano	Unlikely	Minor	Negligible	Less than 6 hours	More than 1 week	Low
Wildfire	Highly Likely	Critical	Small	12 to 24 hours*	More than 1 week*	Medium*

*Rated on an average basis. For example, warning time for agricultural hazards vary by the type of hazard (When under the Warning Time and Duration column).



**Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.*

Note: N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.



VULNERABILITY ASSESSMENT

The intent of this section is to assess Fresno's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Fresno - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Fresno's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table 6 reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

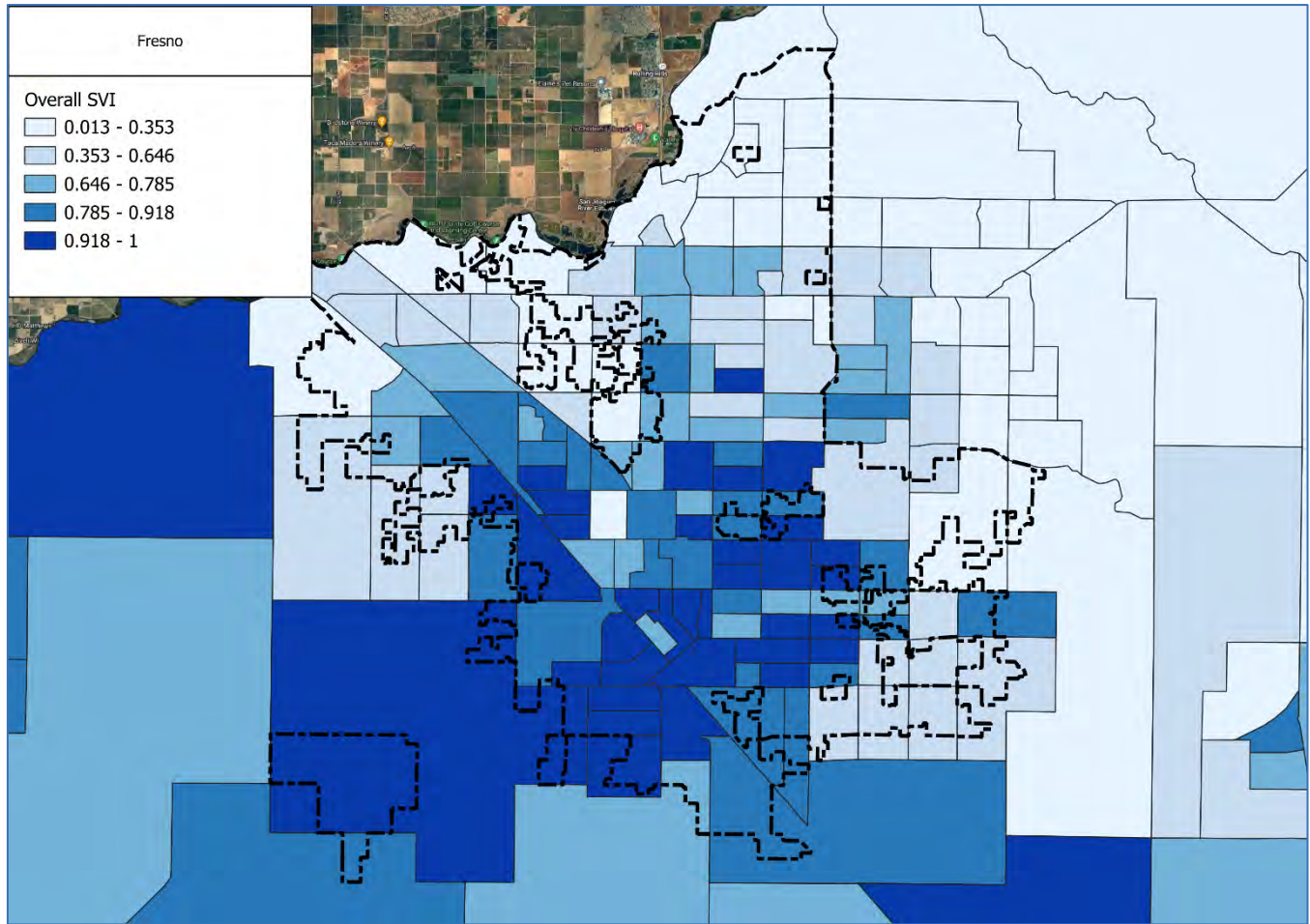
The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Fresno, census tracts with a higher SVI are clustered near the central and southern portion of the City, as shown in **Figure 4. City of Fresno Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.).³

³ CDC/ATSDR Social Vulnerability Index (SVI) | Place and Health | ATSDR

https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html

Figure 4. City of Fresno Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Fresno City Boundary



ASSETS AT RISK

This section considers Fresno's assets at risk, including values at risk; critical facilities and infrastructure; historic, cultural, and natural resources; economic assets; and growth and development trends.

Since the 2009 Plan, the City of Fresno has experienced notable increases in agricultural, commercial, and residential properties and property values at risk. Compared to improved values from the Fresno County Assessor's Office's 2007 Certified Roll Values, agricultural improved value has increased by 254.2 percent, commercial improved value has increased by 299.8 percent and total residential improved value has increased by 265.8 percent. Part of this dramatic increase in exposure of commercial and residential properties can be attributed to annexations of previously unincorporated County land that have occurred within the last decade.

CRITICAL FACILITIES AND INFRASTRUCTURE

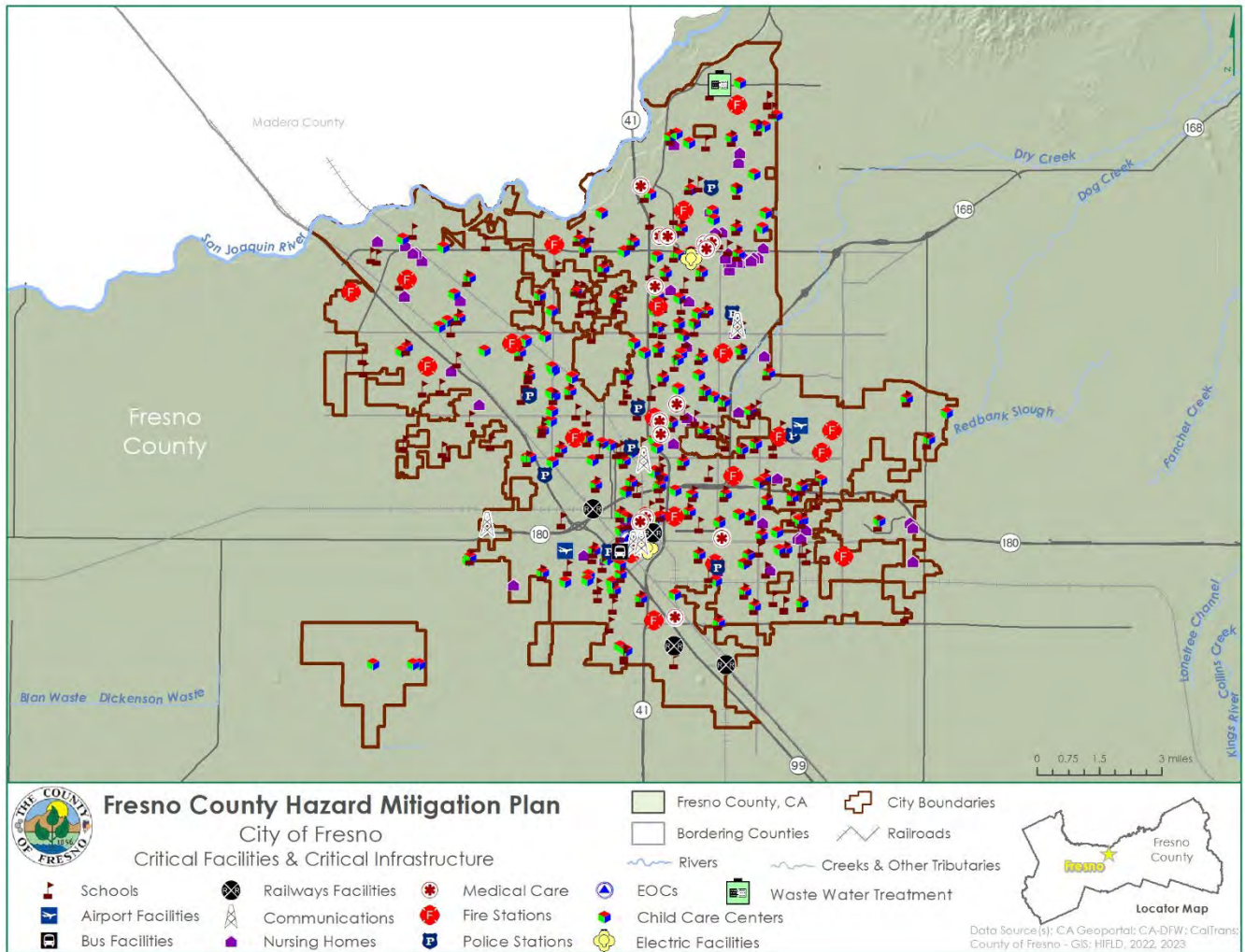
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Fresno from Fresno County GIS is provided in **Table 7. City of Fresno's Critical Facilities** and mapped in **Figure 5. City of Fresno Critical Facilities**.

Table 7. City of Fresno's Critical Facilities

Critical Facility Type	Count
Airport	2
Bus	1
CalARP	28
Colleges & Universities	8
Communications	29
Electric	5
EOC	1
Fire Station	27
Health Care	13
Police	11
Railway	7
School	190
Supplemental College	7
Wastewater	2
Total	331

Source: Fresno County

Figure 5. City of Fresno Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS, 2022, 2023



The list of specific critical facilities and community assets is maintained by the City of Fresno Police Department. The Fresno Urban Area Critical Infrastructure List is considered confidential and may be accessed through the Fresno Police Department Homeland Security Division.

HISTORIC, CULTURAL, AND NATURAL RESOURCES

HISTORIC AND CULTURAL SITES

The Cultural Resource Facility located on the California State University, Bakersfield campus maintains a database, maps, and descriptive surveys of prehistoric sites in the Fresno area. Details of the locations are kept confidential due to the risk of theft or vandalism of artifacts. The general location of these sites is along the San Joaquin River and its bluffs, where permanent Native American settlements were established near a permanent water supply and seasonal salmon fishery.

The City of Fresno maintains a local official register of historic resources (available from the historic preservation officer in the City's Planning and Development Department). There are approximately 284 properties on the register. Twenty-one of the properties were demolished or destroyed by fire after being placed on the list, and three other properties have been relocated to sites outside the City of Fresno. The local register includes 31 properties that are on the National Register of Historic Places (see **Table 8. City of Fresno's Properties on the National Register of Historic Places**).

Table 8. City of Fresno's Properties on the National Register of Historic Places

Property Name	Address	Date-Listed
Azteca Theater	836-840 F Street	4/05/2017
Bank of Italy	1015 Fulton Mall	10/29/1982
Ben Gefvert Rank Historic District	4770 W Whites Bridge Road	1/01/2011
Brix, H.H, Mansion	2844 Fresno Street	9/15/1983
Einstein House	1600 M Street	1/31/1978
Fig Garden Woman's Club	4550 N. Van Ness Blvd	7/18/1994
Forestiére Underground Gardens	5021 W. Shaw Avenue	10/28/1977
Fresno Bee Building	1555 Van Ness Avenue	11/1/1982
Fresno Brewing Company Office and Warehouse	100 M Street	1/5/1984
Fresno County Hall of Records	2281 Tulare Street	12/22/2011
Fresno Memorial Auditorium	2425 Fresno Street	5/10/1994
Fresno Republican Printery Building	2130 Kern Street	1/2/1979
Fresno Sanitary Landfill	West and Jensen Avenues	8/7/2010
Holy Trinity Armenian Apostolic Church	2226 Ventura Street	7/31/1986
Hotel California	851 Van Ness Avenue	4/21/2004
Kearney, M. Theo, Park and Mansion	7160 Kearney Boulevard	3/13/1975
Kindler, Paul, House	1520 E Olive Avenue	10/29/1982
Maulbridge Apartments	2344 Tulare Street	5/6/1982



Property Name	Address	Date-Listed
Meux House	1007 R Street	1/13/1975
Old Administration Building, Fresno City College	1101 University Avenue	5/1/1974
Old Fresno Water Tower	2444 Fresno Street	10/14/1971
Pantages, Alexander, Theater	1400 Fulton Street	2/23/1978
Physicians Building	2607 Fresno Street	11/20/1978
Rehorn House	1050 S Street	1/8/1982
Romain, Frank, House	2055 San Joaquin Street	1/11/1982
San Joaquin Light & Power Corporation Buildings	1401 Fulton Street	1/3/2006
Santa Fe Hotel	935 Santa Fe Avenue	3/14/1991
Santa Fe Passenger Depot	2650 Tulare Street	11/7/1976
Site of First Junior College in California	2500 Stanislaus Street	6/28/1965
Site of the Fresno Free Speech Fight of the Industrial Workers of the World	Mariposa and I Streets	7/19/1974
Southern Pacific Passenger Depot	1033 H Street	3/21/1978
Temporary Detention Camps for Japanese Americans-Fresno Assembly Center	1141 South Chance Avenue	5/13/1980
Tower Theatre	1201 N. Wishon Avenue	9/24/1992
Twining Laboratories	2527 Fresno Street	3/26/1991
Warehouse Row	722, 744, and 764 P Street	3/24/1978
YWCA Building	1660 M Street	9/21/1978

Source: National Register of Historic Places, www.nps.gov/nr/

Other historic resources in the City of Fresno include the following historic districts:

- The Porter Tract Historic District (45 homes)
- The Chandler Field/Fresno Municipal Airport Historic District (four historic structures)
- The Wilson Island Historic District (76 homes)
- The Huntington Boulevard Historic Districts (82 homes)

As comprehensive as the City's register may be, it does not include all properties in the City with potential historic or cultural significance. The list is continually being expanded as sites are discovered through routine analysis of proposed development areas and through proposed new listings of historic districts. The pool of potentially historic properties also changes through time, since federal law provides for a 50-year retrospective review, which now encompasses the post- World War II building boom era. Ten properties that were recommended for the City's register but were denied inclusion by the Fresno City Council are still recognized for their historic/cultural significance (heritage properties),



which is taken into account when any actions are undertaken on them pursuant to provisions of the California Environmental Quality Act. (Three of these properties have been since been demolished.)

While a detailed assessment of seismic and flood risks for the listed properties in Fresno is currently beyond the available staff resources of the City's Historic Preservation Office, it can be generally assumed that most of the structures have not been seismically reinforced and that their masonry is vulnerable to strong ground shaking.

While many of the structures are in Fresno's old downtown and were built when this area was largely within the 100-year floodplain of the Fresno Stream Group, efforts by the Fresno Metropolitan Flood Control District in conjunction with the U.S. Army Corps of Engineers and the City of Fresno have provided for flood detention structures and ponding basins that have greatly reduced the size and extent of the floodplain in the downtown, helping to preserve these historic resources.

NATURAL RESOURCE AREAS

San Joaquin River Corridor

While the City maintains many community and neighborhood parks, its natural resources are primarily along the San Joaquin River. Owing to the year-round presence of water, the river bottom and bluffs host the richest aquatic and riparian forest biota in the City. It is in this area where migratory waterfowl and federally and state-listed endangered wildlife are most likely be encountered. These species include the valley elderberry longhorn beetle, the giant garter snake, and the American bald eagle (recently recommended for delisting from the National Endangered Species list).

Over past decades, land in the river corridor has been purchased and aggregated by state agencies (Department of Fish and Game, San Joaquin River Conservancy), by nonprofit groups (San Joaquin River Parkway Trust, Fresno Sportsmen's Club), and by the City and County (the City's Woodward Park and Milburn Unit, the County's Lost Lake Park). The ultimate goal of the San Joaquin River Conservancy Plan is to fashion a regional parkway with continuity of wildlife corridors and to manage it for joint recreational, habitat conservation, and floodplain protection uses.

Due to its location, this natural resource area is flood-prone. In some areas, this risk has been increased due to removal of massive amounts of sand and gravel (from mining), which lowered the ground surface over past decades. While the native riparian plants and animals have largely evolved with coping mechanisms for periodic severe flooding, any developed recreation facilities would be at risk. The face of the bluff is also very vulnerable to wildfire because of its vegetative overgrowth and nearly vertical slopes. Fire prevention efforts are difficult here because the soils are too unstable for vegetative removal projects or for irrigation that would keep the plants well- watered.

Vernal Pool Areas

In the northerly parts of the City, outside the river corridor, certain clay soils have the capacity to form impermeable hardpans and layers that do not allow rapid percolation of rainwater. During the rainy season, shallow vernal pools form that are populated by a host of specialized plants and animals. Many species associated with vernal pools are federally and state-listed species (e.g., the California tiger salamander, various types of fairy shrimp crustaceans, orcutt grass, button celery species, meadowfoam, and owl clover). Vernal pools are also heavily utilized by nonlisted species, such as migratory waterfowl, rodents, furbearing predators, and raptors that prey on other animals.



Wildfire is not considered a major risk to these natural communities, because they evolved with dry season fires as a common occurrence (the plants have very resistant seeds and the crustaceans and amphibians go into protected parts of their life cycles such as deep dormancy). Human encroachment through agriculture and land development is the greatest risk to vernal pool areas. If the clay layers are disrupted by “deep ripping” plowing, water cannot accumulate on the surface and the pools will not form. If the land is subjected to year-round irrigation, specially adapted vernal pool species will be outcompeted by other species. Conversion of land to urban development with structures, paving, lawns, pets, and people will destroy vernal pool natural communities.

ECONOMIC ASSETS

The City of Fresno’s economic sector includes both private and public entities that have been compiled into clusters in order to identify key economic assets. These ten clusters, known as the Regional Job Initiative (RJI) clusters, are Advanced Manufacturing, Clean Energy, Construction, Food Processing, Healthcare, Info Processing (Call Centers, Logistics, and Distribution), Software Development, Tourism, and Water Technology. Among these clusters are major employers like Amazon, Fresno Unified School District, Foster Farms, and Community Medical Centers that both boost Fresno’s economic growth and provide employment opportunities.

If a disaster struck the City, it could have a severe impact on Fresno’s economic assets. Sectors of greatest concern include all the RJI clusters, but in particular Food Processing, which includes the agricultural industry, and Healthcare.

GROWTH AND DEVELOPMENT TRENDS

The City of Fresno is growing at a rapid pace. Its expansion from incorporation in 1885 to the present day (August 2017) is illustrated in **Figure 6. City of Fresno Annexation History**. Even more growth is anticipated in the years to come, based on current trends.

Table 9. City of Fresno's Change in Population and Housing Units, 2017-2022 shows how the City has grown in terms of population and number of housing units between 2017 and 2022 alone.

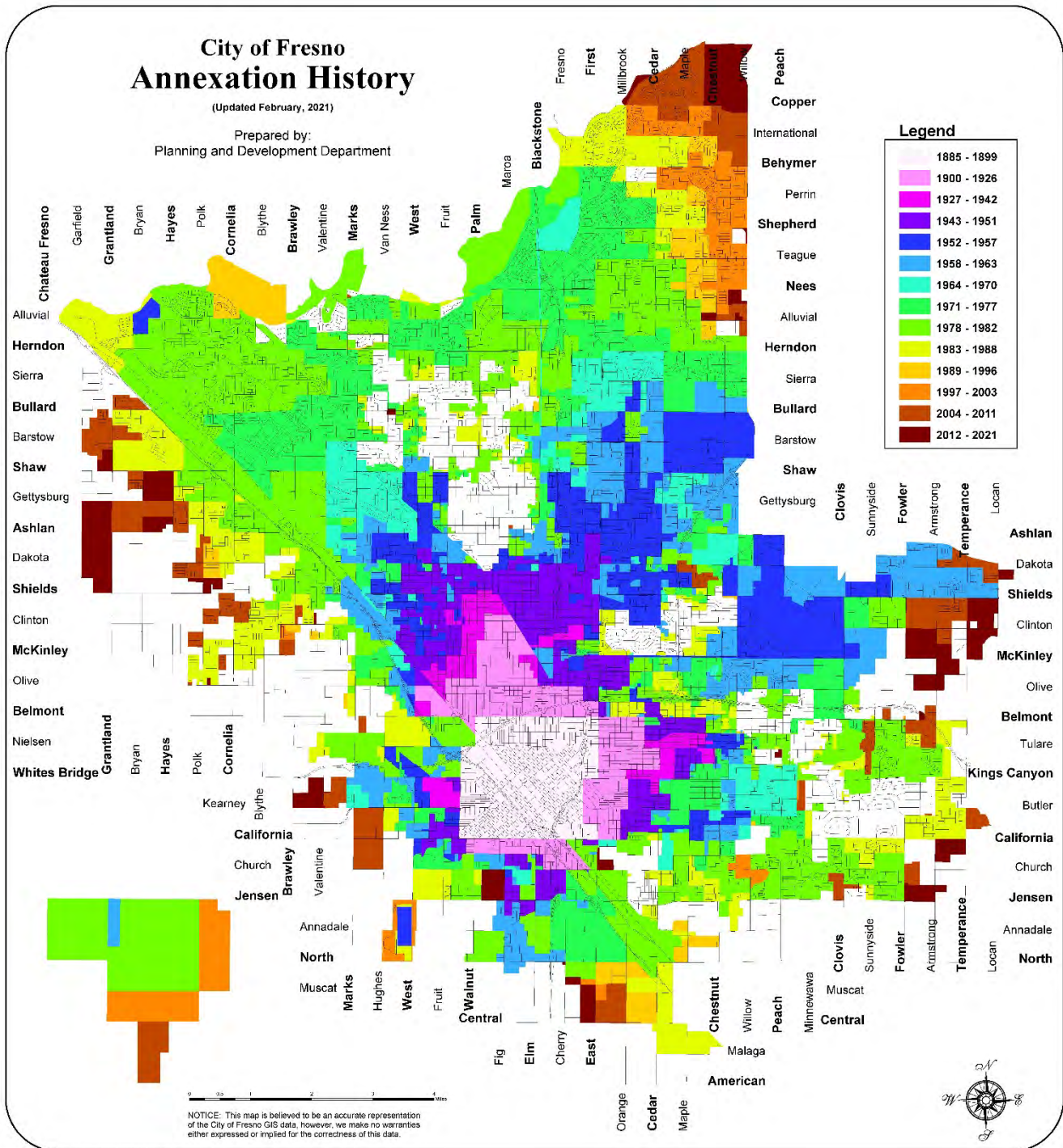
Table 9. City of Fresno's Change in Population and Housing Units, 2017-2022

2017 Population	2022 Population Estimate	Estimated Percent Change 2017-2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017-2022
527,422	545,564	+3.44%	180,495	192,007	+6.38%

Source: American Community Survey 5-Year Estimates 2017 and 2022



Figure 6. City of Fresno Annexation History



Source: City of Fresno Development Department.



By December 31, 2035 (the “Horizon” year of the most recent Fresno General Plan), it is estimated that 771,000 people will reside in the Fresno Metropolitan Area (which would include County islands and areas inside the City’s Sphere of Influence but not yet annexed). This figure of 771,000 would be 64 percent of the projected 2035 Fresno County population of 1,201,416 (State of California Department of Finance population projections).

Development had reached the natural and political northerly boundary of the City, the San Joaquin River, and began expanding to the west and southeast through conversion of rural residential and agricultural land. Within the Sphere of Influence, there continued to be “County islands” and partially urbanized fringe areas. An urban unification annexation program may reduce the numbers and sizes of these enclaves in the coming decade.

The Fresno General Plan made a concerted effort to revitalize the City’s downtown by balancing new growth areas to geographically recenter the downtown. With construction of a major sewer trunk along the Grantland Avenue alignment and proposed construction of new wastewater and water treatment plants in the southeastern area, the City’s future growth is expected to concentrate primarily to the west and southeast.

The Fresno Metropolitan Flood Control District (FMFCD) has commenced major flood control facility construction on Fancher Creek in the eastern portion of the City’s Sphere of Influence. Since the Fresno General Plan was completed in December 2014, the FMFCD will compile technical studies and update its master service plan in conjunction with the City’s land use plan for this new growth area.

The Fresno General Plan also directed that new development be more compact and that single-family residential densities be higher than the City’s traditional 4± dwelling units/acre pattern for subdivisions. The recently adopted Fulton Corridor Specific Plan and Downtown Neighborhoods Community Plan and other plan amendments and projects in process (and proposed in the future) feature smaller lots, multi-story housing, multi-family units, and reduced setbacks.

Unless the cost of manufactured housing units provides a substantial savings over site-built homes, it is not expected that the proportion of manufactured housing in the City of Fresno will greatly increase. It is possible that there will be some increase as producers of these units create models with appropriate roof pitches and other features to meet the City’s design review standards.

More information about the City of Fresno’s growth and current housing stock is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement). More general information on growth and development in Fresno County as a whole can be found in “Growth and Development Trends” in the Fresno County Vulnerability and Assets at Risk section of the main plan.

ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Figure 6. City of Fresno Annexation History shows Fresno’s exposure to hazards in terms of number and value of structures. Fresno County’s parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. No further information on vulnerable structures is available. Impacts of past



events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County).

AGRICULTURAL HAZARDS (LOW)

Agricultural hazards are ranked with a Low significance in the City of Fresno; lower than for the County overall (ranked High) because very little land in the City is used for agricultural purposes. Agricultural losses due to hazard events have greater economic impact on the small communities and rural areas of the County than on the City of Fresno. However, ornamental and garden plants in the City, and pets and incidental livestock kept within City limits, may become involved in any countywide responses to crop pests or infectious agents, because these urban plants and animals provide reservoirs for the diseases and crop pests that threaten the County's agriculture.

DAM FAILURE (HIGH)

The National Inventory of Dams lists five dams located in the City of Fresno, including the Redbank Creek Detention basin, Fancher Creek Detention, Friant Millerton Road Embankment A, Redbank, and Friant Dike 3.

DROUGHT (HIGH)

Annual rainfall in the City of Fresno is typically 12-14 inches. This makes the region vulnerable to episodic drought and to chronic drawdown of aquifer levels (the U.S. Environmental Protection Agency has designated the groundwater below Fresno as a sole source aquifer). Water in this aquifer has historically flowed through permeable strata from north and northeast toward the south and west, but the aquifer has been so affected by drawdown that a "cone of depression" has been created, reversing the historic flow directions (the "groundwater gradient") in portions of west and south Fresno.

In the last 10 years the City of Fresno has made strides to reduce dependence on groundwater by setting a course to implement water plans, which include the Urban Water Management Plan, Recycled Water Waster Plan, and the recently adopted Water Capital Program. A surface water treatment plant is currently under construction in Southeast Fresno and should be completed by 2018. When operational, the plant will maximize use of Fresno's surface water allocations during normal years and allow the City to reduce overuse of groundwater. Recycled water use will also grow in Fresno with the new recycled water mains now being constructed. The City has plans to use 25,000 acre-feet per year of recycled water for irrigating open spaces, parks, street medians and golf courses.

EARTHQUAKE (MEDIUM)

The seismic hazard in the City of Fresno is low relative to California coastal and mountain communities and is lower than in the Sierra and western areas of Fresno County. There are no known earthquake faults underlying Fresno, and the City has never been the epicenter of a known seismic event. However, Fresno is considered to have a moderate risk of earthquake damage due to the presence of major fault systems to the west, south, and east and due to Fresno's large population and number of



buildings, critical facilities, and infrastructure and other development that could be vulnerable to more severe ground shaking.

Historically, Fresno has sustained very little damage from major earthquakes occurring on California's major faults: the Owens Valley earthquake of 1872 toppled an unreinforced masonry (brick) church steeple. More recent major earthquakes in the past four decades (with epicenters near Coalinga and the Bay Area) have resulted in perceptible tall building swaying in Fresno, minor injuries (attributable to shelved items falling), and slight damage (e.g., minor cracked plaster, etc.). To date, no soil liquefaction has been observed in Fresno from any seismic event.

The most serious impacts of an earthquake in Fresno would probably arise from damage to large dams in the Sierra Nevada on the upper reaches of the San Joaquin River very close to active Long Valley Caldera-related faults. Should either of the two most easterly (and largest) dams in this area be severely damaged or breached, the resulting sequential dam failures could cause floodwaters to overtop Friant Dam northeast of the City. While the dam failure inundation map for Friant shows that most of the flooded area would be expected in the northwest part of town (where the confining river bluffs are not as high), there are some residences and important infrastructure in the river channel itself that would be inundated and gravely damaged (or destroyed), including highway bridges and the inlet of the Friant-Kern Canal, which supplies Bureau of Reclamation surface water to the Fresno area and to other communities in the southern San Joaquin Valley.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Fresno's population includes many residents who have limited access to health care, with causes related to low household income levels, lack of insurance coverage, a limited number of primary health care facilities and acute care beds, a low ratio of public health and medical professionals to population, and language barriers. Highly communicable diseases tend to affect a large percentage of the City, perhaps due to large household size and the mobility of the population. If a highly communicable disease outbreak occurred that caused serious or life-threatening illness for most infected persons, health care and other public service systems would experience disruption or breakdown and would require outside intervention with resources from other communities, the state, or the federal government. The recent COVID-19 pandemic caused high mortality and illness across the State of California and within Fresno. The Hazard Profile section in Chapter 4: Risk Assessment, details this event further.

EXTREME COLD/FREEZE (MEDIUM)

Freeze events occur occasionally in Fresno, but impacts are greater to the agriculture industry in the County than to the City. In January 2007, overnight minimum temperatures fell below freezing between January 6 and 10. The event led to a presidential disaster declaration due to the estimated \$710 million in agricultural damage in the Central and South Valley. The 2007 event occurred in another eight-year



interval after the devastating citrus freezes of 1998 and 1990. The event caused frozen pipes in Fresno but little other property damage. The City also has a plan for freezing temperature events and opens warming centers. These centers are primarily geared toward the homeless population.

EXTREME HEAT (MEDIUM)

Fresno uses a local version of the California State Plan for Extreme Heat. This plan was used during the extreme heat event during the summer of 2006 and worked well. The City operates cooling centers, which are primarily geared toward the homeless. Public notification for extreme heat events is conducted through the Public Affairs office in coordination with Fresno County.

EXPANSIVE SOILS (LOW)

These types of soils occur in northern Fresno in the far northeastern portions of its Sphere of Influence (in the “Copper River” area). Expansive clay soils can cause cavitation over time and require special construction standards for foundations.

FLOOD/LEVEE FAILURE (HIGH)

As noted in the preceding section, there is some flood risk to the City from San Joaquin River major dam failure inundation, but the more common flood risk, repetitively experienced in Fresno, is that of shallow “sheet” flooding from major precipitation events. Except for the San Joaquin River, streams in the Fresno-Clovis Metropolitan Area originate in the Sierra foothills to the east and extend into the valley floor west of State Route 99 by way of dual-use irrigation and storm runoff channels and disperse into numerous smaller irrigation canals. Overflow from these canals and urban stormwater from intense precipitation events is sent back to the San Joaquin River or to farmland southwest of Fresno via spillway channels.

In the City of Fresno, these canals and channels are under control of the Fresno Irrigation District, an independent public agency, but their use during storm events is shared by another independent district, the Fresno Metropolitan Flood Control District (FMFCD). The FMFCD was created to develop flood control facilities to prevent further repetitive losses created by the Fresno Stream Group and to provide an urban drainage network. This District is responsible for administering a Storm Drainage and Flood Control Master Plan. The City’s municipal code supports these efforts by including a Drainage Fee Ordinance to ensure that grading and development comply with the FMFCD’s Master Plan and standards and provide proportionate shares of storm drain and ponding basin infrastructure.

The City of Fresno’s Floodplain Ordinance further coordinates and supports FMFCD efforts. This ordinance and the Fresno General Plan Safety Element policies require conformance to FEMA floodplain management policies and to those of California’s Central Valley Flood Prevention Board (which regulates the designated floodway along the San Joaquin River channel). Still, in areas not completely developed to urban standards, areas where the urban drainage network is not yet completed, and in some County “island” areas (land within the City that the County has authority over), stormwater drainage facilities may not prevent localized shallow flooding during intense runoff events.

According to FEMA’s 2016 Flood Insurance Study (FIS), the following major canals and ditches run through the City:



- Central Canal flows southwest through the southeastern part of the City of Fresno.
- Dry Creek Canal begins at the confluence of Mill Ditch and Herndon Canal, just downstream of North Millbrook Avenue, and flows southwest through the southwestern portion of the City.
- Fancher Creek Canal flows southwest along the eastern corporate limits of the City of Fresno and joins Central Canal at the southeast corner of the City.
- Herndon Canal begins at the confluence of Mill Ditch and Dry Creek Canal. It flows west through the center of the City of Fresno, then flows northwest through the northwestern part of the City.
- Mill Ditch flows west along East McKinley Avenue to its confluence with Herndon and Dry Creek Canals.

The FIS details the City of Fresno's flood history as follows:

In February 1884, flood flows from streams of the Fresno-Clovis group inundated the business section of the City of Fresno. Frequent flooding was a problem in the City throughout 1880. Suburban areas of the City were flooded in spring 1920; the downtown area was inundated in 1923; flooding occurred in the Fig Garden area in 1936; and parts of the City, especially in the northeast section, were flooded in March 1938. Since the 1938 flood, which had an estimated discharge of 2,700 cubic feet per second (cfs) on Dry Creek at the Big Dry Creek Dam site, high flows occurred on that stream in December 1955 (3,800 cfs), January 1969 (5,700 cfs), and February 1969 (4,500 cfs). During December 1955, approximately 500 acres of agricultural and suburban land were flooded by overflow from irrigation canals, and damage, mostly to public facilities, totaled approximately \$50,000. The largest and most damaging flood period was January and February 1969, when the combined discharges of Dry, Dog, Redbank, Fancher, and Mud Creeks flooded an estimated 14,500 acres and caused almost \$4.7 million in damage. Most of the flooding was in the eastern and northeastern parts of the City. It occurred because many of the streams in the Fresno-Clovis group discharged floodwater into various irrigation canals, causing them to overflow.

Several flood events that have occurred in Fresno are detailed below.

- **1998 (El Niño rain event):** In 1998, Fresno County was hit by extensive rainfall over 33 days within a six-month period, causing widespread flooding and prompting local, state, and federal emergency declarations. Property and public facility damage totaled nearly half a million dollars, while the farming industry suffered a \$17 million loss, primarily impacting tree fruit and row crops. The community faced substantial economic impacts between \$38-48 million, and the agricultural workforce experienced significant unemployment and reduced work hours.
- **2005-2006:** Above average rainfall occurred between December 19, 2005, and January 1, 2006. This resulted in flooding of low-lying areas throughout the County. Flood control basins were overflowing in several areas, including the Cities of Fresno and Clovis. Property damage included damage to approximately 180 businesses and homes estimated at \$1.4 million within the unincorporated County. Damage to other jurisdictions was estimated at \$611,307. Damage to crops was minimal due to the time of year. Flooding further resulted in several road closures, which were one to two weeks in duration.

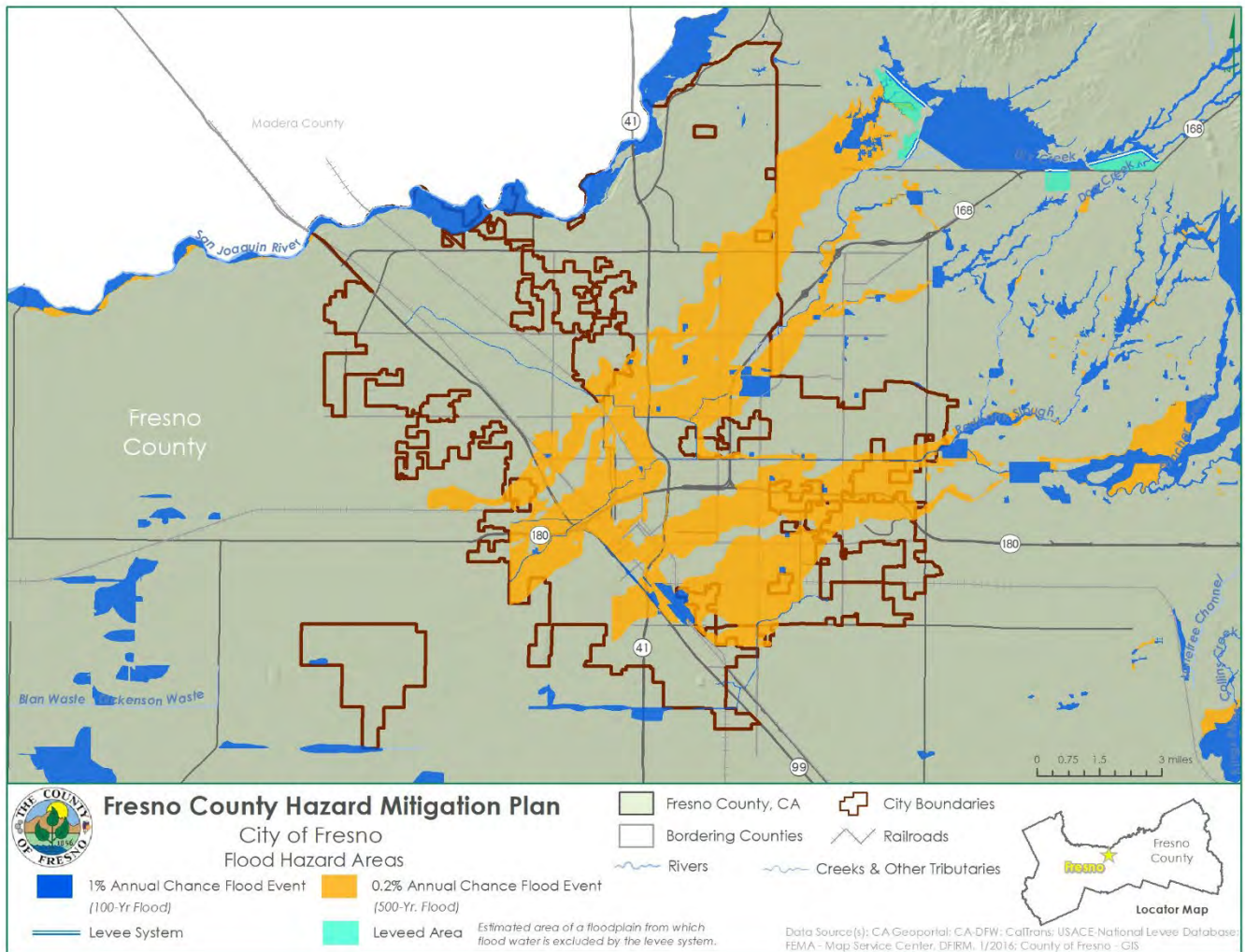


- **October 29, 2007:** Newspapers and broadcast meteorologists reported several roadways flooded in Northwest Fresno. Numerous vehicles were stranded, and water rescues occurred. Heavy rain caused a roof to collapse at an industrial plant on the northwest side of the city. Damage was estimated at 250,000 to the roof structure alone. Total property damage associated with the event amounted to over \$500,000.
- **December 2007:** Heavy rain and snowstorms ravaged central California, including the San Joaquin Valley and Fresno metropolitan area. The combination of locally heavy rains and poor drainage areas within the urban and suburban land lead to over \$175,000 in property damage between December 18th and 19th.
- **December 29, 2010:** On the morning of the 29th, heavy rain across the San Joaquin Valley caused widespread urban and poor drainage flooding. Especially hard hit were the metro areas of Fresno, Visalia, and Bakersfield, and the adjacent foothills. Fresno had a record rainfall of 0.92 inch on the 28th, breaking the old record of 0.72 inch, set in 2004. The two-day total at Fresno-Yosemite International Airport was 1.54 inch, which pushed the December rainfall to 5.92 inches for the second wettest December on record for Fresno; the wettest December was in 1955, with 6.73 inches. It was also the coldest low of the year for Fresno, with temperatures dropping below 32 degrees. Property damage amounted to \$125,000.
- **November 30, 2011:** Fresno set record high minimum temperatures on the last day of the month, establishing the total record for the sixth warmest November. This was also the fourth consecutive month that Fresno ranked in the top 10 warmest months. Fresno had a record rainfall on November 30th of 0.62 inch; the old record was 0.50 inch. As a result of the heavy rainfall, some rock and mud slides occurred as the moisture weakened the soil. Law enforcement reported a rock and mud slide on Highway 168 about 15 miles northeast of Clovis, which closed the road for several hours while authorities cleaned up the debris.
- **December 16, 2018:** A cold front that was associated with a moist upper trough pushed across central California on December 17. This system brought moderate to locally heavy rainfall from Fresno County northward the late evening of December through the morning of December 17 where several stations reported a half inch to an inch and a quarter of rainfall, and there were several reports of mainly nuisance flooding during this time. The precipitation mainly fell as snow above 6500 feet where several stations in the Southern Sierra Nevada north of Fresno County picked up between 3 and 6 inches of new snow. Further south the rainfall was less plentiful with most locations receiving between a few hundredths of an inch to a quarter of an inch of rain by the time the precipitation ended by early afternoon on December 17.

VALUES AT RISK

Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a flood map for the City of Fresno was created (see **Figure 7. City of Fresno Flood Hazard Areas**). **Table 10. City of Fresno's FEMA 1% Annual Chance Flood Hazard Property Type** and **Table 11. City of Fresno's FEMA 0.2% Annual Chance Flood Hazard by Property Type** summarize the values at risk in the City's 100-year and 500-year floodplain, respectively. These tables also detail loss estimates for each flood.

Figure 7. City of Fresno Flood Hazard Areas



Source: CA Geoportal; CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS



Table 10. City of Fresno's FEMA 1% Annual Chance Flood Hazard Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Agriculture	7	\$2,946,135	\$5,728,367	\$8,674,502	\$2,168,625.50
Apartments	105	\$164,861,445	\$31,921,659	\$196,783,104	\$49,195,776.00
Commercial	17	\$2,728,412	\$1,698,214	\$4,701,726	\$1,175,431.50
Condominium	9	\$2,946,834	\$1,001,664	\$3,948,498	\$987,124.50
Industrial	74	\$253,466,476	\$91,341,641	\$347,777,017	\$86,944,254.25
Mobile/Manufactured Home	1	\$2,562,515	\$2,959,024	\$5,521,539	\$1,380,384.75
Office/Professional Space	1	\$300,900	\$81,600	\$382,500	\$95,625.00
Primary Use Not Designated	80	\$0	\$0	\$0	\$0.00
Recreation	1	\$164,951	\$176,735	\$341,686	\$85,421.50
Single-Family Residence	187	\$30,890,879	\$12,724,102	\$43,624,981	\$10,906,245.25
Vacant	34	\$1,040	\$6,284,806	\$6,285,846	\$1,571,461.50
Unknown	1,004				
Total	1,520	\$460,869,587	\$153,917,812	\$618,041,399	\$154,510,349.75

Source: Fresno County Parcel and Assessor Data; 2009 FIRM

Table 11. City of Fresno's FEMA 0.2% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Agriculture	32	\$5,495,613	\$10,676,537	\$16,172,150	\$4,043,037.50
Apartments	3,113	\$11,491,883,444	\$2,307,538,758	\$13,799,422,202	\$3,449,855,550
Church	36	\$26,935,989	\$3,602,572	\$30,755,561	\$7,688,890.25
Commercial	1,003	\$4,370,582,940	\$958,255,679	\$5,361,476,269	\$1,340,369,067
Communications	1	\$0	\$3,458	\$3,458	\$864.50
Condominium	14	\$34,466,814	\$6,779,664	\$41,246,478	\$10,311,619.50
Group Housing/Lodging	25	\$71,850,485	\$15,170,699	\$87,700,784	\$21,925,196.00
Hospital	16	\$341,363,536	\$17,708,710	\$359,072,246	\$89,768,061.50
Industrial	159	\$152,095,940	\$35,261,197	\$190,612,677	\$47,653,169.25
Mobile/Manufactured Home	2	\$2,701,780	\$4,529,389	\$7,231,169	\$1,807,792.25
Office/Professional Space	361	\$795,090,433	\$241,409,256	\$1,039,367,489	\$259,841,872.25
Outlot & Common Area	1	\$9	\$14	\$23	\$5.75



Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Primary Use Not Designated	164	\$0	\$0	\$0	\$0.00
Recreation	1	\$2,147,372	\$418,318	\$2,565,690	\$641,422.50
School	8	\$9,884,350	\$2,386,174	\$12,309,124	\$3,077,281.00
Single-Family Residence	5,390	\$673,165,551	\$240,945,384	\$914,127,235	\$228,531,808.75
Vacant	359	\$949,614	\$45,393,715	\$46,471,529	\$11,617,882.25
Total	10,685	\$17,978,613,870	\$3,890,079,524	\$21,908,534,084	\$5,477,133,521

Source: Fresno County Parcel and Assessor data; FEMA 2009 FIRM

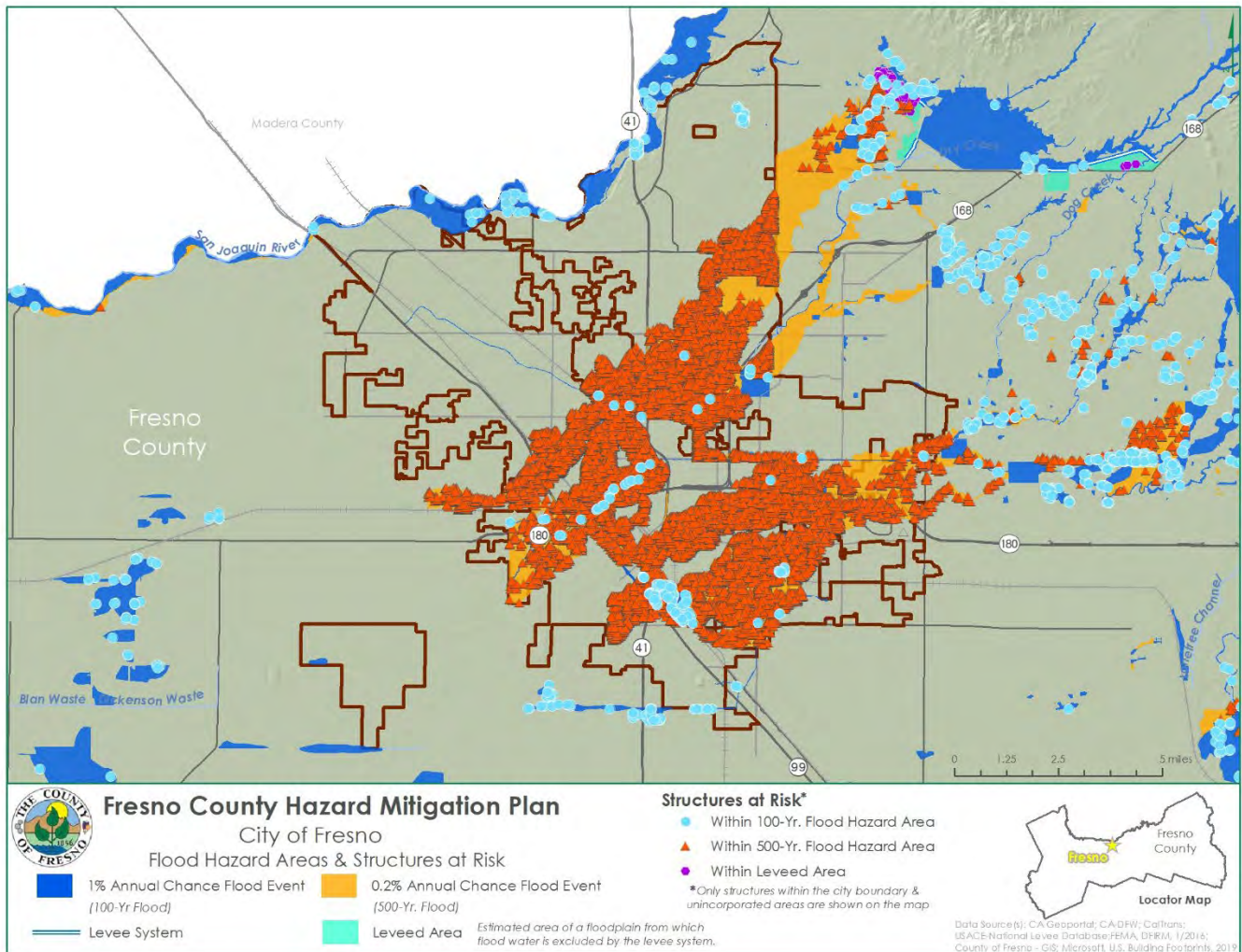
Based on this analysis, the City of Fresno has significant assets at risk to the 100-year and greater floods. There are 1,520 parcels within the 100-year floodplain for a total value of roughly \$618 million, including building and content value. An additional 10,685 parcels valued at roughly \$21.9 billion fall within the 500-year floodplain.

Applying the 25 percent damage factor, there is a 1 percent chance in any given year of a 100-year flood causing roughly \$154 million in damage in the City of Fresno and a 0.2 percent chance in any given year of a 500-year flood causing roughly \$5.48 billion in damage (combined damage from both floods).

Properties at risk to flooding are shown in relation to the mapped floodplains in **Figure 8. City of Fresno Flood Hazard Area Buildings at Risk.**

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Figure 8. City of Fresno Flood Hazard Area Buildings at Risk



Source: CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database, FEMA, DFIRM, 1/2016; County of Fresno – GIS, Microsoft, U.S. Building Footprints, 2019



In addition to the 100-year and 500-year floodplains mapped by FEMA, the California Department of Water Resources maintains Best Available Maps (BAM) which include the floodplains in the Sacramento and San Joaquin River Basins, based on a study performed in 2002 by the U.S. Army Corps of Engineers (USACE). Though limited to the San Joaquin River as a flood source and thus not as comprehensive as the FEMA FIRM, the USACE study shows additional differentiation in flood risk by modeling the 200-year floodplain (the flood with a 0.5 percent annual chance of occurring).

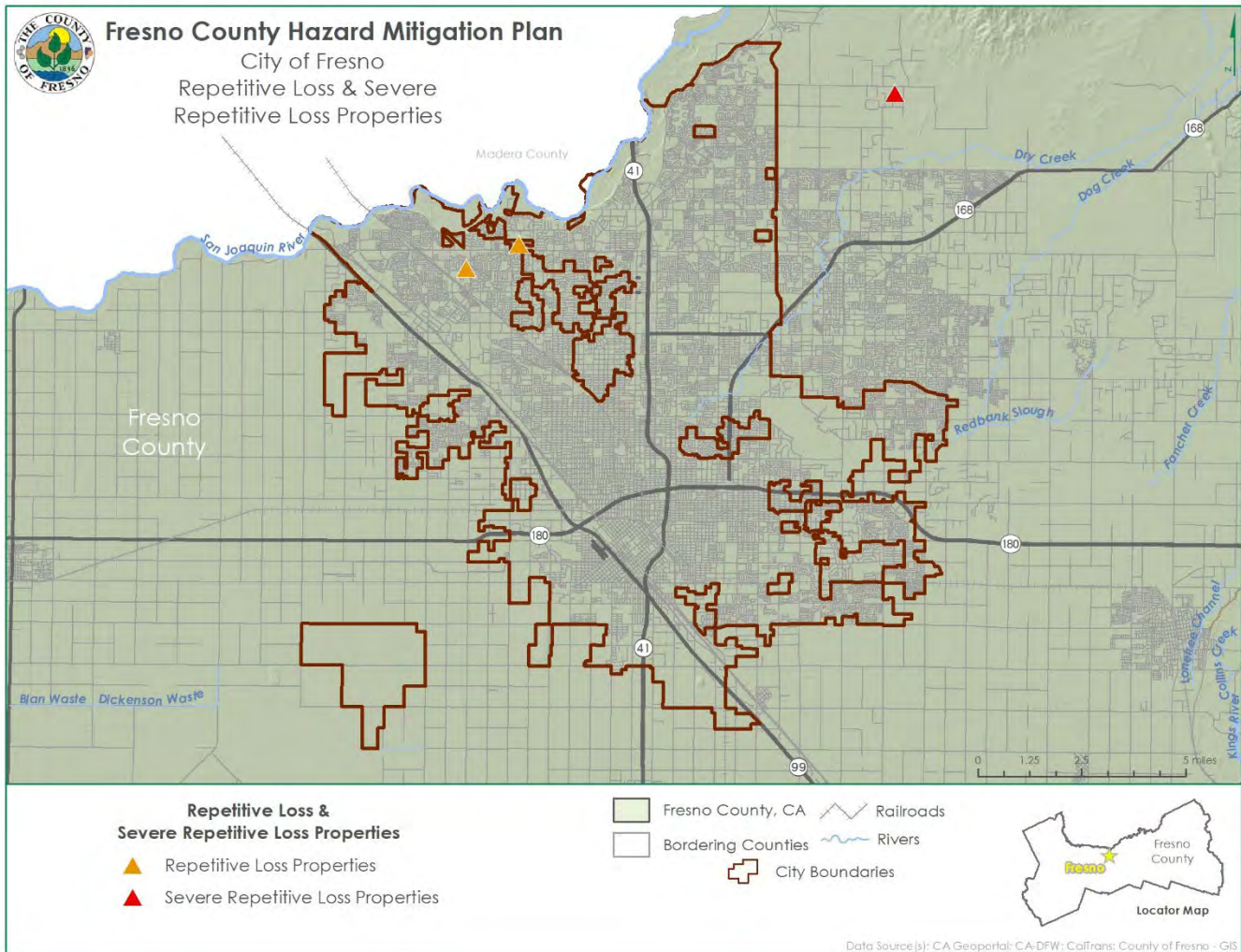
INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. In addition to providing insurance for properties at risk of flooding, the program collects and publishes statistics on flood-related losses in participating jurisdictions.

NFIP insurance data for the City of Fresno indicates that as of March 19, 2024, there were 182 flood insurance policies in force in the City with \$126,073 in total premium or total paid. This coverage represents a decline of nearly 200 policies over the last decade. **Figure 10. Fresno County Flood Insurance Claims** displays where the flood claims were submitted across the City of Fresno.

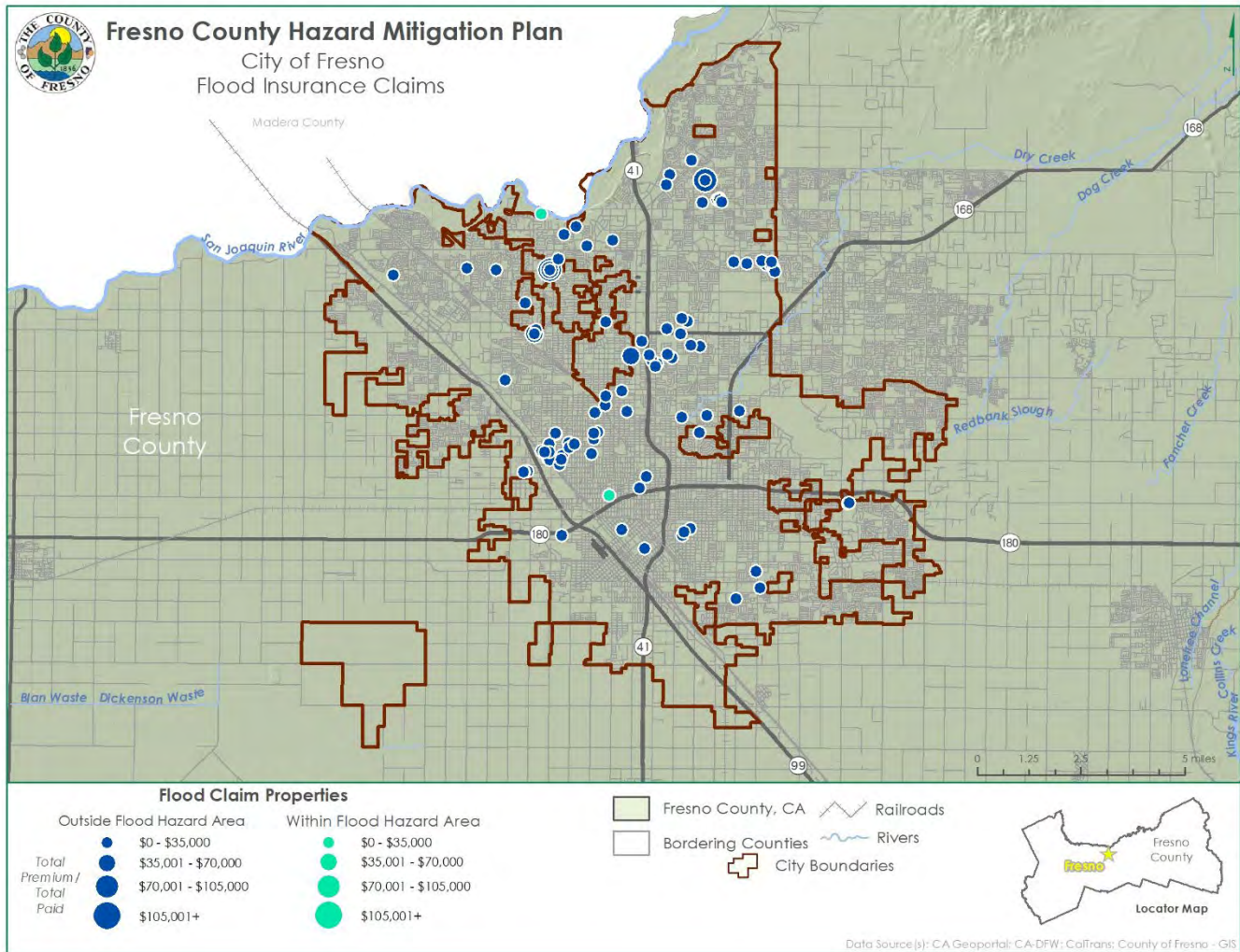
Additionally, the repetitive loss properties located in the City of Fresno are displayed in **Figure 9. City of Fresno Repetitive Loss and Severe Repetitive Loss Properties**.

Figure 9. City of Fresno Repetitive Loss and Severe Repetitive Loss Properties



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS

Figure 10. Fresno County Flood Insurance Claims



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno - GIS



There have been 148 historical claims for flood losses totaling \$931,867.10; According to the FEMA Community Information System accessed March 19, 2024, there are two repetitive loss properties within the City of Fresno, shown in **Figure 9. City of Fresno Repetitive Loss and Severe Repetitive Loss Properties**. The repetitive loss properties are single family homes.



POPULATION AT RISK

Using census tract population values from the 2020 US Census, the planning team estimates that the following are at risk to flooding in the City of Fresno:

- 100-year flood—114,159 people
- 500-year flood— 79,527 people
- Total flood—193,686 people

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.⁴

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. **Table 12. Critical Facilities in the 100- and 500-Year Floodplains: City of Fresno** lists the critical facilities in the City's 100- and 500-year floodplains.

Table 12. Critical Facilities in the 100- and 500-Year Floodplains: City of Fresno

Critical Facility Type	100-Year Floodplain	500-Year Floodplain
Airport Facilities	-	1
Bus Facilities	-	1
Communications	-	4
Electric Power Facilities	-	1
EOC	-	1
Fire Stations	-	6
Medical Care Facilities	-	4
Police Stations	-	5
Railway Facilities	-	1
Schools	-	66
Total	0	90

Source: Fresno County, HIFLD 2017

⁴ Ermagun, A., Smith, V. & Janatabadi, F. High urban flood risk and no shelter access disproportionately impacts vulnerable communities in the USA. *Commun Earth Environ* 5, 2 (2024). <https://doi.org/10.1038/s43247-023-01165-x>
 2024 Fresno County Hazard Mitigation Plan
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HAZARDOUS MATERIALS INCIDENT (HIGH)

The following are the primary concerns for the City of Fresno related to hazardous materials release:

- Train derailments
- Kinder-Morgan pipeline
- Chevron petroleum pipelines
- Storage facilities

There have been 141 hazardous materials incidents from 2017-2022 that have occurred in the City of Fresno. Of the 141 incidents, there were 77 railroad non-release, 1 aircraft, 38 fixed, 8 mobile, 3 pipeline, 3 railroad, 10 storage tank, and 1 unknown sheen incident. There were 34 injuries, 24 hospitalizations, \$350,000 in damages, 31 fatalities, and 395 evacuees during the time period.⁵ There are 28 CalARP hazardous materials facilities located in the City of Fresno.

SEVERE WEATHER: HEAVY RAIN/THUNDERSTORM/HAIL/LIGHTNING/WIND (MEDIUM)

Fresno's prevailing winds are typically light and from the northwest. High wind conditions are occasionally created by strong weather fronts. Occasionally, there are funnel clouds of low intensity. Past structural damage has been light, infrequent, and very limited in geographic extent. Injuries have been extremely rare. Most of this damage has occurred secondary to large trees being blown over. The City's design wind load, the level of wind force that new structures are required to be engineered to withstand, is 70 mph.

SOIL HAZARDS: LAND SUBSIDENCE (LOW)

Despite long-term over-drafting of groundwater that has lowered the static water table under Fresno by as much as 100 feet over the past century, ground level subsidence has not been noted in the vicinity of the City (this is probably due to the geologic strata underlying the City, which features layers of clay and hardpan interleaved with sand and gravel layers).

WILDFIRE (MEDIUM)

Similar to many areas of the County, Fresno has high temperatures in the summer with low rainfall creating fire hazard conditions. There is some wildfire risk in the San Joaquin River Bluff area North of Fresno due to vegetation and steep slopes. However, the Wildfire Hazard Severity Zone outside of jurisdictional boundaries, shown in **Figure 10. City of Fresno Wildfire Hazard Severity Zone**. In this recent 2024 update, the City noted during the planning process that wildfires pose a higher risk which is why the risk has increased from medium to high. There have been no known significant fires that have

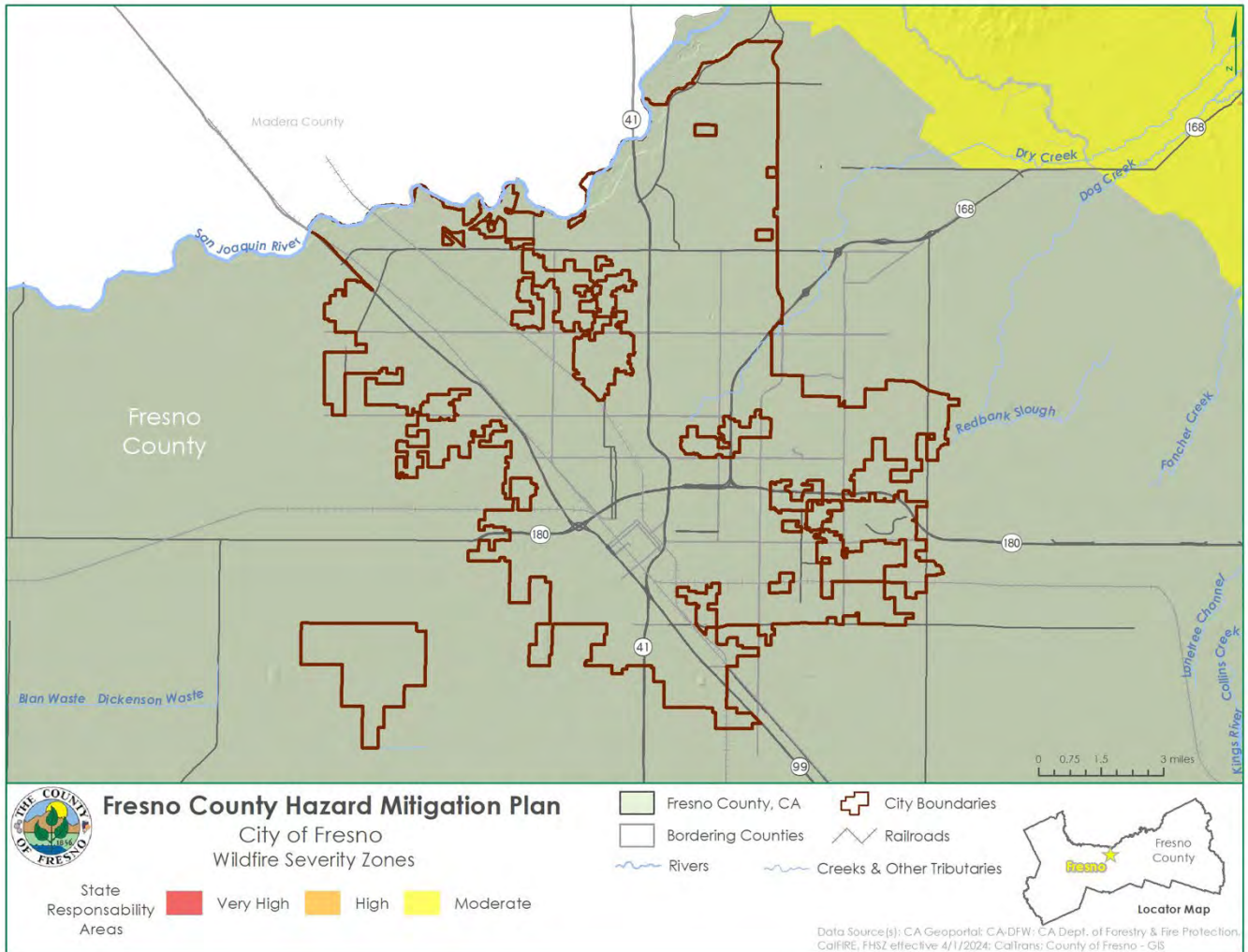
⁵ California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>
2024 Fresno County Hazard Mitigation Plan
May 2024



occurred in the past several years. Additionally, there are not any critical facilities in wildfire threat zones in the City of Fresno.



Figure 10. City of Fresno Wildfire Hazard Severity Zone



Source: CA Geoportal; CA-DFW; CA Department of Forestry and Fire Protection, CalFIRE ArcGIS Online Portal; CalTrans; County of Fresno - GIS



CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Fresno's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 13. City of Fresno Mitigation Capability Summary**.

Table 13. City of Fresno Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Fiscal Capability			X
Available Staff			X
Political Support/Interest			X
Community Support			X

REGULATORY MITIGATION CAPABILITIES

Table 14. City of Fresno's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Fresno.



Table 14. City of Fresno's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	NO	
Building Codes (please indicate UCC or IBC + year)	X					
Community Emergency Response Team (CERT)	X					
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X		X		Expected completion in 2026
Fire Code	X					
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance		X				
Land Use/Development Planning	X					
National Flood Insurance Program (NFIP)	X					
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready	X					
Stormwater Management Plan/Ordinance	X					
Subdivision Regulations/Ordinance	X					
Two Weeks Ready						
Unified Development Ordinance		X				
Zoning Ordinance	X					

FRESNO GENERAL PLAN (ADOPTED DECEMBER 18, 2014)

The Fresno General Plan is forward-looking, comprehensive, and long-range. It supports the community's vision to preserve the desirable qualities that make the City of Fresno an ideal place to live, work, and play. The Plan recommends strategies to address prevalent existing conditions and



trends that impede achieving and maintaining greater human, community, environmental, and economic health and prosperity. The Plan envisions Fresno as a vibrant, growing city, infused with a sense of heritage and community. The primary purpose of a general plan is to outline a long-range vision for the physical development of the city that reflects the aspirations of the community. Since economic, social, transportation, environmental, public facilities and services, and other outcomes are interrelated with land use and development and are important to the community, the Plan includes applicable policies related to these complementary areas as well. The Plan presents a blueprint to guide economic development initiatives, as well as needed investments in improvements to increase competitiveness and promote economic growth. The general plan includes nine state mandated elements including land use, circulation, housing, conservation, noise, open space, safety, air quality and environmental justice. Relevant elements and information to the hazard mitigation plan are outlined below.

- **Goal 9:** Promote a city of healthy communities and improve quality of life in established neighborhoods.
 - Emphasize supporting established neighborhoods in Fresno with safe, well maintained, and accessible streets, public utilities, education and job training, proximity to jobs, retail services, health care, affordable housing, youth development opportunities, open space and parks, transportation options, and opportunities for home grown businesses.
- **Goal 12:** Resolve existing public infrastructure and service deficiencies, make full use of existing infrastructure, and invest in improvements to increase competitiveness and promote economic growth.
 - Emphasize the fair and necessary costs of maintaining sustainable water, sewer, streets, and other public infrastructure and service systems in rates, fees, financing and public investments to implement the General Plan. Adequately address accumulated deferred maintenance, aging infrastructure, risks to service continuity, desired standards of service to meet quality-of-life goals, and required infrastructure to support growth, economic competitiveness and business development.
- **Goal 16:** Protect and improve public health and safety.

Some of the elements of the General Plan also contain objectives and policies relevant to protecting human health and safety (e.g., supporting objectives and policies in the Public Utilities and Services Element direct that amendments to construction and fire codes to reduce the level of risk to life and property from fire commensurate with the City's fire suppression capabilities and that fire and police services be provided). Because the Noise and Safety Element is the portion of the General Plan most relevant to hazard mitigation, select objectives and policies are extracted and included below.

THE NOISE AND SAFETY ELEMENT

The Noise and Safety Element seeks to reduce deaths, injuries, illnesses, damage to property, and economic and social dislocation that could result from hazards. Of specific relevance to this plan, it addresses seismic and geologic conditions, flooding, hazardous materials, and emergency response.



Seismic and Geologic Hazards

Table 15. Seismic and Geologic Hazards Policies

Policy Number	Policy Description
NS-2	Objective: Minimize risks of property damage and personal injury posed by geologic and seismic risks.
NS-2a	Seismic Protection. Ensure seismic protection is incorporated into new and existing construction, consistent with the Fresno Municipal Code.
NS-2b	Soil Analysis Requirement. Identify areas with potential geologic and/or soils hazards, and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.
NS-2c	Landfill Areas. Require proposed land uses on or near landfill areas to be designed and maintained to comply with California Code of Regulations, Title 27, Section 21190, Post Closure Land Use.
NS-2d	<p>Bluff Preservation Overlay Zone. Per the requirements of the Bluff Preservation Overlay Zone District and Policy POSS-7-f (Chapter 5, Parks and Open Space), the following standards shall be applicable for property located within the Bluff Preservation zone:</p> <ul style="list-style-type: none"> Require proposed development within 300 feet of the toe of the San Joaquin River bluffs to undertake an engineering soils investigation and evaluation report that demonstrates that the site is sufficiently stable to support the proposed development, or provide mitigations to provide sufficient stability; and Establish a minimum setback of 30 feet from the San Joaquin River bluff edge for all buildings, structures, decks, pools and spas (which may be above or below grade), fencing, lighting, steps, etc. <ul style="list-style-type: none"> An applicant may request to reduce the minimum setback to 20 feet from the bluff edge if it can be demonstrated, to the satisfaction of the City's Building Official and the Planning Director, that the proposed building, structure, deck, pool and/or spas (which may be above or below grade), fencing, steps, etc., will meet the objectives of the Bluff Preservation Overlay Ordinance. In no case shall the setback be reduced to less than 20 feet.

Flooding Hazards

Table 16. Flooding Hazards Policies

Policy Number	Policy Description
NS-3	Objective: Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.
NS-3a	Stormwater Drainage and Flood Control Master Plan. Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.
NS-3b	Curb and Gutter Installation. Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.
NS-3c	<p>Dual Use Facilities. Support multiple uses of flood control and drainage facilities as follows:</p> <ul style="list-style-type: none"> Use, wherever practical, FMFCD facilities for groundwater management and recharge; and



Policy Number	Policy Description
	<ul style="list-style-type: none"> Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.
NS-3d	Landscaped Buffer. City will support the development of FMFCD ponding basins including the landscaping and irrigation for the top one third of the side sloped areas consistent with the FMFCD Basin Design Criteria.
NS-3e	Pollutants. Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.
NS-3f	Flooding Emergency Response Plans. Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency response plans for designated flood-prone areas, including the San Joaquin river bottom.
NS-3g	Essential Facilities Siting Outside of Floodplains. Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.
NS-3h	Runoff Controls. Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed the capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or flood-proofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.
NS-3i	<p>New Development Must Mitigate Impact. Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project.</p> <p>Commentary: The City recognizes the expertise and significant role of the FMFCD, and will give the highest deference to its recommendations for mitigation measures, consistent with applicable law.</p>
NS-3j	National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements. Review NFIP maps periodically to determine if areas subject to flooding have been added or removed and make adjustments to the Land Use Diagram Figure LU-1.
NS-3k	100-Year Floodplain Policy. Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.
NS-3l	200-Year Floodplain Protection. Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin river bottom.
NS-3m	Flood Risk Public Awareness. Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.
NS-3n	Precipitation Changes. Work with FMFCD to evaluate the planned and existing stormwater conveyance system in light of possible changes to precipitation patterns in the future.



Hazardous Materials

Table 17. Hazardous Materials Policies

Policy Number	Policy Description
NS-4	Minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.
NS-4a	Processing and Storage. Require safe processing and storage of hazardous materials, consistent with the California Building Code and the Uniform Fire Code, as adopted by the City.
NS-4b	Coordination. Maintain a close liaison with the Fresno County Environmental Health Department, Cal-EPA Division of Toxics, and the State Office of Emergency Services to assist in developing and maintaining hazardous material business plans, inventory statements, risk management prevention plans, and contingency/emergency response action plans.
NS-4c	Soil and Groundwater Contamination Reports. Require an investigation of potential soil or groundwater contamination whenever justified by past site uses. Require appropriate mitigation as a condition of project approval in the event soil or groundwater contamination is identified or could be encountered during site development.
NS-4d	Site Identification. Continue to aid federal, State, and County agencies in the identification and mapping of waste disposal sites (including abandoned waste sites), and to assist in the survey of the kinds, amounts, and locations of hazardous wastes.
NS-4e	Compliance with County Program. Require that the production, use, storage, disposal, and transport of hazardous materials conform to the standards and procedures established by the County Division of Environmental Health. Require compliance with the County's Hazardous Waste Generator Program, including the submittal and implementation of a Hazardous Materials Business Plan, when applicable.
NS-4f	Hazardous Materials Facilities. Require facilities that handle hazardous materials or hazardous wastes to be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.
NS-4g	Hazmat Response. Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.
NS-4g	Hazmat Response. Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.
NS-4h	Household Collection. Continue to support and assist with Fresno County's special household hazardous waste collection activities, to reduce the amount of this material being improperly discarded.
NS-4i	Public Information. Continue to assist in providing information to the public on hazardous materials.

Emergency Response

Table 18. Emergency Response Policies

Policy Number	Policy Description
NS-6	Objective: Foster an efficient and coordinated response to emergencies and natural disasters.
NS-6a	County Multi-Jurisdiction Hazard Mitigation Plan. Adopt and implement the Fresno County Multi-Jurisdiction Hazard Mitigation Plan and City of Fresno Local Hazard Mitigation Plan Annex.



Policy Number	Policy Description
	Commentary: The federal Disaster Mitigation Act of 2000 requires that cities, counties, and special districts have a Local Hazard Mitigation Plan to be eligible to receive FEMA hazard mitigation funds. Cities and counties can adopt and use all or part of a regional multi-jurisdictional plan, such as the one prepared by Fresno County, in lieu of preparing all or part of a Local Hazard Mitigation Plan.
NS-6b	Disaster Response Coordination. Maintain coordination with other local, State, and Federal agencies to provide coordinated disaster response.
NS-6c	Emergency Operations Plan. Update the City's Emergency Operations Plan periodically, using a whole community approach which integrates considerations for People with access and functional needs in all aspects of planning.
NS-6d	Evacuation Planning. Maintain an emergency evacuation plan in consultation with the Police and Fire Departments and other emergency service providers, which shows potential evacuation routes and a list of emergency shelters to be used in case of catastrophic emergencies. Commentary: The evacuation plan will be flexible in order to consider many scenarios and multiple modes of transportation beyond private automobiles. It will provide special provisions for disadvantaged populations, such as those with physical disabilities or those with low or very low incomes, and for areas with fewer resources through neighborhood emergency preparedness programs.
NS-6e	Critical Use Facilities. Ensure critical use facilities (e.g. City Hall, police and fire stations, schools, hospitals, public assembly facilities, transportation services) and other structures that are important to protecting health and safety in the community remain operational during an emergency. <ul style="list-style-type: none"> • Site and design these facilities to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, and explosions. • Work with the owners and operators of critical use facilities to ensure they can provide alternate sources of electricity, water, and sewerage in the event that regular utilities are interrupted in a disaster.
NS-6f	Emergency Vehicle Access. Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.
NS-6g	Emergency Preparedness Public Awareness Programs. Continue to conduct programs to inform the general public, including people with access and functional needs, of the City's emergency preparedness and disaster response procedures.

FRESNO FLOODPLAIN ORDINANCE

The City of Fresno's Flood Plain Ordinance was revised in the late 1990s and formally adopted by the Fresno City Council on September 20, 2005. (In late 2007, the Fresno Municipal Code was republished with its chapters somewhat reorganized. There was no change in the text of the Flood Plain Ordinance at that time, but due to the reorganization of its content, its most recent adoption effective date is January 17, 2008.) The Fresno Flood Plain Ordinance is Article 6 of Chapter 11 of the Fresno Municipal Code.

The purpose of this ordinance is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;



- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard;
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage;
- Ensure that potential buyers are notified that property is in an area of flood hazard; and
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, the ordinance includes the following methods and provisions:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction
- Control filling, grading, dredging, and other development which may increase flood damage
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood water or which may increase flood hazards in other areas
- Control the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters

This ordinance applies to all areas of special flood hazards within the jurisdiction of the City as identified by FEMA's Flood Insurance Study for Fresno County, California and incorporated areas dated September 30, 2005, with accompanying Flood Insurance Rate Maps, and all subsequent amendments and/or revisions. It appoints the building official to administer, implement, and enforce the ordinance by granting or denying development permits in accord with its provisions.

This ordinance includes the following standards of construction related to special flood hazard areas:

- Anchoring
- Construction materials and methods
- Elevation and floodproofing
- Residential construction
- Nonresidential construction
- Flood venting



- Standards for utilities
- Standards for subdivisions
- Standards for manufactured homes
- Standards for recreational vehicles
- Floodways
- Standards for storage of materials and equipment

In conjunction with Fresno's Drainage Fee Ordinance (Fresno Municipal Code Chapter 12, Article 19), which requires local grading and development to conform to the Fresno Metropolitan Flood Control District Master Drainage Plan and to provide proportionate shares of drainage infrastructure, the Fresno Flood Plain Ordinance and its preceding Flood Damage Prevention Ordinance have reduced flood damage losses in the City.

NATIONAL FLOOD INSURANCE PROGRAM/COMMUNITY RATING SYSTEM

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. It has been a member of the Community Rating System (CRS) since October 1, 1992. The City's Floodplain Administrator duties are assigned to the building official. The Building and Safety Division of the Planning and Development Department works to improve the City's CRS rating, which determines the price paid for flood insurance policies issued in the jurisdiction. The rating is based on detailed biannual audits conducted by FEMA and/or a designee agency (currently, the California Department of Water Resources). The primary means of improving and maintaining a good CRS rating is through administration of the Fresno Flood Plain Ordinance. As part of its efforts to improve its community rating, the City of Fresno has hosted periodic FEMA Region IX NFIP/CRS training.

According to the FEMA Community Status Book Report, accessed on March 27, 2024, the City's current CRS rating is Class 8, which includes a 10 percent SFHA discount and 0.05 percent Non-SFHA discount.

SAN JOAQUIN RIVER BLUFF PRESERVATION ORDINANCE, 1980

After an interagency San Joaquin River Reconnaissance Plan was completed in the late 1970s, the City of Fresno adopted the San Joaquin River Bluff Specific Plan to preserve this important open space and habitat feature and to safeguard the bluff face, which is the most unstable geologic feature in the City. The San Joaquin River Bluff Specific Plan was later subsumed by the 1988 Bullard Community Plan, which carried forward protective policies for this area of Fresno.

The regulation of land use, development, and grading in this portion of Fresno is ongoing pursuant to the Bluff Preservation Ordinance. This ordinance, part of the City's zoning regulations, delineates an overlay zone district along the river bluff (the Bluff Preservation Overlay District), established allowable and prohibited land uses, and set forth conditions and requirements for using or modifying property in the district. The regulations of the district are deemed to be necessary for the preservation of the special qualities of the bluffs and for the protection of the health, safety, and general welfare of owners and users of property in the area.



The Bluff Preservation Ordinance is administered by the Fresno Development and Resource Management Department through its special permit process and grading plan checks. Anyone applying for a building permit is required to submit a site plan review with accompanying soil investigation and evaluation report (prepared by an appropriately licensed professional engineer or registered geologist). The Department's Code Enforcement Division also conducts periodic surveillance of bluff properties for grading and construction done without permits and institutes abatement actions when these conditions are discovered.

HAZARDOUS MATERIAL INCIDENT SAFEGUARDS

The Fresno Fire Department works with Fresno County Environmental Health to review hazardous material business plans that detail flammable, explosive, toxic, and otherwise hazardous materials used by businesses in the City. The Fire Department has its own permitting requirement for liquid and gaseous fuel tanks to ensure that they are installed and maintained safely. The City's Hazardous Materials Response Unit (housed in a City fire station) maintains the capability to quickly characterize material releases and spills, to evaluate risks to life and property, and to implement appropriate controls and evacuation measures.

FIRE PREVENTION POLICY

The City of Fresno has some of the most progressive and effective fire prevention policies and regulations in the nation relating to water supply (fire flow) required for development, ingress and egress from developed buildings and subdivisions, on-site automatic fire suppression systems (sprinkler and on-site private hydrants), building addressing to facilitate rapid emergency response, marking of unsafe buildings (those older structures with hazardous conditions or a lack of water supply), and instant aid/mutual aid with adjacent fire departments belonging to Fresno County special districts and the City of Clovis.

In addition to its extensive network of well-trained and well-equipped firefighting stations, the Fresno Fire Department has a Fire Prevention Bureau, under supervision of the City's fire marshal, to administer regulations adopted and referenced by the Fresno Municipal Code Chapter 6, Article 5 relating to fire prevention. The Fire Prevention Bureau carries out these responsibilities by conducting routine inspections of all public and commercial buildings, performing detailed development permit and construction plan checks, and investigating arson.

Another component of the City's overall fire protection program is the administration of its public nuisance ordinances to require properties to be kept clean and free of flammable debris and to annually abate weeds and overgrown vegetation before these materials can dry out in the spring to pose a wildfire hazard (Fresno Municipal Code Chapter 10, Article 6 relating to public nuisance abatement). The Planning and Development Department Code Enforcement Division and Department of Public Utilities Community Sanitation Division coordinate their efforts to enforce the nuisance abatement regulations and provide cleanup services when property owners do not take care of matters themselves.



PLANNING MITIGATION CAPABILITIES

Table 19. City of Fresno Planning Capabilities identifies the plans related to mitigation and loss prevention in Fresno.

Table 19. City of Fresno Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes	Yes	
Climate Resiliency or Adaptation Plan	No		
Community Wildfire Protection Plan (CWPP)	No		
Comprehensive Emergency Management Plan	Yes	Yes	Public safety SOPs cover this topic as well as the EOP for the City. Expected completion 2024
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes	Yes	Expected completion 12/2024
Continuity of Operations Plan (COOP)	No		
Disaster Recovery Plan	No		
Economic Development Plan	Yes	Yes	Under review for update
Emergency Operations Plan (EOP)	Yes	Yes	Adopted in 2015 and under review for update
Evacuation Plan	No		
Flood Response Plan	No		
Floodplain Management Plan/Flood Mitigation Plan	No		
Hazard Mitigation Plan	No		
Historic Preservation Plan	No		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	Yes		
Threat Hazard Identification and Risk Assessment	Yes		Listed in EOP

CITY OF FRESNO EMERGENCY OPERATIONS PLAN, UPDATED 2015

The City of Fresno Emergency Operations Plan (EOP) addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, excessive heat/cold, power outages, and national security emergencies in or affecting the City of Fresno. The Plan, which was updated in 2015, does the following:



- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the City of Fresno.
- Identifies the policies, responsibilities, and procedures required to protect the health and safety of City communities, public and private property, and the environment from natural or technological disasters.
- Establishes the operational concepts and procedures associated with initial response operations to emergencies, the extended response operations, and the recovery process.

The EOP is designed to establish the framework for implementation of the California Standardized Emergency Management System/National Incident Management System for the City of Fresno, which is located within the California Governor's Office of Emergency Services' Mutual Aid Region V. It is intended to facilitate multi-agency and multi-jurisdictional coordination, particularly between the City of Fresno and the Fresno County Operational Area, including special districts and state agencies, in emergency operations. This plan will be used in conjunction with the Fresno County EOP and the State of California Emergency Plan. The plan is designed to guide the reader or user through each phase of an emergency: preparedness, response, recovery, and mitigation.

OTHER PLANS AND POLICIES

Other hazard mitigation-related policies and plans in place in and observed by the City of Fresno include the following:

- California Code of Regulations Title 23 administrative law for development and use of land in designated floodway areas along the San Joaquin River administered by the Central Valley Flood Protection Board, staffed by the California Department of Water Resources.
- Standards for constructing and maintaining drainage basins and ponds to prevent mosquito breeding and to provide for mosquito control district access for inspection and abatement activities (jointly promulgated by the Planning and Development Department and Public Works Department in fall of 2005).
- Dam failure inundation plans prepared and administered by the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, Fresno Metropolitan Flood Control District, Southern California Edison, and Pacific Gas and Electric Company.
- The California Environmental Quality Act, overseen by the Fresno City Attorney's Office and administered by several City departments, requires consideration of health and safety impacts as they may relate to projects, which are defined as any action that may result in a change in the physical environment and that would include public facilities, and private development, and even adoption/amendment of land use plans and ordinances. An analysis of every project is conducted by the appropriate City department (the Development and Resource Management Department does the bulk of these analyses). Inquiries regarding project sites and features are distributed to departments and outside agencies that may have knowledge of, or which may regulate, aspects of the proposed project. The information obtained from these requests for comment and from other staff research is compiled into an informational document for decision-makers and the public. The



information is also used to develop a list of mitigation actions to reduce or abate potential adverse impacts of the project. For those projects which may involve federal funds or require federal approvals, a parallel National Environmental Policy Act assessment is also prepared by the City.

- The Development and Resource Management Department administers regulations in the California Building Code and in Uniform Electrical, Plumbing, and Mechanical Codes as those codes are modified through adoption by the state and City. Plan check and inspection activities of the Department ensure structural soundness and compliance with seismic and other regulations.

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 20. City of Fresno's Administrative and Technical Mitigation identifies the personnel responsible for activities related to mitigation and loss prevention in Fresno.

Table 20. City of Fresno's Administrative and Technical Mitigation

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		City Manager	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Public Works Director/City Engineering Firm	Engineers are contracted
Fiscal Management or Procurement Specialists	X		Finance Department	
Floodplain Manager		X		
Land Surveyors		X		
Land Use/Management/Development Planning	X		City Planning Firm	Planning firm contracted
Planners or engineers with an understanding of natural and/or human-caused hazards		X		
Resource Development Staff or Grant-writing	X			
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)	X			
Staff with education or expertise to assess the community's vulnerability to hazards	X			



FISCAL MITIGATION CAPABILITIES

Table 21. City of Fresno's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 21. City of Fresno's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming	X			
Community Development Block Grants (CDBG)			X	
Special Purpose Taxes (or taxing districts)	X			
Gas/Electric Utility Fee	X			
Water/Sewer Fees			X	
Stormwater Utility Fees	X			
Development Impact Fees			X	
General Obligation, revenue, and/or Special Tax Bonds	X			
Partnering Agreements or Intergovernmental Agreements	X			
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)	X			
Homeland Security Grants (HSGP)		X		
USDA Rural Development Agency Grants		X		
US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			



MITIGATION OUTREACH AND PARTNERSHIPS

The Fresno Department of Public Utilities, in conjunction with other agencies, provides water conservation and stormwater quality protection public information programs. The Fire Department provides personal preparedness outreach for heat and freeze emergencies and shelter-in-place information for hazardous materials emergencies. Additionally, the City has developed public service announcements for smoke detector battery life, canal safety, and fireworks safety.

The City's Joint Information System disseminates information in Spanish, and the City can obtain translation services for other languages when necessary. A Joint Information Center plan is an annex to the City of Fresno Emergency Operations Plan and provides comprehensive guidance for early warning notification in all languages and specifically the Americans with Disabilities Act (ADA) community.

Preparedness Exercises afford the opportunity to include the City of Fresno ADA Committee. Members of the committee and volunteers from the ADA community role play for realistic first responder training.

OTHER MITIGATION EFFORTS

- The City is a certified StormReady community through the National Weather Service.
- The Fire Department, Police Department, and Solid Waste Division are nationally accredited.
- The City has installed security systems for the wastewater treatment facility and for its surface water treatment plant. Generators are installed in critical groundwater pumping stations and these facilities are secured.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of Fresno has several existing mechanisms in place that already help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan and are unchanged. In addition to these existing capabilities, there are also opportunities for the City to expand or improve on these policies and programs to further protect the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train City staff on mitigation and the hazards that pose a risk to the City of Fresno will lead to more informed staff members who can better communicate this information to the public. In addition, the City could work to improve the CRS rating through additional floodplain management program enhancements. This could further lower the cost of flood insurance for residents.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Fresno adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The City of Fresno has not identified any specific mechanisms into which information from the 2018 Fresno County Hazard Mitigation Plan was incorporated. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Public Works Department may utilize the hazard information when implementing Capital Improvement projects and the Planning and Development Department may utilize the hazard information when reviewing a site plan or other type of development applications. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Fresno will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

In addition to the mitigation actions identified herein the City will continue to comply with the National Flood Insurance Program as specified in General Plan Policy NS-3-j:

“National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements.”

MITIGATION ACTIONS

The planning team for the City of Fresno identified and prioritized the following mitigation actions based on the risk assessment. Background information as well as information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are also included.

In addition to implementing the mitigation actions below the City of Fresno will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).



While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.

1. ESTABLISH POST-DISASTER ACTION PLAN FOR CITY CONTINUITY OF OPERATIONS PLAN

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, land subsidence, flood, severe weather, wildfire, hazardous materials

Issue/Background: Establish a post-disaster action plan to be part of the City of Fresno Continuity of Operations Plan (COOP) that will include the following elements:

- Procedures for public information
- Post-disaster damage assessment
- Grant writing
- Code enforcement
- Redundant operations

The plan will also include annexes from local businesses and large employers to improve economic and employment recovery. The plan will also identify a mechanism for the City to help businesses without COOPs develop a COOP to be incorporated, as an annex, into the City's Emergency Operations Plan.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer

Priority (High, Medium, Low): High

Cost Estimate: \$150,000

Potential Funding: General Fund, HMGP (if part of HMP update)

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-planning. A City COOP and local business COOPs will reduce the impact of a disaster to the local economy and employment.

Schedule: 5 years

Status: 2009 project, implementation in progress

2. IMPROVE THE CITY'S CAPABILITIES FOR SHELTERING ANIMALS IN A DISASTER

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: During a disaster, not only do people need to be rescued, but their pets do also. Hurricane Katrina showed the nation that shelters do not typically allow pets, so pets may be left behind when their owners evacuate. The care of the animals left behind falls to local animal shelters. Currently,



the SPCA Animal Shelter does not have the supplies to handle a large scale animal emergency. The City has approximately 18,000 licensed dogs. If a disaster occurred, they would only be able to house a small percentage of them. Overcrowding of animals usually causes diseases and loss of animal life. Purchasing new cages would alleviate some of the overcrowding created by a disaster.

Other Alternatives: Ask other agencies for supplies if they have them available.

Responsible Office: City of Fresno Emergency Preparedness Officer working alongside local NGOs

Priority (High, Medium, Low): High

Cost Estimate: \$50,000

Potential Funding: General fund

Benefits (Avoided Losses): This will cut down on the spread of disease and animal loss during an emergency or disaster.

Schedule: 1-3 years

Status: 2009 project, implementation in progress. Working with local NGO to provide concurrent shelter for small animals and people

3. TRAIN AND CERTIFY CITY INSPECTORS TO CONDUCT POST-DISASTER DAMAGE ASSESSMENT

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: City inspectors play a vital role in post-disaster building assessment and damage assessment. Pre-training and certification is vital in response and recovery to reduce loss of life, relocate populations, and ensure the rebuilding of local economies.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer and Planning and Development Department

Priority (High, Medium, Low): High

Cost Estimate: \$250,000

Potential Funding: General Fund, BRIC, FMA

Benefits (Avoided Losses): This will improve response/recovery during an event through pre- training and certification of individuals responsible for performing assessment of structures and facilities impacted by disasters. Certification will also allow qualified staff to mobilize with the State of California Office of Emergency Services (Region 5) Urban Search and Rescue Task Force.

Schedule: 5 years

Status: 2009 project, implementation not yet started



4. IMPLEMENT A FLOOD AWARENESS PROGRAM FOR THE PUBLIC

Hazard(s) Addressed: Flood

Issue/Background: The City needs a program to educate flood-prone property owners along the San Joaquin River and in frequent annual flooding areas about the flood threat and how best to prepare, mitigate, and insure their properties.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer, Planning and Development Department, and Fresno Metropolitan Flood Control District

Priority (High, Medium, Low): Medium

Cost Estimate: \$15,000/year

Potential Funding: General fund, BRIC, FMA, HMGP, HMGP Post Fire

Benefits (Avoided Losses): This will prevent the loss of human life and economic and property losses.

Schedule: Routine activity

Status: Begin in 2014 and ongoing. A communication plan is used during heavy period of rain as well as the spring thaw from heavy snow load in the higher elevations. This is used with direct contact with residents and others impacted from flows with the San Joaquin River.

5. SOUTHWEST FRESNO – RECYCLED WATER DISTRIBUTION SYSTEM CONSTRUCTION

Hazard(s) Addressed: Drought, Agricultural hazards

Issue/Background: In 2009, the State of California adopted a recycled water policy establishing a mandate to increase the use of recycled water in California by 200,000 acre-feet per year by 2020 and an additional 300,000 acre-feet per year by 2030. The Recycled Water Master Plan prepared by the City of Fresno, Department of Public Utilities (DPU), identifies opportunities to assist with compliance of this law by reducing groundwater pumping and replacing groundwater with recycled water for non-potable purposes (i.e. outdoor irrigation, dust control, fountains, etc.). On April 11, 2013, the Council adopted the Recycled Water Master Plan and associated environmental documents.

In 2017, the DPU commissioned a 5 MGD Tertiary Treatment Facility at the Fresno-Clovis Regional Wastewater Treatment Facility. DPU is currently constructing a Recycled Water Distribution System in Southwest Fresno to deliver recycled water to parks, cemeteries, schools, agricultural uses, etc., to offset potable water irrigation demands. This will help mitigate drought by enabling the use of recycled water for certain uses instead of tapping potable water supplies.

Other Alternatives: DPU has a Water Shortage Contingency Plan (WSCP) which was updated in the City of Fresno's 2015 Urban Water Management Plan to manage water shortages including drought conditions. The WSCP consists of four stages allowing the City to ultimately reduce its water demand to a level commensurate with the water supplies available to a maximum reduction of 50 percent.

Responsible Office: City of Fresno Department of Public Utilities



Priority (High, Medium, Low): High

Cost Estimate: \$75,000,000

Potential Funding: California State Water Resources Control Board – Clean Water State Revolving Fund

Benefits (Avoided Losses): Reduced ground water pumping by using recycled water for non-potable purposes.

Schedule: 1-3 years

Status: 2018 project, In progress

6. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought

Issue/Background: The Kings subbasin underlays the City of Fresno and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Fresno has become a joint power authority of the North Kings Groundwater Sustainability Agency, other members of the Agency include the County of Fresno, City of Kerman, City of Clovis, Biola Community Services District, Garfield Water District and International Water District. As a member of the North Kings GSA, the City of Fresno is required to participate in the development and implementation, no later than January 31, 2020, of a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the North Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Fresno.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: City Engineer and North Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with California Department of Water Resources Grants and Loans.



Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: 2018 project, In progress

Annex F: City of Kerman





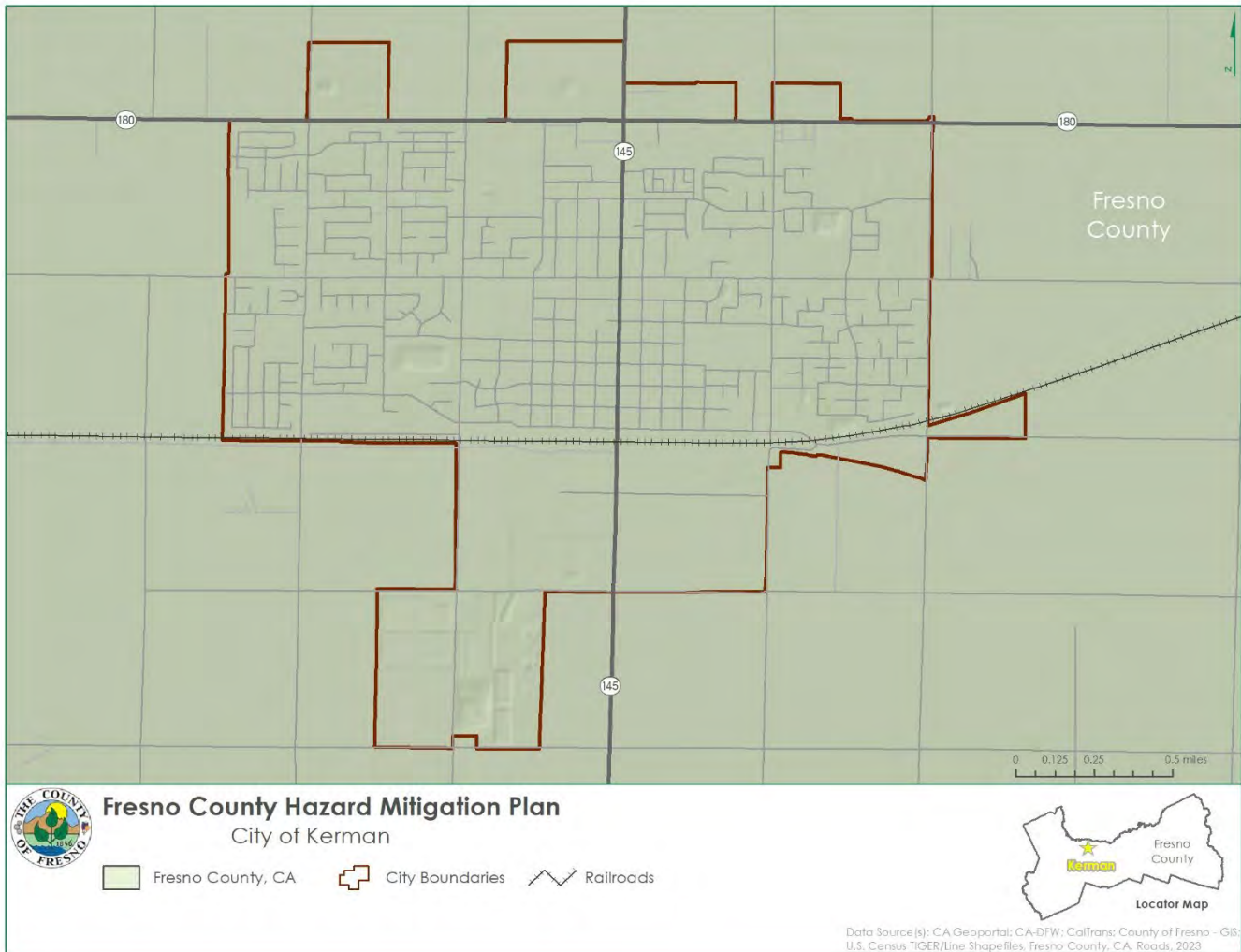
PARTICIPATION

To update the City of Kerman's jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of Kerman's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City shared information regarding the hazard mitigation plan update through social media and other communication outlets.

COMMUNITY PROFILE

Figure 1. The City of Kerman displays a map and the location within Fresno County of the City of Kerman and its Sphere of Influence.

Figure 1. City of Kerman Boundaries



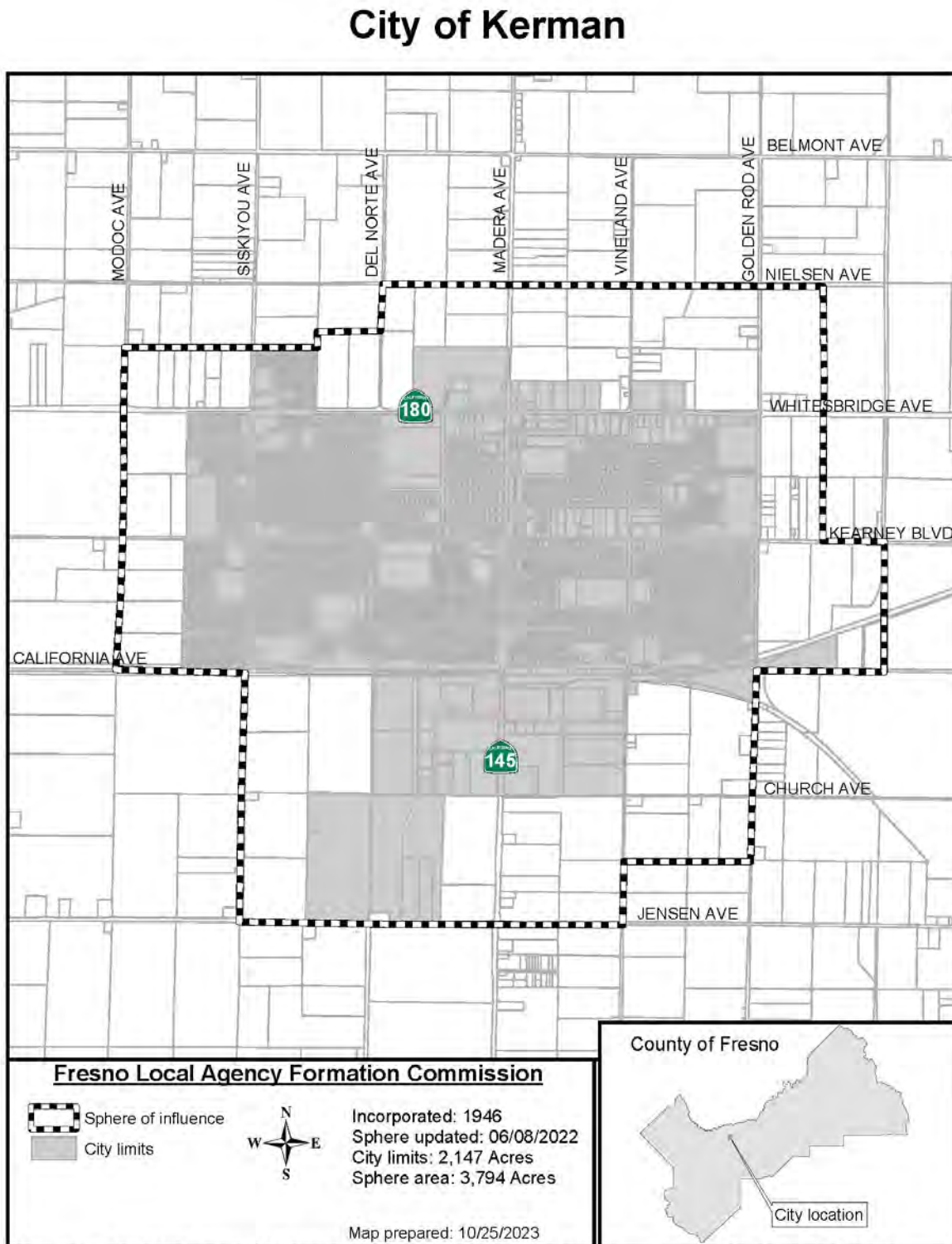
Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads, 2023



GEOGRAPHY AND CLIMATE

Kerman is located on the west side of Fresno County in the central portion of the San Joaquin Valley. Over the past decade, the City of Kerman has expanded its boundaries slightly, annexing land along the eastern reach of its Sphere of Influence (SOI). The City limits covers 2,147 acres and SOI covers 3,794 acres, shown in **Figure 2. City of Kerman Limits and Sphere of Influence.**

Figure 2. City of Kerman Limits and Sphere of Influence



Document path: G:\LAFCO WORKING FILES\GIS Layers and Maps\00-LAFCo Maps\Cities\Kerman\Kerman_MSR_Update5192022.mxd

Source: Fresno Local Agency Formation Commission,
https://www.fresnolafco.org/files/aa150e4de/Kerman_MSR_Update5192022.pdf



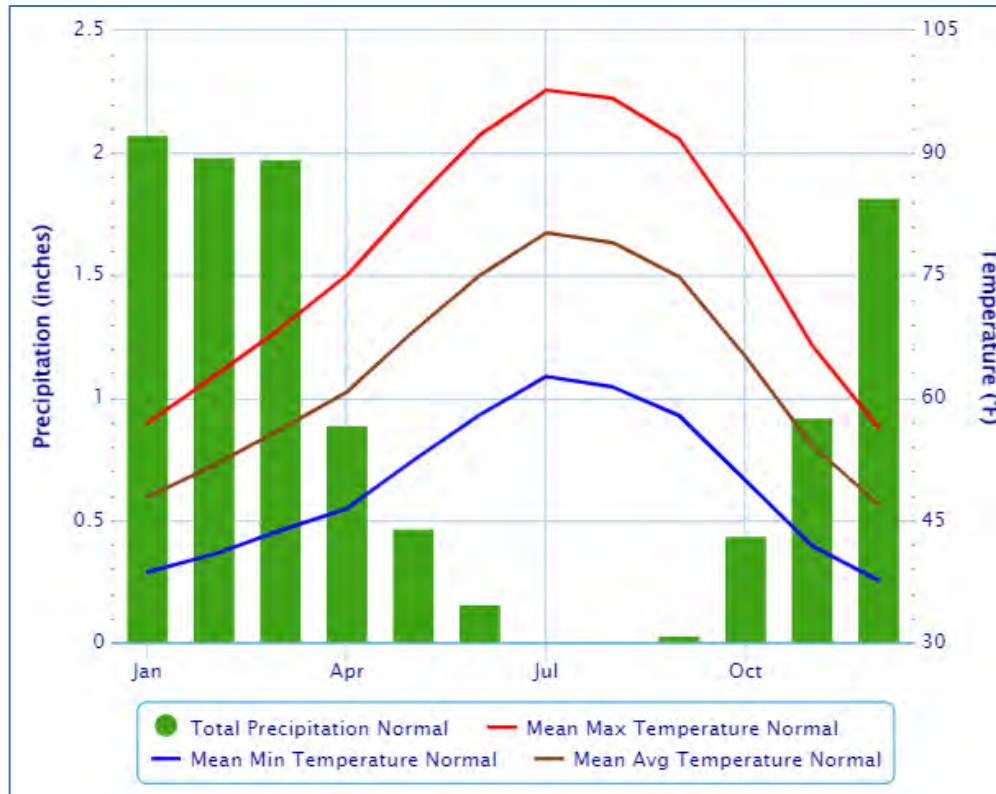
The City is bisected by State Route 145 (Madera Avenue), which runs north/south, and State Route 180 (Whitesbridge Road), which runs east/west. State Highway 99, the major highway through the San Joaquin Valley, is 15 miles east of Kerman. Kerman is 17 miles south of Madera, the county seat of Madera County, and 15 miles west of Fresno, county seat of Fresno County. The smaller cities of San Joaquin and Mendota are about 13 miles southwest and 18 miles west, respectively.

The mountains of the Coast Range and the Sierra Nevada are roughly equidistant from Kerman, about 35 miles to the southwest and northeast, respectively. The topography in and around Kerman is very level with a gentle, imperceptible slope to the southwest. Elevations in the planning area vary from about 210 feet to 225 feet. There are no natural waterways in the planning area. The largest nearby waterway of consequence is the San Joaquin River, about ten miles north. However, there are several irrigation canals that traverse the planning area.

The climate of the Kerman area is described as Mediterranean, which is typified by hot, dry summers and mild winters. Temperatures recorded at the Madera Municipal Airport located 20 miles North of Kerman, show the mean average monthly high temperature for July to be 80.2°F, while the mean average temperature for January is 47.8°F. It is not uncommon for maximum temperatures to exceed 100°F during the summer months; nor for temperatures to drop below freezing in the winter.

Most of the rainfall in Kerman occurs between November and April. Average rainfall measured in Kerman is about 11.68 a year. **Figure 3. Monthly Temperature and Precipitation: Madera Municipal Airport** describes the monthly normal for temperature and precipitation at the closest National Weather Service (NWS) weather station which is about 17 miles north at the Madera Municipal Airport.

Figure 3. Monthly Temperature and Precipitation: Madera Municipal Airport



Source: National Weather Service (NWS)

Air movement through the San Joaquin Valley is in a southeasterly direction. Wind enters the valley over the passes east of the San Francisco Bay and exits through mountain passes at the southern end of the San Joaquin Valley. The averages wind speeds of 8.6 miles per hour. The windiest month of the year in Kerman is June. The windiest part of the year is from March to August. The prevailing wind direction is from the north and north-northwest, except in December and January, when the winds blow from the southeast or east-southeast.

HISTORY

The site of Kerman was first established by the Southern Pacific Railroad Company as a way station with a pump and watering tank in 1891. The site was originally named Collis in honor of the president of the railroad Collis P. Huntington. It was at this site in 1892 that the famous Sontag and Evans gang held up the San Francisco-Los Angeles passenger train, one of the last train robberies in the country and perhaps the most historical event to occur in Kerman.

Settlement and cultivation of the Kerman area began and continued through the turn of the century as irrigation projects brought water to the area, primarily from the Kings River to the south. In 1900, William G. Kerckhoff and Jacob Mansar purchased some 3,027 acres of land from the Bank of California. These men formed the Fresno Irrigated Farms Company. In 1906, Collis was renamed Kerman from the men's names (Kerckhoff and Mansar). By 1914, Kerman had an estimated population



of 400 people surrounded by 29,000 acres of crop land. The Kerman Creamery was producing about 1,600 pounds of butter daily. In 1921, Madera Avenue was paved from the Southern Pacific railroad tracks north to the San Joaquin River, and streetlights were installed from the tracks to Whitesbridge Road. By 1936, development of Kerckhoff Park had begun. Oil and gas exploration was being conducted several miles south of town and culminated in 1941 with the development of the largest gas well in the state (at the time).

In 1946, the residents of Kerman voted to incorporate, and the City of Kerman was born. In the 1950s, new subdivisions began to develop, expanding the urban area outward from the original town site. New development and subdivision activity has continued to the present time.

ECONOMY

Despite Kerman's location in the center of a highly productive agricultural area, agriculture is not the dominant industry in the community. Agriculture remains an economic base of the City of Kerman with nearly 20 percent of the labor force in agriculture related occupations. Agriculture related occupations with high shares of the city's workforce include transportation, production, manufacturing, and distribution. In contrast to some other cities in the region, Kerman does not have extensive packing houses and agricultural processing facilities in its industrial area.

Select estimates of economic characteristics for the City of Kerman are shown in **Table 1. City of Kerman's Economic Characteristics**.

Table 1. City of Kerman's Economic Characteristics

Characteristic	City of Kerman
Families below Poverty Level	20.4%
All People below Poverty Level	21.9%
Median Family Income	\$53,956
Median Household Income	\$58,234
Per Capita Income	\$21,308
Population in Labor Force	6,913
Population Employed	6,030
Unemployment	12.8%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Kerman's Employment by Occupation and **Table 3. City of Kerman's Employment by Industry** detail how the City of Kerman's labor force breaks down by occupation and industry, respectively, based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Kerman's Employment by Occupation

Occupation	# Employed	% Employed
Production, Transportation, and Material Moving Operations	923	15.31%
Service Occupations	1,247	20.68%



Occupation	# Employed	% Employed
Natural Resources, Construction, and Maintenance Occupations	1,726	28.62%
Management, Business, Science, and Arts Occupations	1,142	18.94%
Sales and Office Occupations	992	16.45%
Total	6,030	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Kerman's Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care and Social Assistance	1,404	23.28%
Agriculture, Forestry, Fishing, and Hunting, and Mining	992	16.45%
Manufacturing	548	9.09%
Transportation and Warehousing, and Utilities	370	6.14%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	205	3.40%
Retail Trade	707	11.72%
Public Administration	290	4.81%
Professional, Scientific and Management, and Administrative, and Waste Management Services	195	3.23%
Construction	718	11.91%
Finance and Insurance, and Real Estate and Rental and Leasing	124	2.06%
Wholesale Trade	203	3.37%
Information	27	0.45%
Other Services, Except Public Administration	247	4.10%
Total	6,030	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

POPULATION

According to the U.S. Census Bureau's 2022 Population Estimate, the City of Kerman has a population estimate of 16,208. Select demographic and social characteristics for the City of Kerman from the 2022 ACS are shown in **Table 4. City of Kerman's Demographic and Social Characteristics**.



Table 4. City of Kerman's Demographic and Social Characteristics

Characteristics	City of Kerman
Gender/Age	
Male	49.4%
Female	50.6%
Median Age	27.8
Under 5 Years	7.8%
Under 18 Years	32.9%
65 Years and Over	7.6%
Race/Ethnicity	
White	38.6%
Asian	7.1%
Black or African American	0.4%
American Indian/Alaska Native	2.1%
Hispanic or Latino (of any race)	81.7%
Education	
High school graduate or higher	57.9%
Disability Status	
Population 5 years and over with a disability	12.1%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Kerman's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Kerman (see **Table 6. City of Kerman - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Kerman. However, the City of Kerman would like to consider profiling trail derailment, plane crashes, and cyber attacks in a future plan update.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	



$\text{RF Value} = \{(\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10)\}$				
Risk Assessment Category	Degrees of Risk			Weight Value
impacts localized or regional?	Large	Greater than 25% of area affected	4	
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	

Table 6. City of Kerman - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Moderate	12 to 24 hours*	Less than 24 hours*	Medium*
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Limited	Moderate	Less than 6 hours	Less than 24 hours	Medium
Drought	Possible	Limited	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Critical	Large	Less than 6 hours	Less than 6 hours	High
Flood/Levee Failure	Possible	Limited	Small	More than 24 hours	Less than 1 week	Medium
Hazardous Materials	Likely	Critical	Large	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	Large	N/A	N/A	Medium
Severe Weather						
Extreme Cold/Freeze/Heat	Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Medium
Soil Hazards						
Erosion	Possible	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Possible	Minor	Negligible	N/A	N/A	Low
Land Subsidence	Likely	Minor	Large	N/A	N/A	Medium
Landslide	Unlikely	Minor	Negligible	N/A	N/A	Low
Volcano	Unlikely	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Possible	Minor	Negligible	12 to 24 hours*	More than 1 week*	Low

*Rated on an average basis. For example, warning time for agricultural hazards by vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*



VULNERABILITY ASSESSMENT

The intent of this section is to assess Kerman's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Kerman - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Kerman's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table 6 reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Kerman, census tracts with a higher SVI are clustered near the northern and southeastern portion of the City, as shown in **Figure 4. City of Kerman Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.).¹

¹ CDC/ATSDR Social Vulnerability Index (SVI) | Place and Health | ATSDR
https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html

Figure 4. City of Kerman Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Kerman City Boundary

ASSETS AT RISK

This section considers Kerman's assets at risk, including values at risk; critical facilities and infrastructure; historic, cultural, and natural resources; economic assets; and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

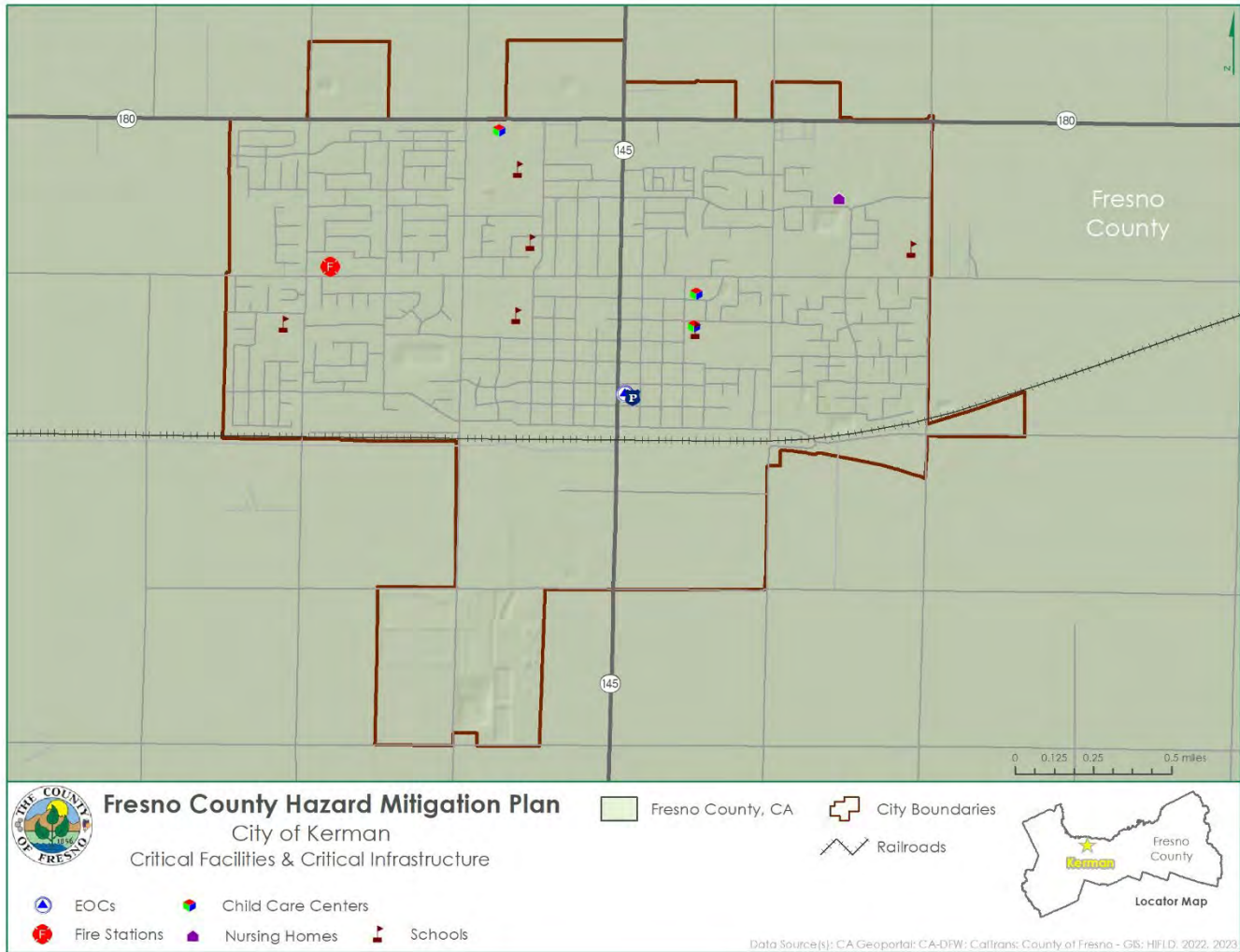
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Kerman from Fresno County GIS is provided in **Table 7. City of Kerman's Critical Facilities** and mapped in **Figure 5. City of Kerman Critical Facilities**. This is the information that was used for mapping and analysis purposes. It should be noted that the City had different data, which is indicated in parentheses in the table. (City data was not used for analysis since it was not available in GIS format).

Table 7. City of Kerman's Critical Facilities

Critical Facility Type	Count
Communications	2
EOC	1
Fire Station	1
Police	1
School	9
Total	14

Source: Fresno County

Figure 5. City of Kerman Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; HIFLD, 2022, 2023



Table 8. Specific Critical Facilities and Other Community Assets Identified by the City of Kerman's Planning Team lists specific critical facilities and other community assets identified by Kerman's planning team as important to protect in the event of a disaster.

Table 8. Specific Critical Facilities and Other Community Assets Identified by the City of Kerman's Planning Team

Name of Asset	Replacement Value (\$)	Occupancy/Capacity #	Hazard Specific Info/Comments
City Hall	3 million	N/A	
Police Station	1.2 million	N/A	Secondary emergency operations center
United Health Center	3.7 million	N/A	EOP medical center
Fire Station	6.4 million	N/A	Primary emergency operations center
Community Center	3.1 million	400	EOP gathering point

Source: Fresno County

ECONOMIC ASSETS

Table 9. Major Kerman Employers identifies the City's largest employers, which are led by the Kerman Unified School District.

Table 9. Major Kerman Employers

Name of Business	Product/Service	# of Employees
Kerman Unified School District	Education	558
Mid Valley Disposal	Waste Management	112
Panoche Creek Packaging	Almonds	180
MEC Ariel Platform	Manufacturing	135
Sebastian	Communications	61
City of Kerman	Municipal Government	80
Helena Chemical	Chemical	29
Hall Ag Enterprise	Labor Contractor	20
Walmart	Grocery	289

Source: City of Kerman

GROWTH AND DEVELOPMENT TRENDS

Table 10. City of Kerman's Change in Population and Housing Units illustrates how the City has grown in terms of population and number of housing units between 2017 and 2022.

**Table 10. City of Kerman's Change in Population and Housing Units**

2017 Population	2022 Population Estimate	Estimated Percent Change 2017-2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017-2022
14,537	15,980	+9.93%	3,943	4,551	+15.42%

Source: Community Survey 2022 5-Year Estimates

For the purposes of the 2040 Kerman General Plan Update, population projections were developed representing low and high estimates. By the year 2027, the estimates forecast a low population estimate of 26,613 and a high population estimate of 40,561 persons.

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk section of the main plan.

ESTIMATING POTENTIAL LOSSES

Fresno County's assessor's data was used to calculate the improved value of parcels. The most vulnerable structures are unreinforced masonry buildings and buildings built prior to the introduction of modern-day building codes. Impacts of past events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County).

Note: Ranked Medium significance by both Kerman and the County, epidemic/pandemic, windstorm, and winter storm potential impacts are not unique to the City in the context of the full planning area. See Chapter 4 Risk Assessment in the main plan for details on the entire planning area's risk and vulnerability to these hazards.

AGRICULTURAL HAZARDS (MEDIUM)

Agriculture is a significant component of the City of Kerman's economy. Any pests, plant diseases, or weather events negatively affecting crop production could have substantial impacts on employment and the local economy.

DROUGHT (HIGH)

Out of the High-ranking significance to the entire planning area, Kerman's High ranking is tied to the fact that groundwater is the only source of drinking water in the City. The City of Kerman draws groundwater from six deep wells. Although the City is not restricted to a specific volume of groundwater, the City is engaged in groundwater recharge projects and activities that reduce the consumptive use of groundwater and are intended to relieve and eliminate long-term overdraft of the Kings subbasin. Water moving down gradient from the floodplains of the Sierra Nevada streams and rivers is the major source of groundwater recharge in this area. Over-application of imported irrigation water within the Fresno Irrigation District is another source of groundwater recharge. Rainfall provides only a minor percentage of total groundwater recharge in the area.

EARTHQUAKE (HIGH)

The City of Kerman is located in an area that is seismically active; however, the potential for dangerous seismic activity is limited. It is located in a seismic zone that is characterized by a relatively thin section of sedimentary rock overlying a granitic basement. Ground motion that could result from an earthquake would be high, but the distance to the faults that are the expected source of the shaking is sufficiently great that the effects should be minimal.

Although Fresno County does not have any major faults within its boundaries, Kerman has been affected by earthquakes in the past. The most notable earthquake was the Coalinga earthquake in May 1983, which measured magnitude 6.7 on the Richter scale. Although no damage was reported in Kerman, the quake was strongly felt by local residents.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Kerman's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

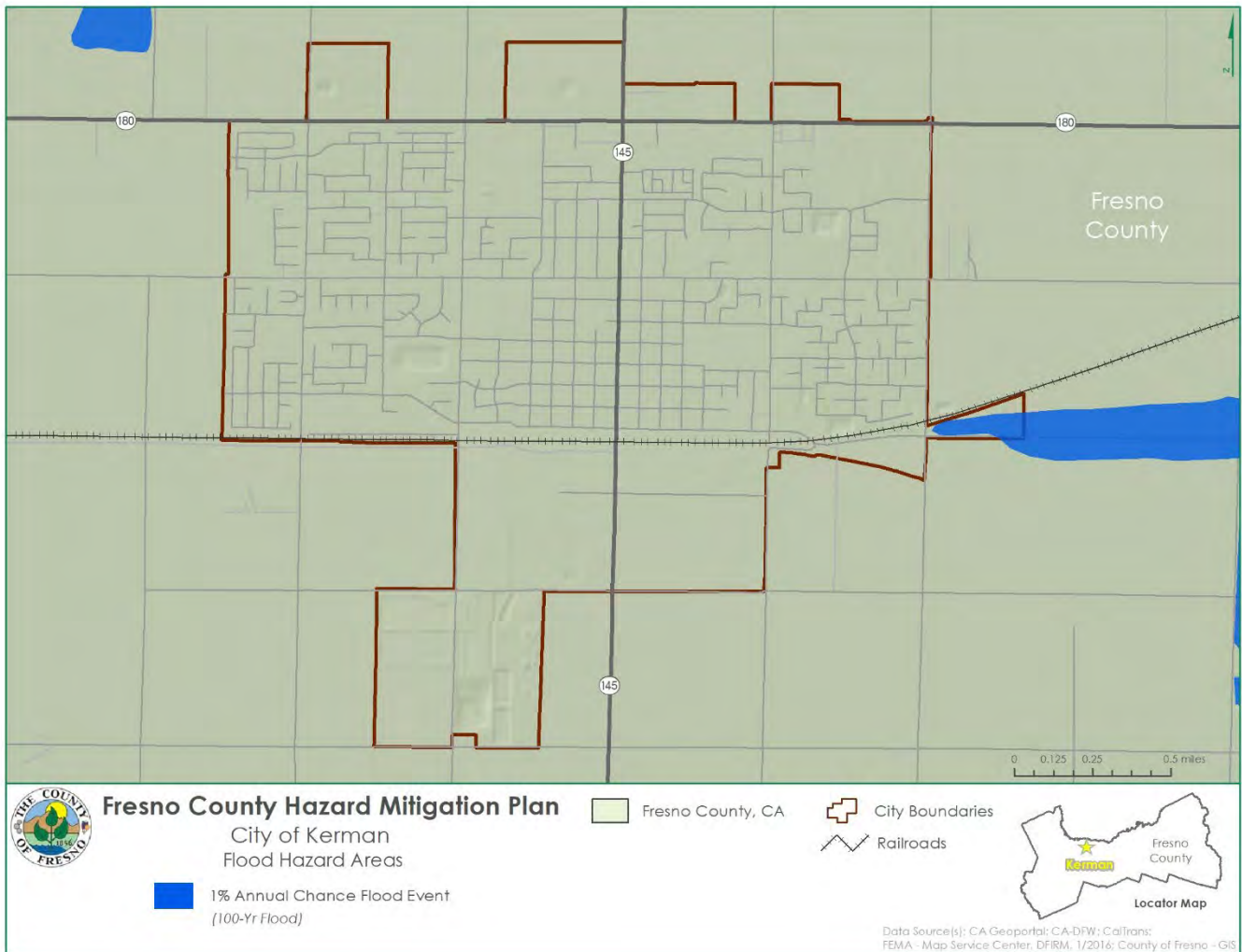
FLOOD/LEVEE FAILURE (MEDIUM)

According to FEMA's 2016 Flood Insurance Study, the City of Kerman is not subject to floodwaters from a 100-year storm. However, areas of the 100-year floodplain are found adjacent to the City, particularly along California Avenue east of the City, as shown in Figure F.3. Therefore, although no property is at risk to damage from the 100- or 500-year floods, vehicular and rail transportation to and from the City could be impacted by flooding.

Certain areas within the City are subject to localized flooding and ponding of stormwater. During rain events, flooding occurs in the area between Madera Ave and 9th St and between D St and California Ave within the southern section of the City of Kerman. The city has sandbag intersections and low areas within this area or buildings will be inundated. The City has sandbagged 5 out of the last 10 years. The sandbagging has saved buildings from being flooded including a local Motel located on California Ave that sustained flood damage before the City started to sandbag the area. A medical center located across from the motel is also potentially affected. In total, 425 homes and businesses and an elementary school are potentially affected by localized flooding within the City. The value of these structures at risk to localized flooding is in excess of \$42,000,000. Furthermore, new development, if not designed properly, can magnify drainage problems. New development must conform to standards and plans contained in the Kerman Stormwater Drainage Master Plan, which directs the location of new stormwater drainage lines, mains, and ponding facilities. **Figure 6. City of Kerman Flood Hazard Areas, Figure 7. City of Kerman Areas of Localized Flooding, and Figure 8. City of Kerman Flood Hazard Area Buildings at Risk** illustrates the areas most vulnerable to localized flooding.



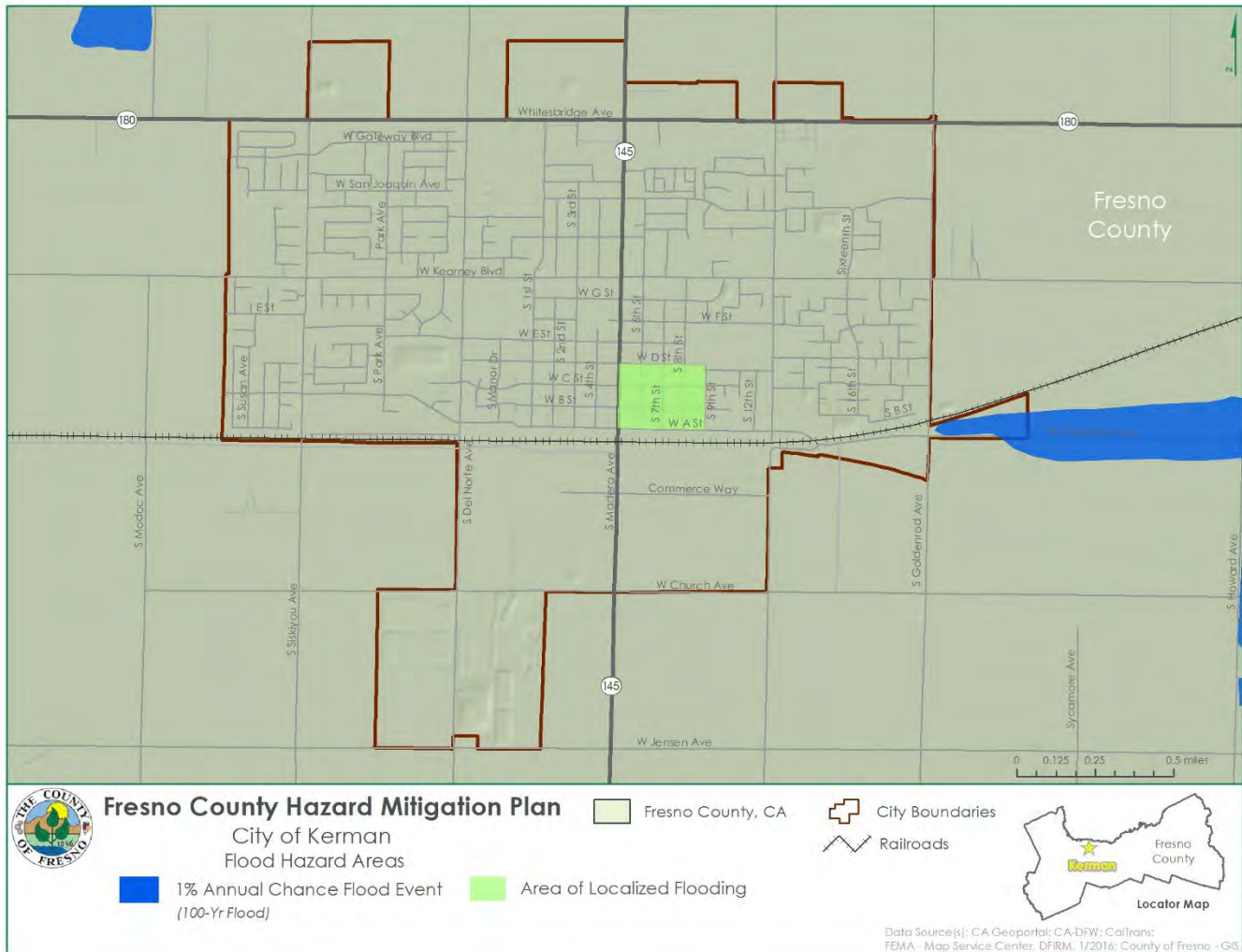
Figure 6. City of Kerman Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS

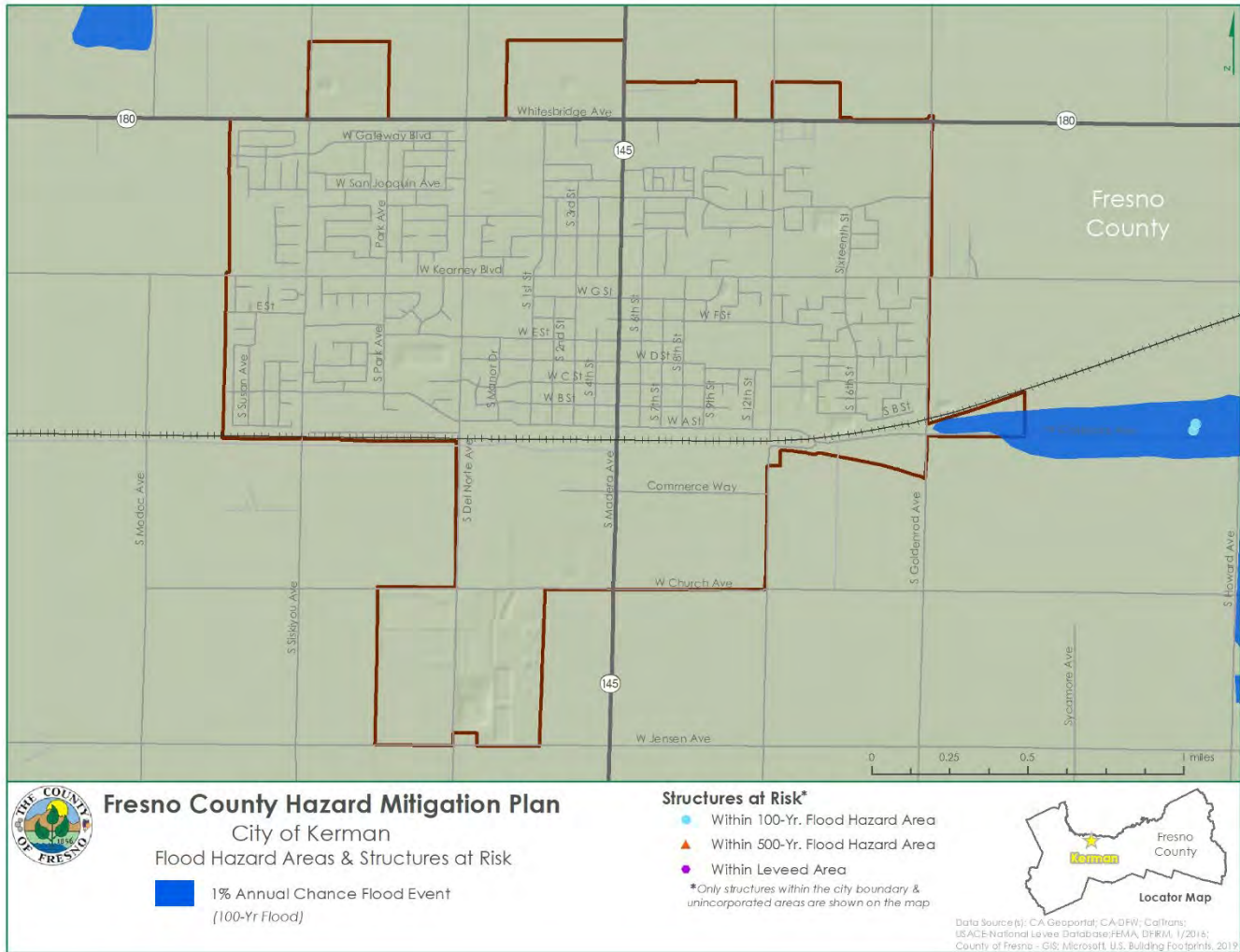


Figure 7. City of Kerman Areas of Localized Flooding



Source: CA Geoportal; CA-DFW; CalTrans; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS

Figure 8. City of Kerman Flood Hazard Area Buildings at Risk



Source: CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database, FEMA, DFIRM, 1/2016; County of Fresno – GIS; Microsoft, U.S. Building Footprint, 2019



One incident of a levee failure did occur outside of Kerman and is detailed below.

- **March 27, 2023:** A levee broke near Floral Avenue and Highway 145 south of Kerman Monday morning. According to a news report, no structures were threatened by the water and the land is all for agricultural use.²

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Kerman joined the National Flood Insurance Program (NFIP) on August 23, 1982. NFIP Insurance data indicates that as of March 19, 2024, there were 3 flood insurance policies in force in the City with \$1,820 in total premium or total paid. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties, and zero claims located in the jurisdiction.

HAZARDOUS MATERIALS INCIDENT (HIGH)

There are several uses of hazardous materials within the City that pose a threat to its citizens. These uses include industrial operations on the south side of the City, the state highways that carry large volumes of truck traffic, the railroad, and the wastewater treatment plant. Kerman has two state highways (State Routes 145 and 180) that carry a large amount of truck traffic. It is difficult to ascertain the number of trucks carrying hazardous waste. The American Avenue landfill lies about seven miles southwest of Kerman. Chemical Waste, Inc. operates a hazardous waste collection facility at Kettleman City, about 55 miles south of Kerman.

There have been 6 hazardous materials incidents from 2017-2022 that have occurred in the City of Kerman. Of the 6 incidents, there have been 2 fixed and 1 storage tank. There were no injuries, damages, or deaths during the time period.³

² <https://kmph.com/news/local/levee-breaks-monday-morning-along-hwy-145-in-eastern-fresno-county-san-joaquin-helm-kerman>

³ California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. The capabilities assessment is divided into three sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, and fiscal mitigation capabilities.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and the Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Kerman's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 11. City of Kerman Mitigation Capability Summary**.

Table 11. City of Kerman Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Fiscal Capability	X		
Available Staff	X		
Political Support/Interest		X	
Community Support		X	

REGULATORY MITIGATION CAPABILITIES

Table 12. City of Kerman's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Kerman.

Table 12. City of Kerman's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X		Uniform building code 2023			



Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Community Emergency Response Team (CERT)		X			X	Desired – TBD
Community Rating System (CRS Program of the NFIP)			Unknown			
Emergency Management Accreditation Program (EMAP)		X			X	
Fire Code	X					NCFPD
Firewise Community			Unknown			
Floodplain Management/Flood Damage Prevention Ordinance		X			X	
Land Use/Development Planning	X					
National Flood Insurance Program (NFIP)	X					
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X			X	
Storm Ready		X			X	Desired – TBD
Stormwater Management Plan/Ordinance	X					
Subdivision Regulations/Ordinance	X					
Two Weeks Ready		X				Desired – TBD
Unified Development Ordinance			Unknown	X		Zoning Update
Zoning Ordinance	X					June 2024

PLANNING MITIGATION CAPABILITIES

Table 13. City of Kerman Planning Capabilities identifies the plans related to mitigation and loss prevention in Kerman.

Table 13. City of Kerman Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)		Yes	FY25
Climate Resiliency or Adaptation Plan		No	
Community Wildfire Protection Plan (CWPP)		No	
Comprehensive Emergency Management Plan		Yes	June 2024



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes		2020
Continuity of Operations Plan (COOP)	No		
Disaster Recovery Plan	No		
Economic Development Plan	Yes		
Emergency Operations Plan (EOP)	No	Yes	June 2024
Evacuation Plan	No	No	
Flood Response Plan	No	No	
Floodplain Management Plan/Flood Mitigation Plan	No	No	
Hazard Mitigation Plan	Yes	Yes	Partner w/County
Historic Preservation Plan	No	No	
Natural Resources Protection Plan (NRPP)	No	No	
Open Space Management Plan (Parks and Rec/Greenway Plan)	No	No	
Threat Hazard Identification and Risk Assessment	No	No	

KERMAN 2040 GENERAL PLAN UPDATE

The Kerman 2040 General Plan, updated in 2020, expresses the City's vision and expectations for the future. It is a development blueprint for the year 2040. The Kerman General Plan contains the goals and policies upon which the City Council and Planning Commission base their decisions. Typically, a general plan is designed to address the issues facing the city for the next 15-20 years. The horizon year for Kerman's General Plan Update is 2040. The general plan includes nine state mandated elements including land use, circulation, housing, conservation, noise, open space, safety, air quality and environmental justice. Relevant elements and information to the hazard mitigation plan are outlined below.

SAFETY ELEMENT

The Safety Element is the primary vehicle for relating local safety planning to City land use decisions. Its main purpose is to reduce death, injuries, property damage, and the economic and social dislocation resulting from natural hazards.



Fire Safety

Table 14. Fire Safety Policies

Policy Number	Policy Description
PH-2	To minimize the risks to life and properties from fire hazards.
PH-2.2	The City shall require new projects to have adequate water supplies to meet the fire-suppression needs of the project without compromising existing fire suppression services to existing uses.
PH-2.4	The City shall continue to coordinate with North Central Fire District in providing education on fire prevention training to City staff, residents, and business owners.

Emergency Services

Table 15. Emergency Services Policies

Policy Number	Policy Description
PH-3	To provide the highest levels of public safety services as fiscally feasible to respond to natural and man-made disasters.
PH-3.2	The City shall maintain rapid, reliable, and redundant communication systems for emergency response and community alerts, and actively educate residents and businesses on its use. The City will look toward new technologies for rapid communication through mobile devices and other developing technologies.
PH-3.4	The City shall continue to provide informational materials on potential harm, abatement, and response to probable natural and man-made hazards in the region.
PH-3.5	The City shall support residents' and community organizations' efforts to cultivate social support networks to improve community preparedness, response, and recovery from hazards and disasters to minimize injury and loss of life.

Natural Disasters

Table 16. Natural Disasters Policies

Policy Number	Policy Description
PH-4	To prevent the loss of life and personal property by reducing the risk and magnitude of hazards from natural and man-made hazards, including earthquake, floods, fires, and climate change.
PH-4.1	The City shall continue to actively participate in and implement the Fresno County Multi-Hazard Mitigation Plan to reduce risks from natural disasters.
PH-4.2	The City shall continue to pursue funding opportunities to implement Kerman projects that are identified in the Fresno County Multi-Hazard Mitigation Plan.
PH-4.3	The City shall require all new development to be constructed in accordance with the current seismic safety design standards at the time of initial building plan submittal.
PH-4.4	The City shall expand partnerships with non-governmental organizations, churches, and businesses to provide additional cooling center to service the community during periods of high heat.
PH-4.5	The City shall promote the use of urban greening techniques, such as cool pavement technology, parking lot shading, landscaping, and other methods to offset climate change impacts and reduce greenhouse gas emissions for discretionary development and City-initiated projects.



Building Safety

Table 17. Building Safety Policies

Policy Number	Policy Description
PH-5	To protect residents and employees from potential hazards from unreinforced masonry buildings and other substandard buildings.
PH-5.1	The City shall continue to abate or rehabilitate unreinforced masonry buildings, as defined by the Uniform Housing Code.

Hazardous Materials

Table 18. Hazardous Materials Policies

Policy Number	Policy Description
PH-6	To protect residents from exposure to hazardous materials and wastes.
PH-6.1	The City shall require that uses generating hazardous materials and wastes do not contaminate air, water, or soil resources
PH-6.2	The City shall require that proposed activities and land uses that use, store, or dispose of hazardous materials or wastes be located in the industrial area in the southern portion of the city.
PH-6.3	The City shall require new projects that are using, producing, or generating hazardous materials, such as cold storage facilities, prepare an emergency preparedness plan.
PH-6.4	The City shall support educational programs that inform the public about household hazardous waste and proper disposal methods.
PH-6.5	The County shall encourage and support the use of Integrated Pest Management practices to reduce pesticide use and health risks.
PH-6.6	The City will work to obtain notification of the application of restricted materials (pesticides applied by spray techniques) for area inside or within the ¼ mile of the Kerman Planning Area.

Air Quality

Table 19. Air Quality Policies

Policy Number	Policy Description
PH-7	To protect public health, agricultural crops, and natural resources from air pollution.
PH-7.1	The City shall continue to participate in regional planning efforts to meet air quality goals
PH-7.2	The City shall encourage agricultural operations to incorporate Best Management Practices to reduce particulate emissions consistent with State and Federal regulations, such as organic composting, using enhanced efficiency fertilizers, paving roads, limited or no tiling, cover-cropping, and transitioning to electric or alternatively fueled agricultural equipment in place of gasoline or diesel equipment.
PH-7.3	The City shall require industrial facilities to incorporate economically feasible Best Management Practices and control technology to reduce PM10 and PM2.5 emissions consistent with State and Federal regulations.
PH-7.4	The City shall require new projects to incorporate economically feasible SJVAPCD construction best management practices as conditions of approval, if the project exceeds the most recent SJVACPD SPAL screening levels at the time of preparation.
PH-7.5	The City shall require new development projects that produce Toxic Air Contaminants (TACs) or other health risks to retain a qualified professional to complete a SJVAPCD-compliant evaluation of all

Policy Number	Policy Description
	stationary source developments near sensitive receptors to determine if a project-specific Health Risks Assessment (HRA) would be required prior to approval. If required, the City shall require all identified TAC risks from the HRA to be mitigated to meet current SJVAPCD TAC thresholds.

PUBLIC FACILITIES AND SERVICES

The City is responsible for providing many essential public facilities and services. It is vital to the provision of those facilities and services that the City secure funding for new services and maintenance of existing facilities. The City needs to ensure that adequate resources are devoted to providing the necessary public facilities and services to meet the needs of existing and future residents and businesses. The City must be responsive to meeting service needs, while also ensuring that new facilities are strategically located to maximize use and efficiency.

Essential Public Facilities and Services

Table 20. Essential Public Facilities and Services Policies

Policy Number	Policy Description
PFS-1	To provide quality public facilities and services that enhance social opportunities and quality of life.
PFS-1.4	The City shall continue providing a safe and environmentally sensitive storm drainage system that protects people and property
PFS-1.5	The City shall require new development to comply with the standards and plans contained in the Kerman Storm Drainage Master Plan, which directs the location of new stormwater drainage lines, mains, and ponding facilities.

Water

Table 21. Water Policies

Policy Number	Policy Description
PFS-2	To ensure a quality and reliable water supply to meet the needs of residents, businesses, and the agricultural industry.
PFS-2.1	The City shall continue to install and upgrade water, sewer, and storm drainage infrastructure to meet current and projected growth demand, as well as current water quality standards.
PFS-2.2	The City shall pursue a secondary water supply system that is effective and cost-efficient to service urban-level development.
PFS-2.3	The City shall discourage industrial uses that are high water users and that generate high strength wastewater, unless the industrial use can mitigate this adverse impact through ample fees, investment in public infrastructure, and/or pretreatment of its wastewater.
PFS-2.4	The City should preclude the intrusion of any land uses that are incompatible with operation of the Kerman Waste Water Treatment Plant.
PFS-2.5	During the development review process, the City shall require new development to provide facilities and/or measures to reduce pollutants in water run-off prior to entering the city's stormwater collection system. Options could include bioswales and other best management practices currently available at time of development.



Policy Number	Policy Description
PFS-2.6	The City shall explore opportunities to connect and provide water service to nearby and small disadvantaged communities that lack reliable access to safe and clean public water. The City shall seek financial assistance from the State Water Resources Control Board to fund these efforts.
PFS-2.7	The City shall continue to be a member of the North Kings Groundwater Sustainable Agency (NKGSA) and work closely with the NKGSA to develop the Sustainable Groundwater Management Plan for Kerman and the North Kings region.
PFS-2.8	The City shall support adequate groundwater recharge by developing storm ponding and retention basins where feasible. In some areas these ponds or basins can be incorporated into a recreational area or used as wildlife habitat area or may be required by new development to offset impacts associated with new nonpermeable surfaces.

KERMAN MASTER STORM DRAIN PLAN

In 1982, the City of Kerman developed a master storm drain plan that defined the existing storm drain facilities and provided a plan for the City of Kerman as it grew. Through annual updates, the plan has evolved into today's comprehensive plan of system pipelines, drainage basins, and pump stations. In some locations, the basins are used as parks in the dry season. As new development takes place, the developers are required to construct master drainage facilities defined by the plan that impact their area of construction.

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 22. City of Kerman's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Kerman.

Table 22. City of Kerman's Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		1-CM	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure		X	Contract	
Fiscal Management or Procurement Specialists		X		
Floodplain Manager		X	N/A	
Land Surveyors		X		
Land Use/Management/Development Planning		X	Contract	Could contract if needed but no funds are available
Planners or engineers with an understanding of natural and/or human-caused hazards		X	Contract	Could contract if needed but no funds are available



Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Resource Development Staff or Grant-writing	X			By contract
Scientists familiar with the hazards of the community		X		Could contract if needed but no funds are available
Staff experienced with Geographic Information Systems (GIS)	X			By contract
Staff with education or expertise to assess the community's vulnerability to hazards		X		Could contract if needed but no funds are available

According to FEMA's 2016 Flood Insurance Study, the City of Kerman is not subject to floodwaters from a 100-year storm and thus is not required to participate in the NFIP.

FISCAL MITIGATION CAPABILITIES

Table 23. City of Kerman's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 23. City of Kerman's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)		X	X	
Special Purpose Taxes (or taxing districts)		X		Former RDA
Gas/Electric Utility Fee			X	PG&E
Water/Sewer Fees			X	City
Stormwater Utility Fees			X	City
Development Impact Fees			X	City, School, County
General Obligation, revenue, and/or Special Tax Bonds		X	X	Debt not retired

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Partnering Agreements or Intergovernmental Agreements			X	Several
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)	X			Unknown
Homeland Security Grants (HSGP)		X		Police Department
USDA Rural Development Agency Grants		X		Possible
US Economic Development Administration Grants	X			In the future
Infrastructure Investment and Jobs Act (IIJA)	X			

OPPORTUNITIES FOR ENHANCEMENT

Based on the assessment of capabilities, the City of Kerman has existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. The opportunities for enhancement of the City's existing mitigation program are listed below.

- Develop a Drought Contingency plan that will help to create a framework for drought response and mitigation in Kerman.
- Update the Storm Drain Master Plan
- While the City of Kerman is not subject to floodwaters from a 100-year storm on a creek or river and thus is not required to participate in the NFIP, the City might consider the benefits of joining the program which would allow residents and businesses access to flood insurance, given the flood issues associated with stormwater drainage.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Kerman adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy. In the recent 2024 update, the City has proposed to consider adding three new goals which include: addressing Cyber Attack Prevention, emphasize effective weed abatement implement with North Central Fire Protection District to avoid fire spread to structures or source of conflagrations, and planning and response strategies for chemical, hazmat events in the City or nearby which threatens public health or transportation.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Planning and Development Services may utilize the hazard information when reviewing site plan and building applications. The City Manager will use hazard information when working on economic development specific projects and opportunities to recruit new businesses. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140. The 2018 plan was integrated into the latest 2024 Emergency Operations Plan (EOP) and the City's 2020 General Plan.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Kerman will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

COMPLETED 2009 MITIGATION ACTIONS

The City of Kerman has not completed any of the actions identified in the 2009 plan. However, these actions will be carried forward in the mitigation strategy for this plan update.

COMPLETED 2018 MITIGATION ACTIONS

The City of Kerman has conveyed to the planning team that the following 2018 Mitigation Action has been completed:

1. Install Warning Lights for the Intersection of State Route 145 and Highway 180

MITIGATION ACTIONS

The planning team for the City of Kerman identified the following mitigation action based on the risk assessment. Background information and information on how the action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule is included.

In addition to implementing the mitigation actions below the City of Kerman will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public



awareness program, with an emphasis on drought. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.

1. CONSTRUCT CALIFORNIA AVENUE PARALLEL STORM DRAIN LINE

Hazard(s) Addressed: Flood

Issue/Background: When the City of Kerman constructed the first storm drain system in the early 1960s, a 20-inch storm drain line was installed in California Avenue to move the water that drained from the central part of Kerman to the main storm drain line that leads south to Church Avenue where the master storm drain basin was constructed. As Kerman grew so did the storm drain runoff and a master storm drain plan was developed in the early 1980s to allow storm drain impact fees to be collected on new growth and provide a plan to install the new infrastructure. The last section of the master planned storm drain system in the south part of Kerman is a parallel 30 inch storm drain line running west from 4th Street to 1st Street. Because this section of master planned SD has not been constructed, there is a potential for flooding in the drainage area feeding this part of the SD system. We have experienced continual problems throughout the area draining to this section of the SD system and we are required to sandbag when significant rain events occur. The map (**Figure 9. City of Kerman Storm Drain Project Area of Benefit** below) delineates the area that drains to this section of the SD system.

Other Alternatives: No Action Responsible Office: Public Works Director Priority (High, Medium, Low): High Cost Estimate: \$140,000

Responsible Office: City of Kerman City Manager

Potential Funding: General Fund

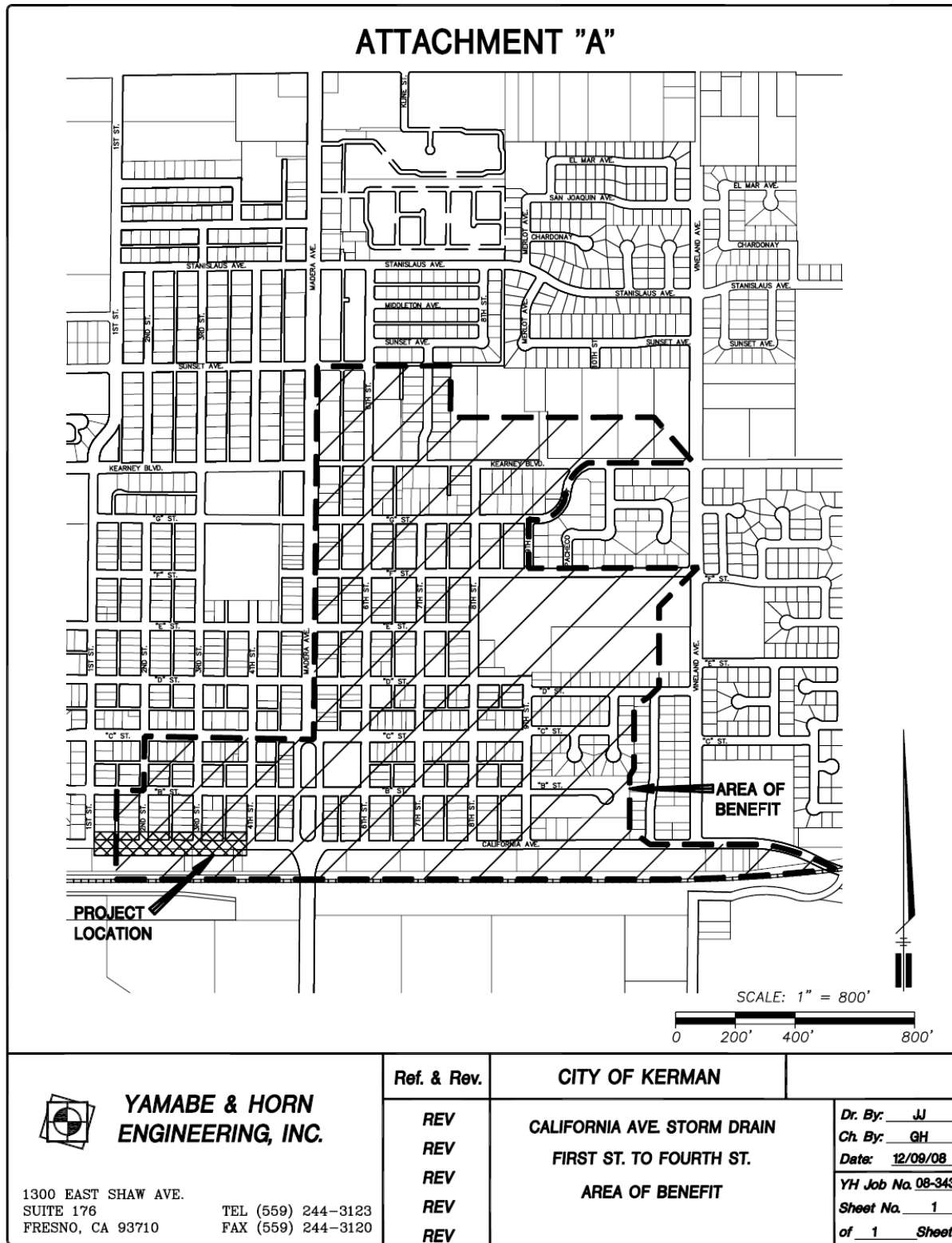
Benefits (Avoided Losses): Possible flooding to approximately 425 homes and businesses and one elementary campus valued in excess of \$42,000,000

Schedule: Within 2-5 years, dependent on funding.

Status: 2009 project, not yet commenced



Figure 9. City of Kerman Storm Drain Project Area of Benefit





2. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought, Agricultural hazard

Issue/Background: The Kings subbasin underlays the City of Kerman and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Kerman has become a joint power authority of the North Kings Groundwater Sustainability Agency, other members of the Agency include the County of Fresno, City of Fresno, City of Clovis, Biola Community Services District, Garfield Water District and International Water District. As a member of the North Kings GSA, the City of Kerman is required to participate in the development and implementation, no later than January 31, 2020, of a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the North Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Kerman.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: City of Kerman City Manager and North Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments, General Fund, and California Department of Water Resources Grants and Loans.

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: 2018 project, in progress

3. ADDRESS CYBER ATTACK PREVENTION

Hazard(s) Addressed: Cyber Terrorism (not profiled)

Responsible Office: City of Kerman City Manager

Priority (High, Medium, Low): High

Potential Funding: Cyber security grants, General Fund, HSGP



Schedule: 1-5 years

Status: New project in 2024

4. EMPHASIZE EFFECTIVE WEED ABATEMENT IMPLEMENTATION WITH NORTH CENTRAL FIRE PROTECTION DISTRICT TO AVOID FIRE SPREAD TO STRUCTURES OR SOURCES OF CONFLAGRATIONS

Hazard(s) Addressed: Wildfire

Responsible Office: North Central Fire Protection District

Priority (High, Medium, Low): High

Potential Funding: FEMA HMGP, HMGP Post Fire

Schedule: 1-3 years

Status: New project in 2024

5. PLANNING AND RESPONSE STRATEGIES FOR CHEMICAL, HAZMAT, OR OTHER EVENTS THAT THREATEN PUBLIC HEALTH OR TRANSPORTATION

Hazard(s) Addressed: All hazards

Responsible Office: City of Kerman City Manager

Priority (High, Medium, Low): High

Potential Funding: U.S. Department of Transportation Hazardous Materials Emergency Preparedness Grants

Schedule: 1-5 years

Status: New project in 2024

6. ADOPTING BUILDING CODES TO MITIGATE EARTHQUAKE DAMAGE

Hazard(s) Addressed: Earthquake

Responsible Office: City of Kerman City Manager

Priority (High, Medium, Low): High

Potential Funding: General Fund, BRIC

Schedule: 1-5 years

Status: New project in 2024

7. PUBLIC EDUCATION FOR NATURAL HAZARDS

Hazard(s) Addressed: All hazards

Responsible Office: City of Kerman City Manager

Priority (High, Medium, Low): High

Potential Funding: General Fund, HMGP, HMGP Post Fire, BRIC, FMA



Schedule: 1-3 years

Status: New project in 2024

Annex G: City of Kingsburg





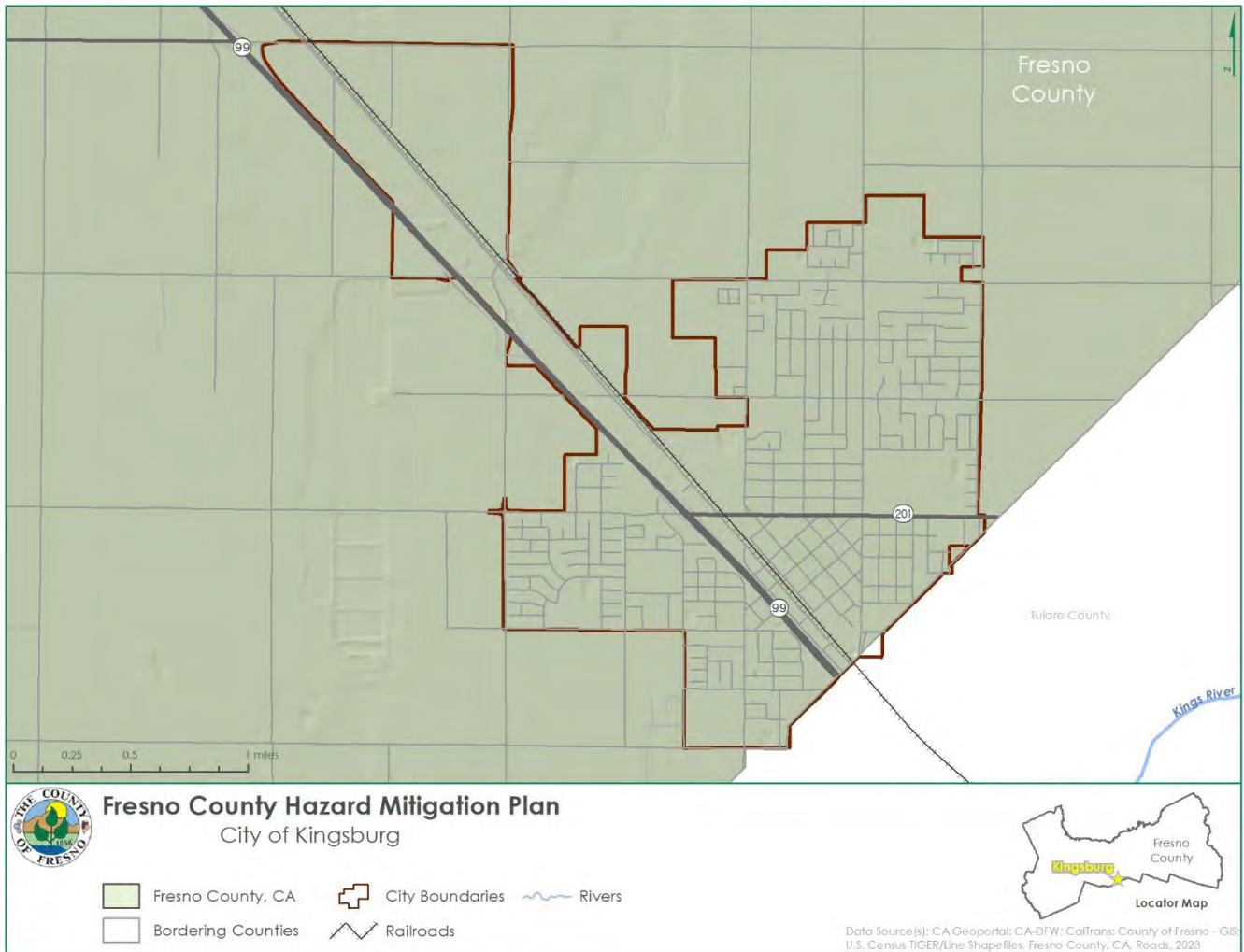
PARTICIPATION

To update the City of Kingsburg's jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of Kingsburg's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of Kingsburg did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee. These stakeholders are identified in Appendix B.

COMMUNITY PROFILE

Figure 1. The City of Kingsburg displays a map displays the location of the City of Kingsburg within Fresno County.

Figure 1. City of Kingsburg

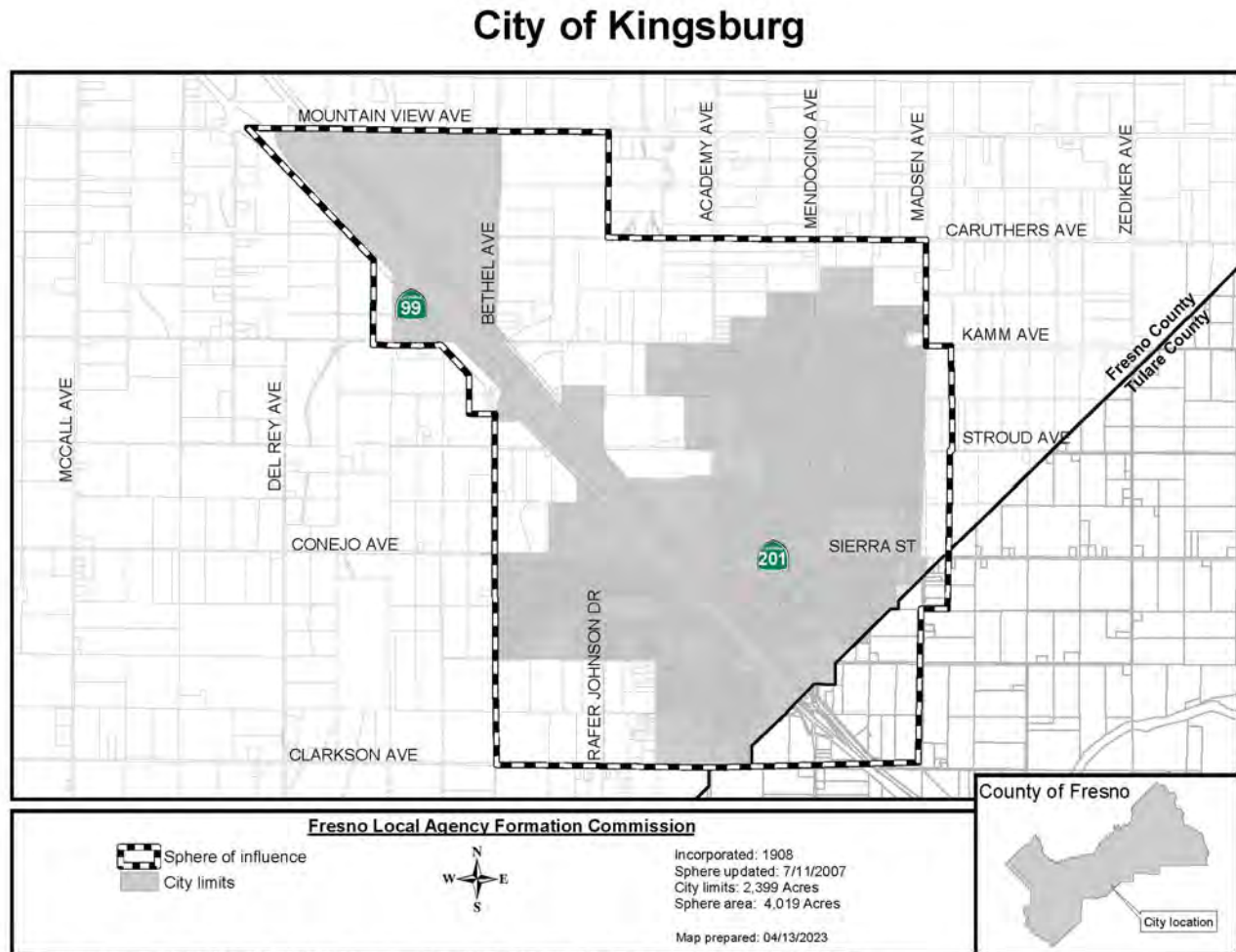


Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads, 2023

GEOGRAPHY AND CLIMATE

The City of Kingsburg is a corporate city in Fresno County in the San Joaquin Valley of California. The City limits encompass 2,399 acres and the Sphere of Influence covers 4,019 acres, shown in **Figure 2. City of Kingsburg Limits and Sphere of Influence.**

Figure 2. City of Kingsburg Limits and Sphere of Influence



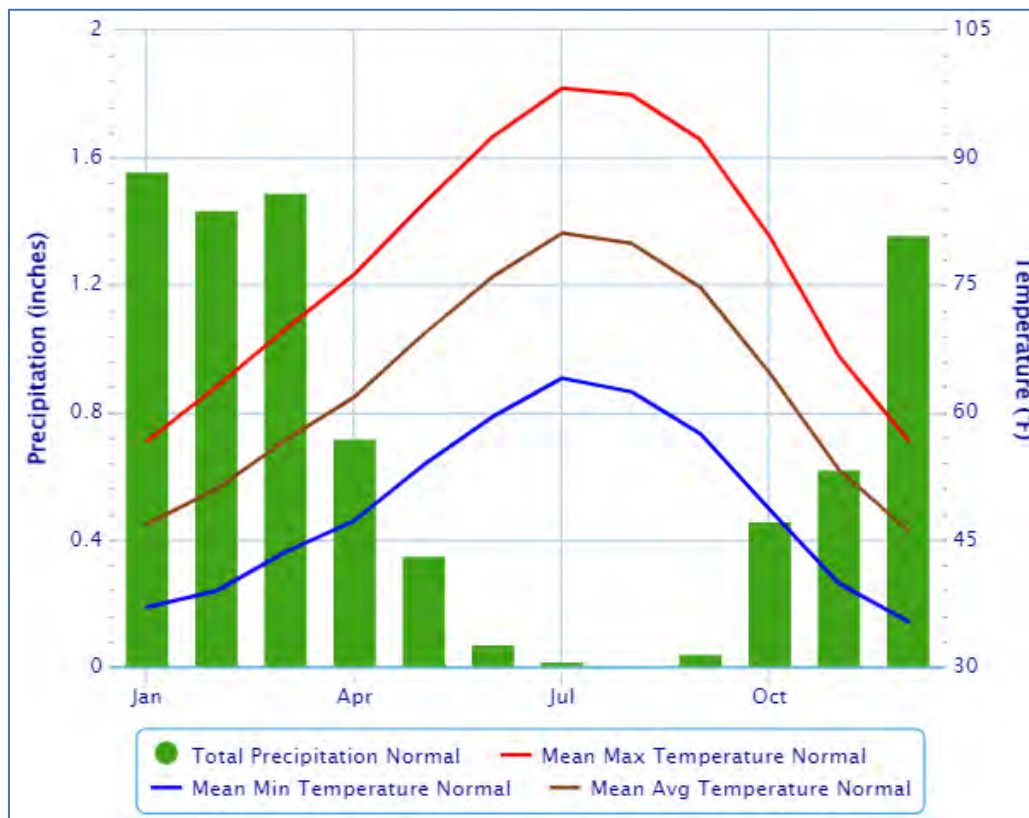
Source: Fresno Local Agency Formation Commission,
https://www.fresnolafo.org/files/4ffefed6c/Kingsburg_04132023.pdf

Over the past decade, the City has annexed a significant amount of land in the northwestern reaches of its Sphere of Influence toward the City of Selma, along California State Highway 99 and the Union Pacific Railroad.

Kingsburg is directly southeast of the City of Selma and approximately 20 miles south of the County seat, the City Kingsburg. Kingsburg sits directly adjacent to Tulare County on its eastern and southern boundaries, and Kings County is one mile to the south. The Union Pacific Railroad and California State Highway 99 both run through the middle of the City. The Kings River, a major waterway that starts in the Sierra Nevada Mountains and runs through the lower part of the San Joaquin Valley, is close to the City's southern and eastern boundaries.

Kingsburg's climate can be described as Mediterranean. The summers are hot and dry, and winters are characterized by moderate temperatures and light precipitation. Temperatures and rainfall for Kingsburg are typical of that of the rest of Fresno County. **Figure 3. Monthly Temperature and Precipitation: Hanford Municipal Airport** shows the monthly normal temperature and precipitation for the nearest National Weather Service (NWS) weather station which is 10 miles east of the Hanford Municipal Airport.

Figure 3. Monthly Temperature and Precipitation: Hanford Municipal Airport



Source: National Weather Service (NWS)

HISTORY

Kingsburg was established in the 1870s, when the now Union Pacific Railroad was laid through the heart of the San Joaquin Valley, and when cattle raising, and wheat production were the principal economic activities. The City was originally established in 1873 as a railroad stop called "Kings River



Switch” and was settled primarily by Swedish immigrants. This culture persisted, earning the community the nickname “Little Sweden.” The City was later incorporated in 1908. The first highway was built around 1912 and connected Kingsburg to Sanger to the north. By 1925, raisin production and packing had become the City’s main industries. To this day, agriculture remains the integral to Kingsburg’s economy and Swedish influence can still be seen in the City’s architecture.

ECONOMY

Kingsburg is primarily a bedroom community. Development in the City is 72 percent residential, 20 percent commercial, and 8 percent industrial, which limits the sales and property tax base. Kingsburg has diversified its economy over the past decade, though agriculture remains the primary industry around the City, and supports economic development within the City. The largest employers in Kingsburg include Sun-Maid Raisins (700 employees), Guardian Glass (297 employees), Kingsburg Elementary School District (268 employees), and Sacramento Container Company (121 employees), and Central CA Sheets (65 employees).¹

The City has developed an industrial park on Golden State Boulevard and Stroud Avenue at Highway 99 and a 45-acre commercial park west of Highway 99 and north of Sierra Street. The City’s downtown area, known as the “Swedish Village,” has specialty shops, restaurants, and businesses. Select estimates of economic characteristics for the City of Kingsburg are shown in **Table 1. City of Kingsburg's Economic Characteristics**.

Table 1. City of Kingsburg's Economic Characteristics

Characteristic	City of Kingsburg
Families below Poverty Level	6.4%
All People below Poverty Level	9.6%
Median Family Income	\$83,242
Median Household Income	\$74,897
Per Capita Income	\$32,155
Population in Labor Force	5,426
Population Employed	5,128
Unemployment	5.5%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Kingsburg’s Employment by Occupation and **Table 3. City of Kingsburg's Employment by Industry** show how the City of Kingsburg’s labor force breaks down by occupation and industry based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Kingsburg’s Employment by Occupation

Occupation	# Employed	% Employed
Management, Business, Science, and Arts Occupations	1,593	31.06%



Occupation	# Employed	% Employed
Sales and Office Occupations	1,250	24.38%
Service Occupations	1,038	20.24%
Production, Transportation, and Material Moving Occupations	757	14.76%
Natural Resources, Construction, and Maintenance Occupations	490	9.56%
Total	5,128	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Kingsburg's Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care and Social Assistance	1,100	21.45%
Retail Trade	612	11.93%
Arts, Entertainment, and Recreation, Accommodation, and Food Services	442	8.62%
Agriculture, Forestry, Fishing and Mining	278	5.42%
Public Administration	396	7.72%
Wholesale Trade	136	2.65%
Other Services, Except Public Administration	313	6.10%
Professional, Scientific and Management, and Administrative, and Waste Management Services	430	8.39%
Finance and Insurance, and Real Estate and Rental and Leasing	187	3.65%
Transportation and Warehousing, and Utilities	213	4.15%
Construction	419	8.17%
Manufacturing	602	11.74%
Information	0	0.00%
Total	5,128	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

POPULATION

According to the U.S. Census Bureau's 2022 Population Estimate for the City of Kingsburg is estimated at 12,613. Select demographic and social characteristics for the City of Kingsburg from the 2022 American Community Survey are shown in **Table 4. City of Kingsburg's Demographic and Social Characteristics**.



Table 4. City of Kingsburg's Demographic and Social Characteristics

Characteristics	City of Kingsburg
Gender/Age	
Male	46.7%
Female	53.3%
Median Age	37.6
Under 5 Years	4.8%
Under 18 Years	25.9%
65 Years and Over	17.4%
Race/Ethnicity	
White	68.5%
Asian	6.8%
Black or African American	0.6%
American Indian/Alaska Native	0.3%
Hispanic or Latino (of any race)	46.8%
Education	
High school graduate or higher	85.7%
Disability Status	
Population 5 years and over with a disability	14.9%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Kingsburg's planning team identified hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Kingsburg (see **Table 6. City of Kingsburg - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Kingsburg.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Kingsburg - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Moderate	12 to 24 hours*	Less than 24 hours*	Medium*
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours	Medium*
Drought	Possible	Limited	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Limited	Large	Less than 6 hours	More than 1 week	Medium*
Flood/Levee Failure	Possible	Critical	Negligible	More than 24 hours	Less than 1 week	Medium
Hazardous Materials	Highly Likely	Critical	Large	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Limited	Small	N/A	N/A	Medium
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	High
Fog	Likely	Limited	Large	More than 24 hours	Less than 24 hours	Medium*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Low*
Soil Hazards						
Erosion	Likely	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Possible	Minor	Negligible	N/A	N/A	Low
Land Subsidence	Possible	Minor	Limited	N/A	N/A	Medium
Landslide	Possible	Minor	Negligible	12 to 24 hours*	Less than 6 hours*	Low
Volcano	Unlikely	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Possible	Limited	Negligible	12 to 24 hours*	More than 1 week*	Low*

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*



VULNERABILITY ASSESSMENT

The intent of this section is to assess Kingsburg's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk of hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Kingsburg - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Kingsburg's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

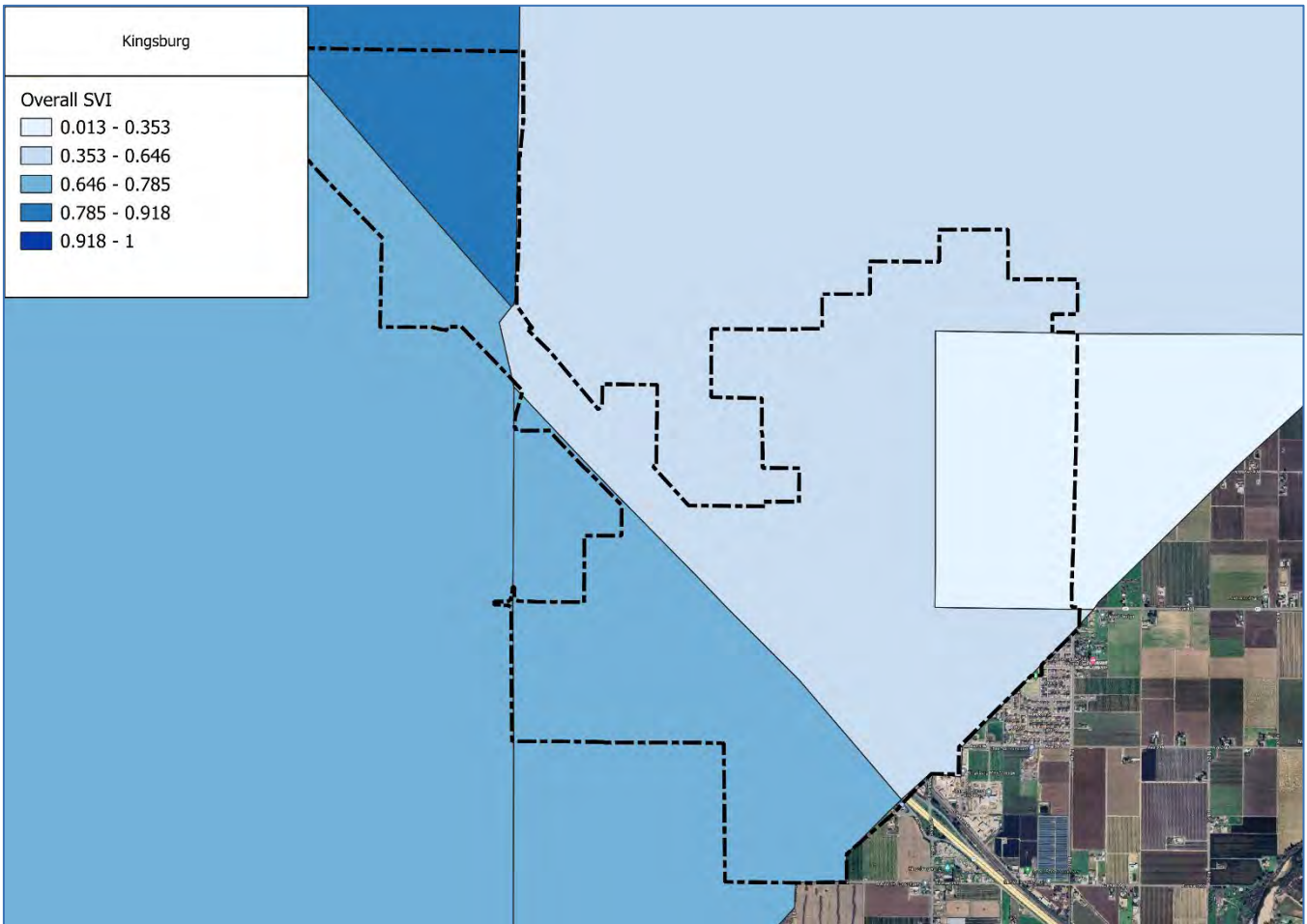
The hazard summaries in **Table 6. City of Kingsburg - Hazard Summaries** reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Kingsburg, census tracts with a higher SVI are clustered near the northern and western portion of the City, as shown in **Figure 4. City of Kingsburg Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.). ²

Figure 4. City of Kingsburg Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Kingsburg City Boundary

ASSETS AT RISK

This section considers Kingsburg's assets at risk, including values at risk, critical facilities and infrastructure, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

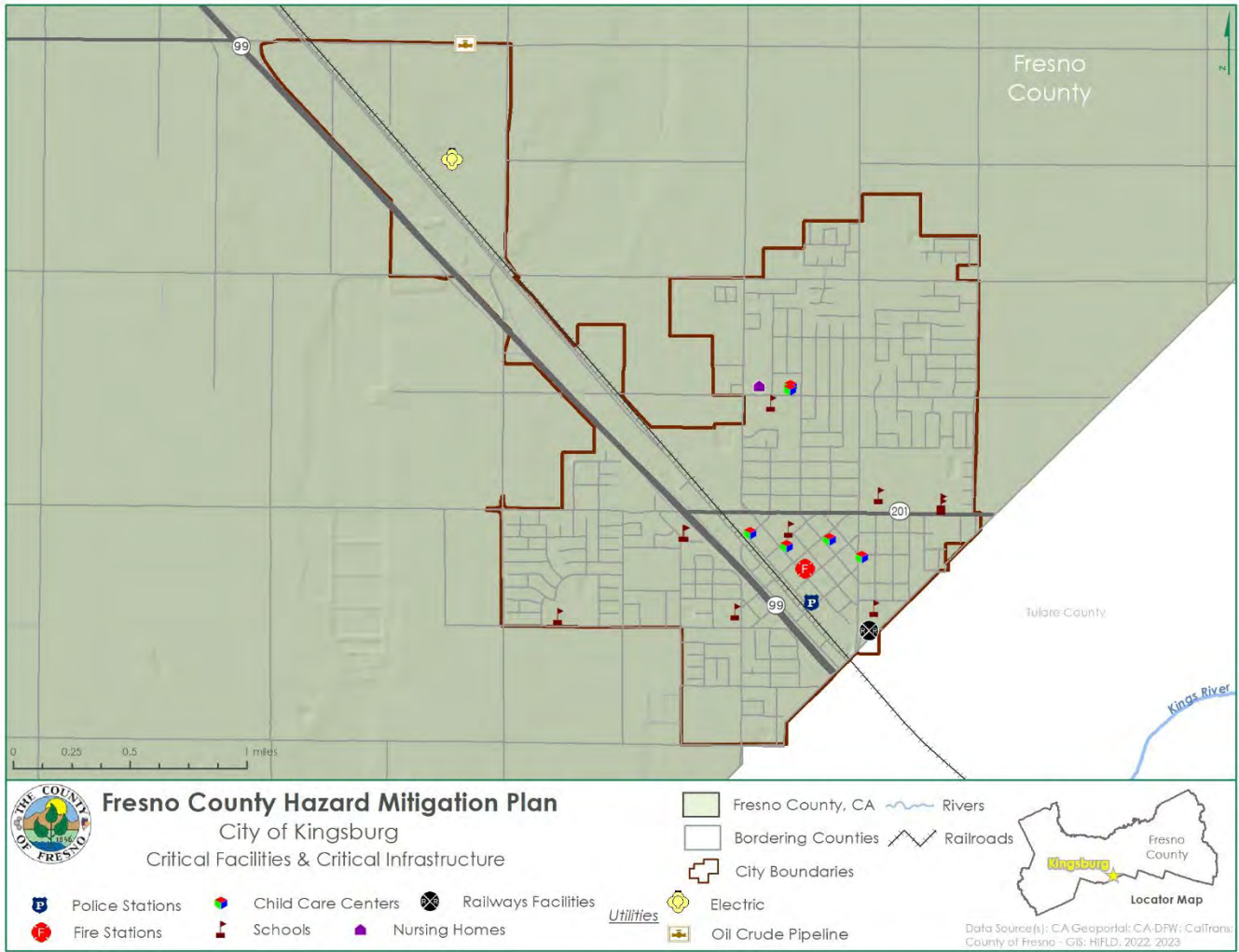
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Kingsburg from Fresno County GIS is provided in **Table 7. City of Kingsburg's Critical Facilities.** and mapped in **Figure 5. City of Kingsburg Critical Facilities.**

Table 7. City of Kingsburg's Critical Facilities

Critical Facility Type	Count
CalARP	5
Fire Station	2
Oil Crude Pipelines	1
Police	1
School	11
Total	19

Source: Fresno County

Figure 5. City of Kingsburg Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS, HIFLA, 2022, 2023



Table 8. Specific Critical Facilities and Other Community Assets Identified by the City of Kingsburg's Planning Team lists particular critical facilities and other community assets identified by Kingsburg's planning team as important to protect in the event of a disaster.

Table 8. Specific Critical Facilities and Other Community Assets Identified by the City of Kingsburg's Planning Team

Name of Asset	Replacement Value (\$)	Occupancy/Capacity #	Hazard Specific Info/Comments
City Hall	\$376,531	28	Unreinforced masonry
Fire Department – Downtown Station	\$2,224,747	N/A	Unsecured perimeter
Fire Department – Bethel Avenue Station	\$1,923,264	N/A	Close proximity to railroad system
Kingsburg Elementary School District (5 schools)	N/A	2,445	Some campuses do not have secured facilities
Kingsburg High School District (one main campus, one alternative education center)	N/A	1,279	Open campus

Source: Fresno County

GROWTH AND DEVELOPMENT TRENDS

Table 9. City of Kingsburg's Change in Population and Housing Units illustrates how the City has grown in terms of population and number of housing units between 2017 and 2022.

Table 9. City of Kingsburg's Change in Population and Housing Units

2017 Population	2022 Population Estimate	Estimated Percent Change 2017-2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017-2022
11,794	12,490	+5.90%	4,016	4,482	+11.60%

Source: U.S. Census Bureau

Due to County boundaries on the east and south, all growth potential is in the west and north areas of the City. The City has developed a commercial/business park on the north side of Sierra Street in the northwest area of town. Also, there are two new industrial parks on the north area of town on the west side of Simpson Street (Golden State Boulevard).

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk section of the main plan.



ESTIMATING POTENTIAL LOSSES

Fresno County's assessor's data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Impacts of past events and vulnerability to specific hazards are further discussed below in accordance with the criteria identified under the Vulnerability Assessment section and the Hazard Summaries table above. (See the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County).

AGRICULTURAL HAZARDS (MEDIUM)

The lands surrounding Kingsburg (in Kingsburg, Kings, and Tulare counties) are all in agricultural production (dairy, citrus, grapes/raisins, and nuts). Crop losses in the surrounding area due to hazards have economic impacts in Kingsburg. Some of the primary businesses in Kingsburg are agricultural, including Del Monte and Sun Maid Raisin. Kingsburg's agriculturally based economy is vulnerable to freezes, heat waves, flooding, and insect infestations. A freeze in the winter of 2006 affected the citrus industry and the heat wave in the summer of 2006 affected the dairy and poultry industries. Non-weather-related hazards such as disease outbreaks (i.e., listeria, E. coli) can impact agriculture. For example, recently a Kingsburg farm experienced a fruit recall due to a listeria outbreak.³

Any time a hazard-related event results in reduced crop or product production, Kingsburg is negatively impacted by loss of revenue to major businesses. The associated unemployment affects the crime rate, housing market, local businesses, and the City's sales tax revenues.

DAM FAILURE (MEDIUM)

Kingsburg is in the mapped inundation area of Pine Flat Dam. Pine Flat Reservoir is located in the foothills of the Sierra Nevada Mountains, approximately 30 miles northeast of Kingsburg. The construction of the 429-foot Pine Flat Dam on the Kings River was completed in 1954. The project's primary purposes are flood control, irrigation, water conservation, and recreation. When completely full, Pine Flat Reservoir is 20 miles long, holds 1 million acre-feet of water, and covers 5,790 acres with 67 miles of shoreline. The upper Kings River is the main tributary that fills the reservoir. According to the Kings River Conservation District, "in the event of a major release from Pine Flat Dam, downstream flooding could occur over agricultural lands near the riverbanks and possibly within the Cities of Reedley and Kingsburg." The Kings River is located approximately one mile, at its closest, from Kingsburg's eastern, southeastern, and southern boundaries. In June 2017, Pine Flat Dam had to release significant water due to flooding along the Kings River, prompting evacuations and levee breaches near Kingsburg. Additionally, Between June 18 and June 29, significant water releases from Pine Flat Dam caused flooding along the Kings River, prompting evacuations and levee breaches near Kingsburg, affecting homes, and prompting a large-scale sandbagging operation. The second levee breach on June 24 threatened 90 homes in Tulare County, leading to the evacuation of 300 people and damaging 7 structures. Water levels receded by June 29 after releases from the dam were reduced on June 26, ending the immediate flood threat.

³ Kingsburg farm has fruit recalled after Listeria outbreak (sjvsun.com) <https://sjvsun.com/ag/kingsburg-farm-has-fruit-recalled-after-listeria-outbreak/>



DROUGHT (HIGH)

Groundwater is the source of domestic water supply for Kingsburg. The groundwater basin is recharged primarily by rainfall and infiltration, stormwater runoff, infiltration from irrigated ditch flows and seepage in the Kings River bottom, and water conservation recharge to natural sloughs in the nearby agricultural area. In October 2007, the City's water utility was operating at maximum peak performance due to drought conditions. Drought may also lead to agricultural losses in the surrounding area, which may impact the City economically.

EARTHQUAKE (MEDIUM)

Kingsburg is located in Seismic Hazard Zone 3. The nearest active earthquake faults are located more than 55 miles to the east in the Sierra Nevada range. Kingsburg has experienced several noticeable ground movement incidents, such as from the 1983 Coalinga earthquake and the 1989 Watsonville earthquake, but no local damage was sustained. The existence and extent of soil liquefaction hazards in the area of Kingsburg are unknown.

In 2018, The planning team identified approximately 36 unreinforced masonry buildings in the City. The majority of the unreinforced masonry buildings are downtown, which is very much a community asset. The downtown area, with its Swedish theme, is the community's major attraction. It is referred to as Historic Swedish Village. City Hall is the only critical facility that is an unreinforced masonry building.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Clovis' vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (MEDIUM)

Heavy rain can lead to problems with storm drainage and create localized flood problems. According to the City of Kingsburg Storm Drain Master Plan, there are several flooding problem areas in the City. These areas are primarily a result of undersized pipes where runoff exceeds pipe capacity even for minor storms, damaged curb and gutters where the flow lines have been disrupted due to raised gutters and other obstructions, or damaged drainpipes.

Most damaged lines are downtown, where the storm drainpipes are some of the oldest in the system. The undersized lines are located along Kern Street near Roosevelt Elementary School and along Mariposa Street near Lincoln Elementary School. Areas with curb and gutter flow line damage are generally in the older residential areas, including the areas south and west of Kingsburg High School. The downtown areas along Washington, Lincoln, and Lewis streets also have damaged curbs and gutters.



Prior to the construction of the Pine Flat Dam in the 1920s, flooding occurred in the Kings River area. However, today there is no flood hazard area mapped by FEMA within the City of Kingsburg.

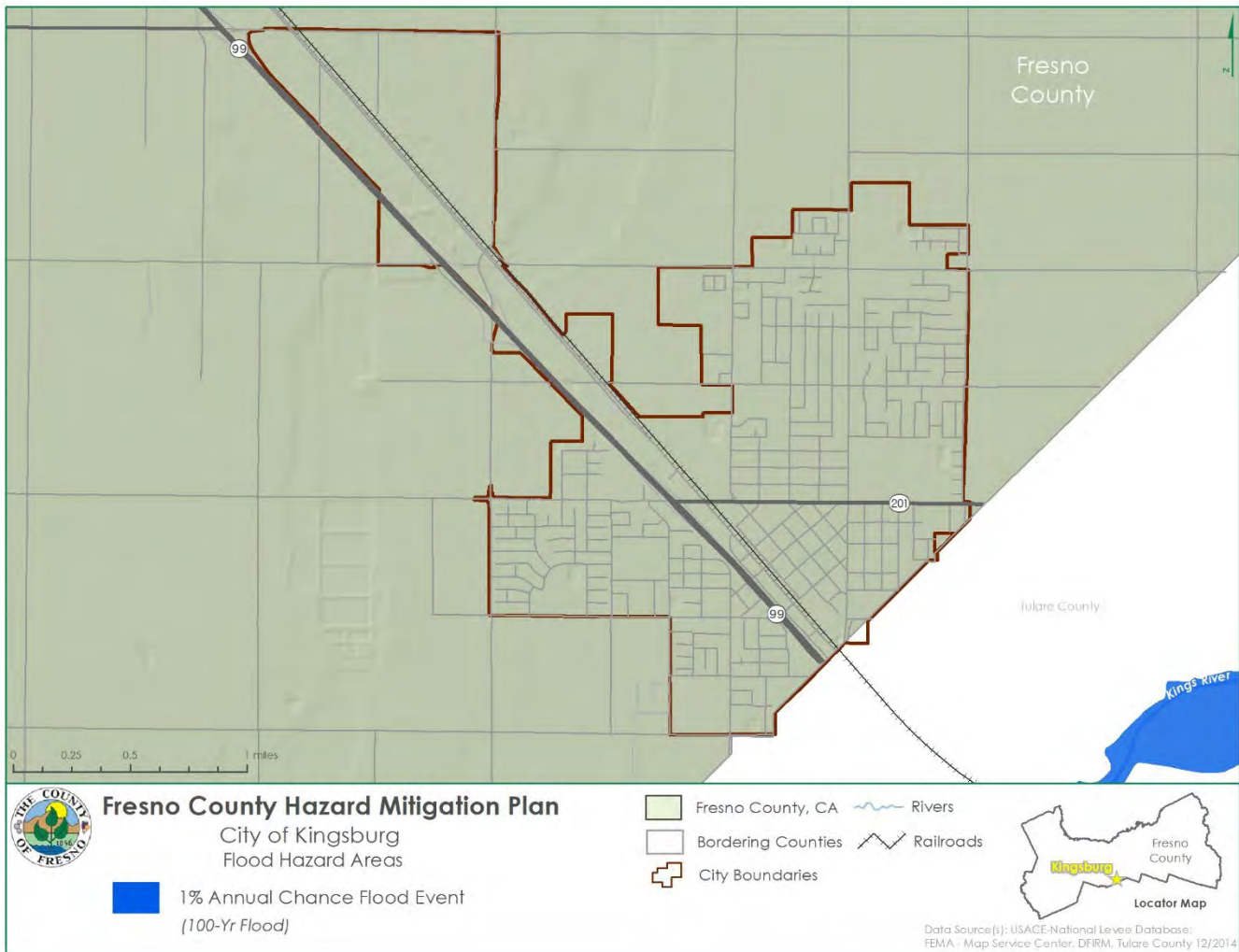
Recent flood events are described below

- **6/19/2017:** Between June 18 and June 29, significant water releases from Pine Flat Dam caused flooding along the Kings River, prompting evacuations and levee breaches near Kingsburg, affecting homes, and prompting a large-scale sandbagging operation. The second levee breach on June 24 threatened 90 homes in Tulare County, leading to the evacuation of 300 people and damaging 7 structures. Water levels receded by June 29 after releases from the dam were reduced on June 26, ending the immediate flood threat.
- **5/29/2019:** Following cool temperatures, the area warmed up on May 28, leading to seasonable conditions and daily afternoon showers and thunderstorms due to abundant moisture. On May 31, storms in the mountains contributed to heavy rainfall, snowmelt, and significant runoff, causing river levels in the San Joaquin Valley to rise rapidly, notably along the Kings River due to Pine Flat Dam releases. This led to flooding at Lindy's Landing campground near Reedley and the Kings River Golf and Country Club near Kingsburg from May 29, continuing beyond month's end.
- **6/01/2019:** Because of continued increased releases at Pine Flat Dam. Runoff continued to produce flooding at Lindy's Landing campground near Reedley, and the Kings River Golf and Country Club near Kingsburg well into June. The releases were cut back during the middle of the month and the flood waters receded by the evening of June 19.

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Kingsburg joined the National Flood Insurance Program (NFIP) on November 30, 1983. NFIP Insurance data indicates that as of March 19, 2024, there were two flood insurance policies in force in the City with \$1,388 in total premium or total paid. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties, and zero claims located in the jurisdiction. **Figure 6. City of Kingsburg Flood Hazard Areas** shows the FEMA mapped 100- and 500-year floodplain around the City of Kingsburg. Based on the latest FEMA flood data, the floodplains are outside of the City of Kingsburg. The 100-year floodplain is along Kings River in Tulare County.

Figure 6. City of Kingsburg Flood Hazard Areas



Source: USACE National Levee Database; FEMA – Map Service Center, DIRM, Tulare County 12/2014



HAZARDOUS MATERIALS INCIDENT (HIGH)

California State Highway 99 and the Union Pacific Railroad both run through the heart of Kingsburg. With these two main transportation corridors comes the potential and history of major incidents involving loss of life and property.

Incidents such as those mentioned in the fog section above not only affect Highway 99, but also affect local streets and traffic due to detours through the City. Along with the potential for death and injuries from large-scale motor vehicle accidents, there is the potential for hazardous material spills or fires as numerous commercial transportation vehicles travel Highway 99 with various types and quantities of hazardous materials.

The Union Pacific Railroad is a strictly commercial freight transportation system. Large quantities and numerous types of hazardous materials are transported through Kingsburg by rail on a daily basis. In 1947, a collision occurred between a passenger train and a semi-truck hauling gasoline at the Union Pacific railroad crossing and Sierra Street in Kingsburg, killing four people and injuring 129. The rail line was closed for several days, but the specific closures and damage are no longer known. Warning devices have since been approved. However, due to the increased rail and vehicle traffic in the City, this type of accident may occur again in the future. Of particular concern is the large number of liquefied petroleum gas vessels that are transported on the system. A derailment and fire, with large exploding liquefied petroleum gas vessels, could cause widespread damage to the City, as has happened in other communities across the country.

Large quantities of hazardous materials are used by the agricultural industry and thus travel through Kingsburg and are stored and used in the surrounding areas. Also, there is the potential for hazardous materials releases from large industrial plants in Kingsburg, such as Guardian Glass and Del Monte.

There have been 6 hazardous materials incidents from 2017-2022 that have occurred in the City of Kingsburg. Of the 6 incidents, there have been 1 pipeline, 1 railroad, and 4 railroad non-release. There were no injuries or deaths during the time period, however, there were 4 fatalities from the a railroad and railroad non-release incidents that occurred 2017, 2019, and 2022. ⁴ There are five CalARP hazardous materials facilities located in the City of Kingsburg.

SEVERE WEATHER: EXTREME HEAT (HIGH)

The City has increased the risk ranking for extreme heat based on the increase of temperatures since the last plan update. Daytime highs can exceed 110 degrees Fahrenheit and pose a significant risk to the public, but especially to outdoor workers and individuals with access and functional needs. The City has a Heat Prevention Plan to protect the city and its residents from extreme heat impacts such as extreme heat illness which can be deadly. The City does have a cooling station plan administered by the Community Services Department. The fire and police stations, city hall, and the senior center serve as cooling centers. Kingsburg has a high population of elderly residents that are vulnerable during extreme heat events.

SEVERE WEATHER: FOG (MEDIUM)

Severe fog events have contributed to multi-vehicle traffic accidents with multiple casualties along Highway 99 in Kingsburg. The most recent large events occurred in 1998 along Highway 99 and



Avenue 384 (dense fog caused a chain-reaction accident involving 74 vehicles, killing two and injuring 51) and in 2000 along Highway 99, a major traffic artery in California, between Bethel and Mountain View avenues. The planning team reported that fatal accidents related to severe fog events occur in the area every year. About every five years, there is a major incident involving several vehicles. A similar event is highly likely to occur again in the future, especially with the expansion of Highway 99 from four to six lanes and the increase in highway usage.

These incidents require assistance from the City's emergency responders and also cause traffic to be diverted through the town, increasing the number of accidents there. Kingsburg does have a fog plan that involves constant replacement of signage and street stripping to maintain visibility. The school districts implement a foggy day schedule when needed.

A few of the previous fog events that have occurred are described below.

- **November 1998:** Dense fog caused a chain-reaction accident involving 74 vehicles along a one-mile stretch of Highway 99 near Kingsburg. Two people were killed, 51 others injured.
- **February 2008:** Two nights of dense fog resulted in a 10-15 car pileup on the morning of the 11th near Kerman west of Fresno, where there were no injuries, and newspaper accounts of only minor property damages. However, the fog was a major factor in a series of chain-reaction accidents on Highway 99 near Kingsburg during the morning of February 12th. At least four separate accidents occurred, involving at least 40 vehicles, and resulting in at an estimated 10 people being injured.

WILDFIRE (LOW)

Similar to many areas of the County, Kingsburg has high temperatures in the summer with low rainfall creating fire hazard conditions. Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a wildfire map for the City of Kingsburg was created. An analysis was performed using GIS software to determine where populations, values at risk, and critical facilities are located within wildfire threat zones. According to this assessment, there is no value at risk to wildfire within the city. There are not any critical facilities in wildfire threat zones in the City of Kingsburg.

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Kingsburg's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 10. City of Kingsburg Mitigation Capability Summary**.

Table 10. City of Kingsburg Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability	X		
Fiscal Capability		X	
Available Staff	X		
Political Support/Interest		X	
Community Support		X	

REGULATORY MITIGATION CAPABILITIES

Table 11. City of Kingsburg's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Kingsburg.

Table 11. City of Kingsburg's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X		2022 CBC			



Community Emergency Response Team (CERT)	X					
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X				
Fire Code	X		2022 CFC			
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance		X				
Land Use/Development Planning	X		2017 General Plan			
National Flood Insurance Program (NFIP)		X				
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready		X				
Stormwater Management Plan/Ordinance	X					
Subdivision Regulations/Ordinance	X					
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance	X					

PLANNING MITIGATION CAPABILITIES

Table 12. City of Kingsburg Planning Capabilities identifies the plans related to mitigation and loss prevention in Kingsburg.

Table 12. City of Kingsburg Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes	No	Annually adopted/updated
Climate Resiliency or Adaptation Plan	No	No	
Community Wildfire Protection Plan (CWPP)	No	No	
Comprehensive Emergency Management Plan	No	No	Adopted/updated by Fresno County
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes		
Continuity of Operations Plan (COOP)	Yes		Adopted/updated just updated April 23



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Disaster Recovery Plan	No		
Economic Development Plan	Yes		
Emergency Operations Plan (EOP)	Yes		April 23 updated/adopted
Evacuation Plan	No		
Flood Response Plan	No		
Floodplain Management Plan/Flood Mitigation Plan	No		
Hazard Mitigation Plan	Yes	Yes	Partner with the County
Historic Preservation Plan	Yes		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	Yes		
Threat Hazard Identification and Risk Assessment	No		

COMPREHENSIVE GENERAL PLAN FOR THE SWEDISH VILLAGE OF KINGSBURG, 1992

The Kingsburg General Plan reflects the City's long-range aspirations (15-20 years) of physical form and amenity and provides guidance for developmental regulations, such as zoning and subdivision ordinances. Two of the plans' goals, in particular, support hazard mitigation. These goals and their policies are included below.

GOAL 8: SEISMIC HAZARDS

Goals for achieving and maintaining safety from seismic events include preventing serious injury, loss of life, serious damage to critical facilities involving large assemblies of people, and loss of continuity in providing services.

- The City will inventory all buildings which are unsound under conditions of "moderate" seismic activity; buildings having questionable structural resistance should be considered for either rehabilitation or demolition. Structures determined by the City's building official to be structurally unsound are to be reported to the owner and recorded with the County recorder to insure that future owners are made aware of hazardous conditions and risks.
- All new building construction shall conform to the latest seismic requirements of the Uniform Building Code as a minimum standard.
- The present building height limit of 50 feet shall be maintained, with a maximum of four stories. This policy should stay in force until such time that high rise construction is desired and capability for evacuation and fire fighting in upper stories is possible through the availability of appropriate equipment.
- Facilities necessary for emergency service should be capable of withstanding a maximum credible earthquake and remain operational to provide emergency response.



- Soil compaction tests, and geotechnical analysis of soil conditions and behavior under seismic conditions shall be required of all subdivisions and of all commercial, industrial and institutional structures over 6,000 square feet in area (or in the case of institutional structures, those which hold 100 or more people).
- The City should adopt an Earthquake Disaster Plan in coordination with Fresno County and local special districts. The plan should identify hazards that may occur as the result of an earthquake of major magnitude. The plan should be sufficiently broad in scope to include the designation of evacuation routes and means to coordinate all local government agencies in assisting local residents in the event of a major earthquake, large-scale fire or explosion, or hazardous chemical spill or release of hazardous airborne gas.
- All lines which are part of the domestic water distribution system should be looped to assure adequate pressure in the event of major fire, earthquake, or explosion. Adequate emergency standby power generation capability should be available at water wells to assure water availability in the event of a major power failure.

GOAL 9: PUBLIC SAFETY HAZARDS

Goals for public safety seek to reduce loss of life or property due to crime, fire, earthquake, or other disasters or hazards, provide adequate medical and emergency services to reduce the effects of natural or manmade disasters, promote citizen awareness and preparedness for emergency/disaster situations or potential for the incidence of crime, and implement adequate interagency disaster planning.

- The City will continue to maintain and update emergency service plans, including plans for managing emergency operations, the handling of hazardous materials, and the rapid cleanup of hazardous materials spills.
- The City will continue to cooperate with the County of Fresno and other agencies in pre- disaster planning activities, such as evacuation required in the event of a serious spill of hazardous chemicals.
- The City will seek to reduce the risks and potential for hazards to the public through planning and zoning practices and regulations which avoid hazardous land use relationships and by the continued and timely adoption of new edition building and fire codes.

The general plan's Hazard Management Element incorporates the Safety Element of the Fresno County General Plan by reference "to the extent that these original elements apply to the Kingsburg Planning area."

CITY OF KINGSBURG STORM DRAIN MASTER PLAN, 2005

The primary purposes of the City of Kingsburg's Storm Drain Master Plan were to assess the existing storm drain system, determine system deficiencies, recommend cost-effective improvements to correct identified deficiencies, and identify facilities and costs for planned orderly expansion of the system to provide for planned future growth within the planning area (for purposes of flood control and groundwater recharge). The 2005 plan is an update to the 1982 plan. It considers drainage system

improvements and development that has occurred since the previous plan and incorporates the latest growth plans envisioned by the City.

The current drainage system collects surface runoff in pipelines that drain to a series of retention basins located through the City. The plan includes recommendations for additional retention basins or improvements to provide the required capacity.

NORTH KINGSBURG SPECIFIC PLAN, 2005

The North Kingsburg Specific Plan serves as the primary instrument of the City of Kingsburg for carrying out urban development proposals of the Comprehensive General Plan for the Swedish Village of Kingsburg as they apply in North Kingsburg, where future development in the City is focused. The plan addresses stormwater drainage as an issue associated with proposed growth and states that all surface water drainage facilities will be designed in conformance with the City of Kingsburg Storm Drain Master Plan.

WATER CONSERVATION ORDINANCE

City of Kingsburg Municipal Code 13.04.070 addresses water conservation (water waste). It specifies when watering is allowed for irrigating lawns, shrubs and trees (i.e., days and times or restrictions)

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 13. City of Kingsburg's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Kingsburg.

Table 13. City of Kingsburg's Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		City Manager	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X			Contract with peters engineering
Fiscal Management or Procurement Specialists	X		Finance Division	
Floodplain Manager		X		
Land Surveyors		X		
Land Use/Management/Development Planning	X		Community Development	
Planners or engineers with an understanding of natural and/or human-caused hazards	X			Peters Engineering
Resource Development Staff or Grant-writing	X			Consultants - Townsend



Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)		X		
Staff with education or expertise to assess the community's vulnerability to hazards		X		

FISCAL MITIGATION CAPABILITIES

Table 14. City of Kingsburg's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 14. City of Kingsburg's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)			X	
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fee			X	PG&E
Water/Sewer Fees			X	
Stormwater Utility Fees		X		
Development Impact Fees			X	
General Obligation, revenue, and/or Special Tax Bonds		X		
Partnering Agreements or Intergovernmental Agreements			X	
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, BRIC)		X		
Homeland Security Grants (HSGP)			X	
USDA Rural Development Agency Grants	X			



US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			

MITIGATION OUTREACH AND PARTNERSHIPS

The City of Kingsburg has an existing water responsible program and annual fire safety programs in schools and throughout the year at special community events. The City of Kingsburg Fire Department recently agreed to an automatic aid agreement for fire and emergency medical services with the Fresno County Fire Protection District. They also have mutual aid agreements with Kings and Tulare county fire departments.

OTHER MITIGATION EFFORTS

The City has implemented mitigation efforts in the past. Examples that were not covered elsewhere in this section include the following:

- The City has installed auxiliary power sources on three municipal water wells.
- The City's Building Department has standards on building elevations in reference to curbs and gutters based on past practice.
- The City has designated cooling centers and secondary sites if needed during a heat emergency. City Recreation Department staff would assist in staffing these sites, and the City would provide for water and other basic needs.
- The Kingsburg Police Department and the California Department of Transportation have a plan to divert traffic from Highway 99 in the event of fog-related traffic accidents.
- Kingsburg has a fog plan that involves constant replacement of signage and street striping to maintain visibility. The school districts implement a foggy day schedule when needed.
- The City requires, on average, pad elevation of 1 ½ feet above flow line of gutter in residential development, which prevents most flood damage.

OPPORTUNITIES FOR IMPROVEMENT ENHANCEMENT

Based on the capabilities assessment, the City of Kingsburg has existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. The opportunities for enhancement of the City's existing mitigation program are listed below.



- Develop a Drought Contingency Plan that will create a framework for drought response and mitigation.
- Update the 2005 City of Kingsburg Storm Drain Master Plan

MITIGATION STRATEGY

The City of Kingsburg modified the goals and objectives developed by the Fresno County Hazard Mitigation Planning Committee to better fit the City's needs. The City of Kingsburg's mitigation goals and objectives are the following:

MITIGATION GOALS AND OBJECTIVES

The City of Kingsburg adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy. In the 2024 update, the City has proposed to consider adding one new goal which states, "provide additional resources and training opportunities for local government in disaster preparedness and response."

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Economic Development Coordinator may utilize the hazard information when developing business incentives and the Public Works Department may utilize the information when implementing new infrastructure projects. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Kingsburg will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting. The 2018 plan was integrated into the city's Emergency Operations Plan (EOP), Emergency Operations Center (EOC) workflow, and noted within the Safety Element of the General Plan.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1983. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.

COMPLETED 2009 MITIGATION ACTIONS

The City of Kingsburg completed two mitigations actions identified in the 2009 plan. These completed actions are as follows:

- Conduct Disaster Response Training
- Replace Storm Drains on Lewis and Washington Streets



These completed actions have reduced vulnerability to hazards and increased local capability through improved hazard event preparation.

MITIGATION ACTIONS

The planning team for the City of Kingsburg identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are included.

In addition to implementing the mitigation actions below the City of Kingsburg will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program, with an emphasis on drought. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate the information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.



1. ENHANCE TRAFFIC DIVERSION SYSTEM -- INSTALL PERMANENT ILLUMINATING MESSAGE AND DIRECTIONAL SIGNS, IMPROVE STREET STRIPPING, AND POSSIBLY WIDEN THE DETOUR ROUTE, SIMPSON STREET THROUGH THE CITY OF KINGSBURG.

Hazard(s) Addressed: Multi-Hazard: Earthquake, flooding, severe weather, wildfire,

Issue/Background: California State Highway 99 runs through the center of Kingsburg. Historically, when major issues (i.e., major motor vehicle accidents) shut the highway down, traffic is detoured through the City of Kingsburg. The street that traffic is normally diverted onto is Simpson Street (Golden State Boulevard) from Mendocino Avenue at the south to either Bethel or Mt. View avenues on the north. Simpson Street is one of two main north/south arteries that run through Kingsburg.

Several times a year, a significant event occurs on Highway 99, and traffic is diverted onto Simpson Street, especially during the fog season. This diversion typically causes problems for the normal City traffic flow as well as the diverted traffic off of the highway. The City has taken measures to minimize the impact on local traffic by placing traffic signal lights at the two main east/west street arteries, Sierra and Draper streets. Assistance is needed to ensure the diverted traffic has a clear and adequate detour through the City with minimal impact on the community and its public safety entities. With the current road conditions and signage on Simpson Street, detoured traffic often gets off course and confused. There are then thousands of Highway 99 vehicles driving around the City, which causes problems for both the routine traffic patterns and public safety. Local police must then deal with trying to keep diverted traffic on course and the problems associated with an influx of heavy traffic onto side streets that are not designed for the increased traffic load (i.e., additional motor vehicle accidents). Fire and ambulance services are also affected by slower responses due to the influx of traffic.

Other Alternatives: The City could divert highway traffic through County side streets to minimize the impact on the heavier population of Kingsburg. There are no County streets that are clearly marked or as easily accessible as Simpson Street.

Responsible Office: City of Kingsburg Public Works

Priority (High, Medium, Low): High

Cost Estimate: \$154,780 (stripping cost: \$40,000; four new electronic LED outdoor message signs: \$114,780)

Potential Funding: California Office of Traffic Safety grants and U.S. Department of Transportation

Benefits (Avoided Losses): This would greatly reduce the impact to major state corridor Highway 99, motor vehicle accidents, injuries, City of Kingsburg public safety, and traffic flows.

Schedule: Expected completion in 2030

Status: In progress

Comments: Phase 1 is complete and working with COG and Measure C funding on Phase 2. The city already completed part of the stripping, and we are waiting for improvements to be completed by Fresno COG/Measure C by Fresno Transportation Authority.

2. CREATE EMERGENCY EVACUATION PLAN FOR LARGE SCALE INCIDENT

Hazard(s) Addressed: Multi-Hazard: dam failure, flood, earthquake, severe weather, wildfire



Issue/Background: Summer 2017 there was significant flooding around the Kings River area East of Kingsburg. Tulare County and Kingsburg City could have been better prepared to handle the evacuation. Kingsburg would benefit from a plan to evacuate during large scale incidents. Evacuation planning should include the evacuation of the City of Kingsburg as well as receiving evacuees into the City.

Other Alternatives: No action

Responsible Office: Kingsburg Fire Department

Priority (High, Medium, Low): High

Cost Estimate: \$10,000

Potential funding: General Fund or HMGP, HMGP Post Fire, BRIC

Benefits (Avoided Losses): Having a plan in place will reduce the potential loss of life and property.

Schedule: Expected completion in 2035

Status: In progress

3. IDENTIFY HIGH RISK AND HIGH VALUE TARGET AREAS*

Hazard(s) Addressed: Multi-Hazard: Hazardous materials incident, dam failure, levee failure

Issue/Background: Due to the rise in mass shooting incidents, and ongoing terror threats both foreign and domestic, preplanning would be helpful in identifying target areas. Once identified, steps can be taken to minimize losses.

Other Alternatives: No action

Responsible Office: Kingsburg Fire Department

Priority (High, Medium, Low): High

Cost Estimate: \$15,000

Potential funding: General Fund

Benefits (Avoided Losses): Once target areas are identified, threat assessments can be done for each site. Preplans can then be updated to reduce loss of life and property. Updates can be added to the city's Emergency Operation Plan.

Schedule: Expected completion in 2030

Status: In progress

Comments: As part of the city's 2024 EOP update all current high risk target hazards have been identified

4. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought, Agricultural hazards



Issue/Background: The Kings subbasin underlays the City of Kingsburg and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Kingsburg has become a joint power authority of the South Kings

Groundwater Sustainability Agency, other members of the Agency include the City of Fowler, City of Parlier and City of Sanger. As a member of the South Kings GSA, the City of Kingsburg is required to participate in the development and implementation, no later than January 31, 2020, of a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the South Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Kingsburg.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: Public Works and South Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments, General Fund, and California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: In progress

Comments: The city is working with the appropriate water basin to become compliant with SGWA.

5. IDENTIFY PREPAREDNESS AND RESPONSE GAPS FOR SERVING THE UNSHELTERED, PHYSICALLY DISABLED, AND INDIVIDUALS SUFFERING FROM SERIOUS MENTAL ILLNESS DURING A DISASTER

Hazard(s) Addressed: Multi-Hazard

Issue/Background: Individuals who are unhoused, disabled, have access and functional needs, or mental illness may experience gaps in preparing and responding to disasters and therefore may result in disproportionate impacts and increased exposure and risk.

Other Alternatives: None

Responsible Office: City of Kingsburg City Manager



Priority (High, Medium, Low): High

Cost Estimate: Varies by activities

Potential Funding: General Fund or HMGP, HMGP Post Fire, BRIC

Benefits (Avoided Losses): Decrease loss of life, illness, and injuries.

Schedule: Expected completion in 2038

Status: New activity in 2024

Annex H: City of Mendota





PARTICIPATION

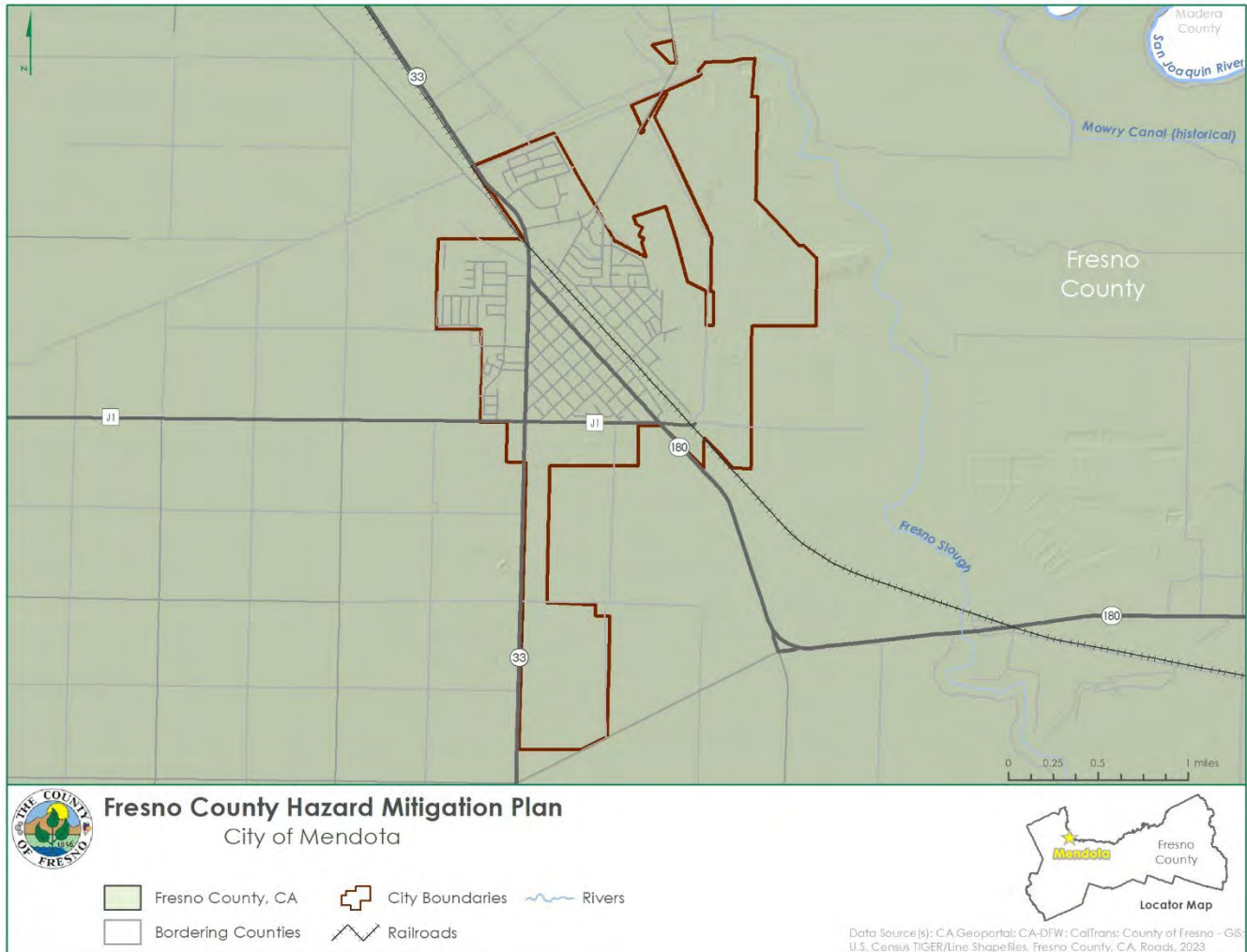
To update the City of Mendota’s jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O’Brien’s consulting team provided opportunities for the City of Mendota’s input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of Mendota did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee. These stakeholders are identified in Appendix B.



COMMUNITY PROFILE

Figure 1. City of Mendota Boundaries displays a map and the location within Fresno County of the City of Mendota.

Figure 1. City of Mendota Boundaries



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads, 2023

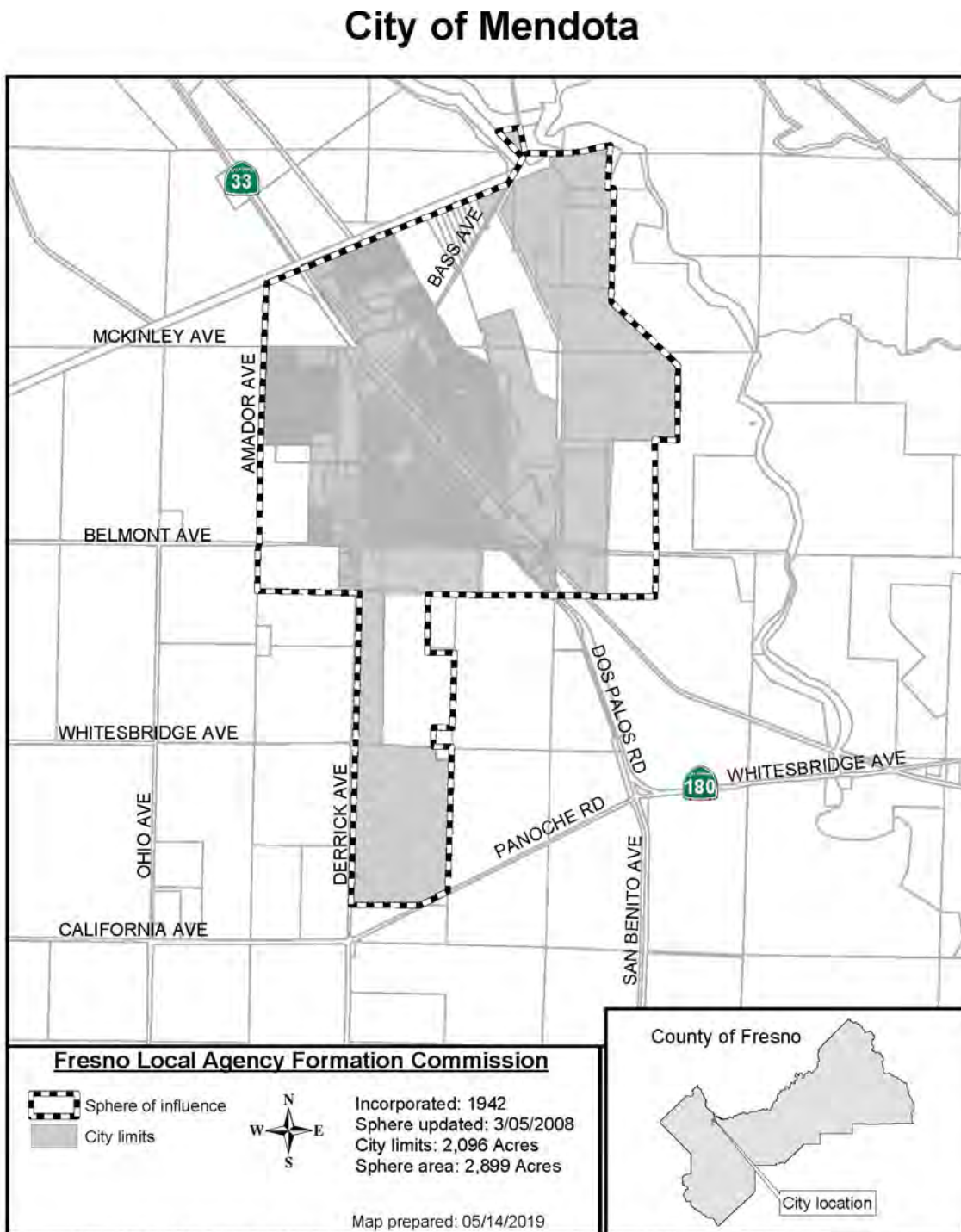


GEOGRAPHY AND CLIMATE

The City of Mendota sits in the central part of the San Joaquin Valley. The City is approximately 40.6 miles west of the City of Fresno, where California State Highway 180 and Highway 33 meet. While surrounded by thousands of acres of agricultural lands, the City of Mendota does have some neighbors. The City of Firebaugh lies eight miles to the north, and Kerman and San Joaquin are also nearby to the east and southeast, respectively.

The City limits encompass 2,096 acres and the Sphere of Influence encompasses 2,899 acres, shown in **Figure 2. City of Mendota Limits and Sphere of Influence**. The City boundary and the Sphere of Influence have expanded significantly over the past decade, with most growth occurring in the north of the City as well as some annexations in the west.

Figure 2. City of Mendota Limits and Sphere of Influence



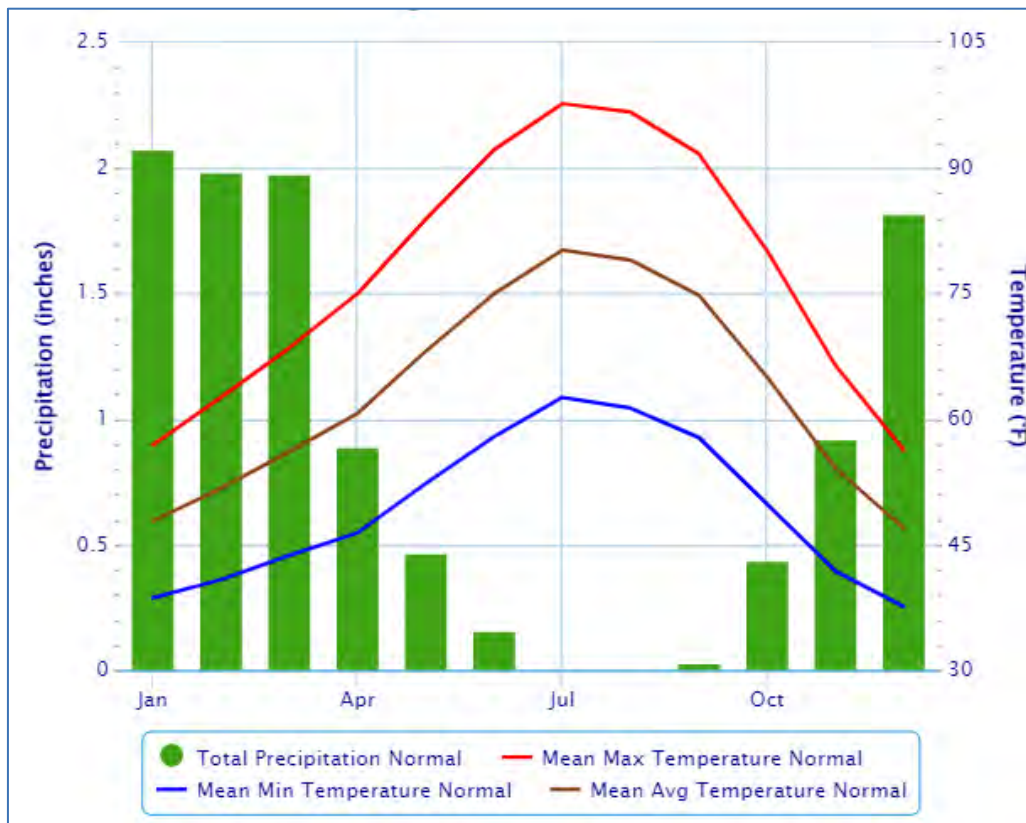
Document path: G:\LAFCO WORKING FILES\GIS Layers and Maps\00-LAFCo Maps\Cities\Mendota\Mendota_050119.mxd

Source: Fresno Local Agency Formation Commission,
https://www.fresnolafco.org/files/6150e2fe7/Mendota_050119.pdf

The City of Mendota has a relatively flat terrain profile. Approximately 25-30 miles to the west is the Coast Range. In all other directions, the terrain is flat agricultural lands. Just north of the City is the conflux of the Delta-Mendota Canal (DMC), the Helm Canal, the San Joaquin River, and the Fresno Slough. These collect into the Mendota Pool, which discharges into the San Joaquin River and then on to the San Francisco Bay Delta. To the east is the 12,000-acre Mendota Wildlife Refuge for Pintail and Snow Geese species.

The closest national weather service station is located in Los Banos, California, which is about 33 miles traveling distance north of Mendota. The City experiences high temperatures that range from 40-50 degrees Fahrenheit in the winter and 100-110 degrees Fahrenheit in the summer. The average rainfall is about 9.5 inches per year. **Figure 3. Madera Municipal Airport Monthly Normals for Precipitation and Temperature (1991-2020)** shows the monthly normal for temperature and precipitation at the nearest National Weather Service (NWS) weather station which is about 27 miles northeast of the city at the Madera Municipal Airport.

Figure 3. Madera Municipal Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: National Weather Service (NWS)

HISTORY

In 1891, the Southern Pacific Railroad established a storage and switching facility at the site of present-day Mendota, allegedly to avoid the unruly town of Firebaugh. This service point was unusually large and well-equipped and included a roundhouse and repair facilities. In 1868, under governmental



pressure, the Mendota Pool was built to facilitate ship passage on the river, but regulations were eventually changed, and the turntable gate was never used.

By 1900, a good-sized business district had grown around the train station. Development slowed abruptly in 1910 when the railroad discontinued use of the roundhouse. To make matters worse, the largest landowner sold off his holdings at about the same time, ending his support of the local economy.

For a time, a diatomite mine operated in the area. That industry, together with the increasing number of farm workers who resided in the town, brought pressure for municipal services, and Mendota incorporated in 1942.

In the 1950s, the State of California established the Mendota Wildlife Refuge, where, at the time, deer, elk, and migratory birds from Siberian breeding grounds would spend the winter. Although today the deer and elk are gone, the birds still migrate to the refuge for the winter. In 1964, the County established Mendota Pool Park at the site of the turntable gate, which includes an 85-acre park with launch ramp, playgrounds, and picnic areas.

ECONOMY

The most up-to-date economic data available for the City of Mendota comes from the U.S. Census Bureau by way of the American Community Survey (ACS). Select estimates of economic characteristics for the City of Mendota are shown in **Table 1. City of Mendota's Economic Characteristics**.

Table 1. City of Mendota's Economic Characteristics

Characteristic	City of Mendota
Families below poverty level	29.8%
All people below poverty level	32.7%
Median family income	\$43,301
Median household income	\$43,315
Per capita income	\$12,850
Population in labor force	5,077
Population employed	4,500
Unemployment	11.4%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Mendota's Employment by Occupation and **Table 3. City of Mendota's Employment by Industry** show how the City of Mendota's labor force breaks down by occupation and industry based on 5-year estimates from the 2018-2022 American Community Survey.

Table 2. City of Mendota's Employment by Occupation

Occupation	# Employed	\$ Employed
Natural Resources, Construction, and Maintenance Occupations	2,988	66.40%



Occupation	# Employed	\$ Employed
Production, Transportation, and Material Moving Occupations	433	9.62%
Sales and Office Occupations	370	8.22%
Management, Business, Science, and arts Occupations	351	7.80%
Service occupations	358	7.96%
Total	4,500	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Mendota's Employment by Industry

Industry	# Employed	% Employed
Agriculture, Forestry, Fishing and Hunting and Mining	3,075	68.33%
Educational Services, and Health Care, and Social Assistance	288	6.40%
Retail Trade	336	7.47%
Wholesale Trade	128	2.84%
Manufacturing	93	2.07%
Transportation and Warehousing, and Utilities	161	3.58%
Public Administration	38	0.84%
Construction	70	1.56%
Other Services, Except Public Administration	51	1.13%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	76	1.69%
Information	18	0.40%
Professional, Scientific, and Management, and Administrative and Waste Management Services	138	3.07%
Finance and Insurance, and Real Estate and Rental and Leasing	28	0.62%
Total	4,500	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

The City of Mendota's economy has been largely based on agriculture. Approximately 68 percent of the City's labor force have jobs in agriculture. Despite efforts to diversify the economy, the agriculture industry has grown in dominance as the primary employer in the City over the past 20 years. As a result, the City is particularly vulnerable to any hazards that could affect agricultural production, including agricultural hazards, drought, flood, and severe weather.

As of May 2022, the City of Mendota has 5.2 percent unemployment rate. The unemployment rate increased significantly since the last plan update in 2018, which was over 20 percent.



POPULATION

According to the U.S. Census Bureau 2022 Population Estimates, the City of Mendota has a population estimate of 12,618. Select demographic and social characteristics from the U.S. Census Bureau's 2022 American Community Survey 5-year estimates are shown in **Table 4. City of Mendota's Demographic and Social Characteristics**.

Table 4. City of Mendota's Demographic and Social Characteristics

Characteristic	City of Mendota
Gender/Age	
Male	51.7%
Female	48.3%
Median age	24.3
Under 5 years	9.8%
Under 18 years	38.5%
65 years and over	6.5%
Race/Ethnicity	
White	32.4%
Asian	0.1%
Black or African American	0.3%
American Indian/Alaska Native	0.4%
Hispanic or Latino (of any race)	97.9%
Education	
High school graduate or higher	37.2%
Disability Status	
Population 5 years and over	5.7%%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Mendota's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Mendota (see **Table 6. City of Mendota - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Mendota.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Mendota - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Moderate	12 to 24 hours*	Less than 24 hours*	Medium*
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours	Medium*
Drought	Possible	Critical	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Critical	Large	More than 24 hours	More than 1 week	Medium*
Flood/Levee Failure	Likely	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Likely	Critical	Large	Less than 6 hours	Less than 1 week	Medium*
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Limited	Large	More than 24 hours	Less than 1 week	Medium*
Fog	Possible	Limited	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Limited	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Winter Storm	Possible	Negligible	Extensive	More than 24 hours	Less than 1 week	Low*
Soil Hazards						
Erosion	Possible	Minor	Large	N/A	N/A	Low
Expansive Soils	Likely	Minor	Large	N/A	N/A	Medium
Land Subsidence	Possible	N/A	Limited	N/A	N/A	Low
Landslide	Unlikely	Minor	Negligible	12 to 24 hours*	Less than 6 hours*	Low
Volcano	Unlikely	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Possible	Limited	Negligible	Less than 6 hours*	More than 1 week*	Medium

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*



VULNERABILITY ASSESSMENT

The intent of this section is to assess Mendota's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Mendota - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Mendota's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

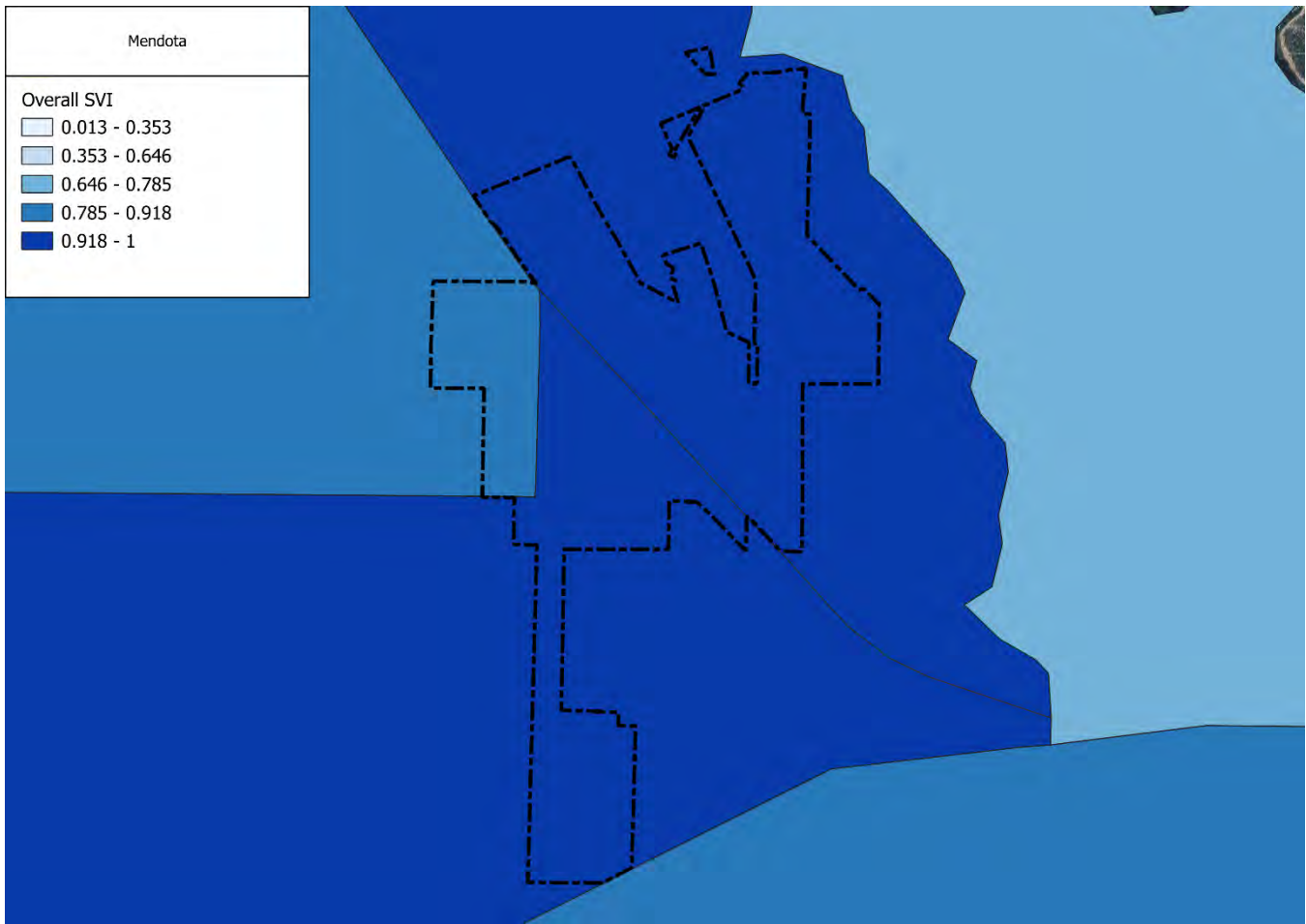
The hazard summaries in Table 6 reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Mendota, census tracts with a higher SVI encompass most of the City, as shown in **Figure 4. City of Mendota Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.).

Figure 4. City of Mendota Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Mendota City Boundary

ASSETS AT RISK

This section discusses Mendota's assets at risk, including values at risk, critical facilities and infrastructure, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

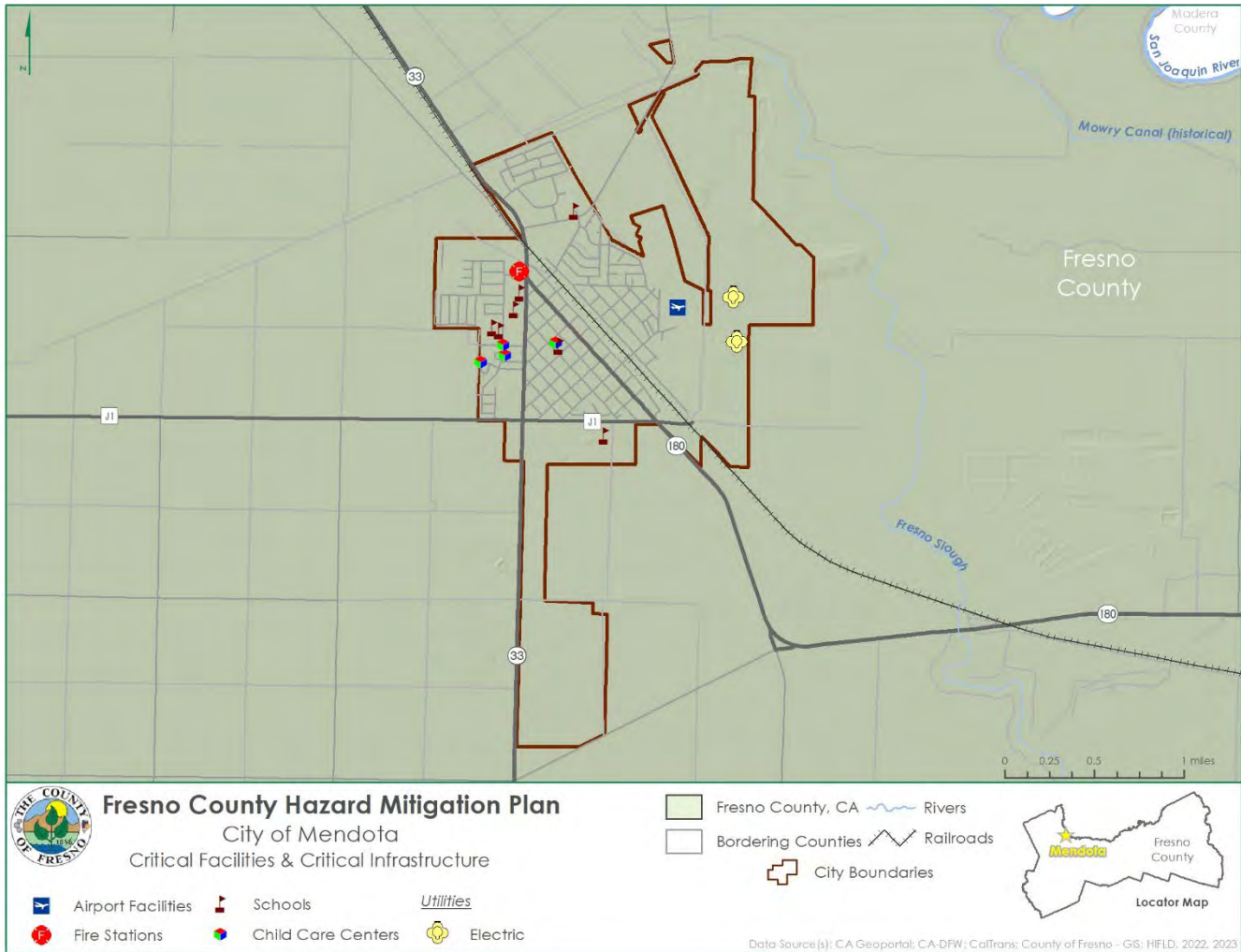
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Mendota from Fresno County GIS is provided in **Table 7. City of Mendota's Critical Facilities** and illustrated in **Figure 5. City of Mendota Critical Facilities**. The City noted that there is also a police station (near airport) and an American Ambulance station (on 6th, north of Quince).

Table 7. City of Mendota's Critical Facilities

Critical Facilities Type	Number
Airport	1
CalARP	2
Fire Station	1
School	7
Total	11

Source: Fresno County

Figure 5. City of Mendota Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; HIFLD, 2022, 2023



Table 8. Specific Critical Facilities and Other Community Assets Identified by City of Mendota Planning Team lists particular critical facilities and other community assets identified by Mendota's planning team as important to protect in the event of a disaster. It should be noted that information from the Fresno County GIS does not match this information provided by the City.

Table 8. Specific Critical Facilities and Other Community Assets Identified by City of Mendota Planning Team

Name of Asset	Replacement Value (\$)	Occupancy/Capacity #
Water Treatment Plant	\$8 million	4.5 MGD
Wastewater Treatment Plant	\$5 million	1.24 MGD
Sewer and Water System pipes	\$30 million	N/A
Mendota Municipal Airport	\$3-5 million	N/A
Natural Gas line at Water Treatment Plant	\$50,000	N/A
Mendota Wildfire Refuge	N/A	N/A

Source: Fresno County

GROWTH AND DEVELOPMENT TRENDS

Current growth trends are on three borders of the City. A new federal prison and Fresno County Library are to the south of the City in an area that has been annexed into the City limits, and new housing tracts are being built to the west and the north of the City.

Some of the growth has come in the form of infill commercial development as well. The only large and critical infrastructure development being planned for the City is an expansion of the wastewater treatment plant. New housing construction is going in as mid-range homes with on- site construction. Only 2 percent of the buildings constructed in the last year have been pre- manufactured, all belonging to the City. **Table 9. City of Mendota's Change in Population and Housing Units** illustrates how the City has grown in terms of population and number of housing units between 2017 and 2022.

Table 9. City of Mendota's Change in Population and Housing Units

2017 Population	2022 Population Estimate	Estimated Percent Change 2017-2022	2017 # of Housing Units	2022 Estimated #of Housing Units	Estimated Percent Change 2017-2022
11,396	12,603	+10.59%	2,784	3,226	+15.88%

Source: California Department of Finance, www.dof.ca.gov/research

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk section of the main plan.



ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Fresno County's assessor's data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes.

Impacts of past events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County).

AGRICULTURAL HAZARDS (MEDIUM)

Agricultural losses have cascading effects on the City of Mendota. The loss of crops from any hazard event results in loss productivity for farm owners, loss of jobs for farm workers, and loss of expendable income for use in stores. It also limits the City's revenue. In a small city like Mendota, there is even more interdependency than in larger cities, and what affects one sector affects them all. Local crops include cantaloupe, broccoli, lettuce, and alfalfa. In the recent drought period, from 2020 to 2023, Mendota farms experienced dry conditions impacting cantaloupe production, significantly impacting supply and profits.¹

DAM FAILURE (MEDIUM)

Mendota is in the mapped inundation areas for the Friant and Pine Flat dams. Containing 1 million acre-feet and 555,500 acre-feet respectively, these are the largest and second largest dams in the County.

DROUGHT (HIGH)

Mendota's water supply comes from groundwater. Extended droughts can cause decline in the local groundwater table, which can have impacts on the ability of current wells and pumps to extract necessary quantities of groundwater for use in the City.

EARTHQUAKE (MEDIUM)

Mendota is located in Seismic Zone 3 but near the boundary of the more hazardous Seismic Zone 4, which covers the foothills to the west. The Ortigalita fault is located approximately 30 miles northwest of Mendota. It is considered active and is designated an Earthquake Hazard Zone under the Alquist-Priolo Earthquake Fault Zoning Act of 1994.

In 2018, Mendota's planning team identified several important buildings that are vulnerable to seismic events and may be constructed of unreinforced masonry, which are particularly susceptible to earthquake shaking. These included the following:

- Water Treatment Plant
- Wastewater Treatment Plant
- Community Recreation and Public Works departments
- Old Mendota Library

The total number of unreinforced masonry buildings in the City is unknown. There are no hospitals built before 1973.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Mendota's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (HIGH)

According to the 2016 Flood Insurance Study, there are three basic areas of flooding in Mendota: along Belmont Avenue, the Hacienda Gardens area, and a ponded area west of Highway 33 and the railroad. There are no defined channels within the City limits of Mendota. Thus, the principal type of flooding in the City of Mendota area is sheetflow—broad, shallow, overland flooding, which is generally less than three feet deep and characterized by unpredictable flow paths. In addition, the City suffers flooding in certain residential areas, primarily along Naples Street from Second to Tenth Streets, where runoff from the westerly portion of the City itself is impeded by the elevated railroad and collects into puddles which can be as much as four feet deep. These are relieved only by the City's temporary pumps, and water can persist for 48 to 72 hours after the end of a rain event.

The main source of flooding in Mendota is heavy rains in the Coastal Range west of the City, which run off into Panoche Creek. The City of Mendota lies at an approximate elevation of 175 feet. Terrain in the study area slopes gently from the southwest to the northeast. The drainage basin of Panoche Creek originates in the Diablo Range approximately 30 miles west of the City of Mendota. The creek flows through steep mountain canyons in well-defined channels to the California Aqueduct (around the foothill line). From there to Mendota, the land is relatively flat, and the channel steadily decreases in size and carrying capacity due to siltation and vegetable growth, until it ends at Belmont Avenue. During high creek flows, stormwater floods vast tracks of agricultural land and drains into Belmont Avenue.



Landowners along Belmont Avenue sometimes construct levees parallel to the road, which act as canal banks and channel flow along Belmont Avenue to Highway 33. There, water can continue easterly on Belmont, but can also flow north along Highway 33 to Seventh Street. At that point, it flows northeast through the downtown area and adds to the flooding along Naples Street mentioned above. In 1972, the City won a Superior Court injunction against the landowners which requires them to not build levees but to allow the Panoche Creek water onto their lands in preference to flooding the City. This injunction has been irregularly enforced over the years, though in the past five years the provisions have been vigorously enforced by the City, with a corresponding decrease in the number of Belmont Avenue flood events.

The planning team for Mendota agreed that, on average, flooding occurs on Belmont Avenue twice per year but is relatively minor. Drains along Belmont Avenue become clogged with sedimentation from flood events. The City pays to remove this build-up annually. Nevertheless, a significant flood occurs every two to three years.

Urban runoff from just under 1,000 acres within the City of Mendota in general is surface flows across city streets in an east-northeasterly direction. The City of Mendota, as with much of the San Joaquin Valley, is relatively flat. Gutters have imperceptibly shallow slopes. Precise topographic surveys of various locations in the city show lengths of gutter with zero slope, others with more commonly shallow slopes of around 0.2% (0.002 feet of fall per foot.) The ground elevations fall towards the Fresno Slough and San Joaquin River to the northeast of the City, but there is currently no discharge of storm water runoff to these bodies of water. There are four storm water basins in newer developments around the perimeter of the city and those areas are not prone to flooding. The older downtown “triangle” – bounded by Derrick Ave (State Route 33) on the west, the Union Pacific Railroad to the northeast, and Belmont Avenue on the south – has very limited storm drain infrastructure.

The infrastructure within the downtown triangle is limited to surface flow conveyances such as curbs and gutters. Runoff passes through street intersections via concrete valley gutters or “bubble- ups,” which are short systems comprised of an inlet, a short length of buried pipe, and an outlet. In these systems, storm water enters the inlet from a gutter on one side of the street, fills the pipe and outlet structure until the water reaches a depth sufficient to flow out of the outlet structure and down the next gutter. Several feet of water is often left standing for months in these systems as the structures of these old systems have solid walls and the heavy clay native soil does not allow percolation.

Because of the high clay content, the City experiences only minimal percolation of standing water within basins, canals and other drainage structures. Removal of collected storm water runoff is by evaporation only. Groundwater levels under the city are 20- to 25-feet below ground surface.

The railroad that trends northwest to southeast through the City is above grade and creates a major impediment to the flow of storm water runoff across the City. Naples Street which parallels the railroad on the southerly side sees extreme flooding centered around its intersections with 2nd Street and 9th Street. Flooding overtops curbs and flood waters have lapped up against the door thresholds of adjacent residential homes. During these events, the street is impassable and there is a threat to public safety due to pedestrian and vehicular mobility risks.

There is a pump station at the intersection of 2nd and Naples that moves water from that intersection under the railroad tracks to a curb outlet structure at the 2nd and Marie Street intersection. The pumps are equipped with variable speed controllers, and when run at full speed their output can exceed the capacity of the 2nd Street gutter flow, but even that is not sufficient to dewater the Naples and 2nd Street intersection during even a moderate storm event. In an effort to mitigate this situation, the City constructed a small basin that, by the use of a diversion valve on the forcemain, can accept some of the water pumped from 2nd & Naples when, during big rain events, they need to run the pumps at maximum speed. During less-intense rains, when a slower pump operating speed is adequate, they bypass this basin and direct all water down the 2nd Street gutter.



The intersection of Naples and 9th Street is a local low spot. There is no pump station there, which means storm water begins to collect in every storm regardless of the intensity. This problem is exacerbated because when 2nd and Naples floods, water breaks over at 4th Street, and flows southeast along both sides of Naples, eventually reaching and adding to the flooding at 9th Street. At that intersection, there is a system of curb inlets and buried pipe which runs through a private property to the south to discharge into an open channel which runs through a second private property and then discharges on a third private property outside the southeast city limits. This pipe system does not have the capacity to handle even moderate-intensity rain events. When water floods the 9th Street intersection, the only relief currently available is by temporary pump either at the inlet at 9th Street or at the inlet at 10th Street. From 9th Street, water must be pumped over the adjacent railroad tracks to a curb and gutter, when then flows to the storm water retention pond at the Mendota Airport. From 10th Street, water can be pumped onto the private property mentioned above, where it eventually flows to the open channel.

A major storm water management concern is the occasional flood of silty water that comes down Belmont Avenue when a storm in the Coast Range mountains causes Panoche Creek to flood. Flood waters spill over the creek banks 6.75 miles west of the City and flow eastward on Belmont Avenue. A court injunction dating to the 1970s has mandated that the farmers with land adjacent to Belmont must keep their earthen berms below the crown grade of Belmont Avenue, but this is often ignored. The result is causing silt-laden floodwaters to reach the City at the southwest corner of town. During especially high flows, the flood water over tops the intersection of Derrick Ave (State Route 33) and heads northeasterly along Derrick Avenue, across 7th Street, and then easterly through the heart of downtown. This water can easily cross Oller Street, compounding the flooding at 9th Street and Naples. There is a large (48"-72") diameter storm drain in Belmont Avenue, running east from the west end of Derrick Avenue. This pipe largely provides detention of runoff as it discharges into an open channel at the southeast corner of town on the same private property mentioned above. The invert at the end of the pipe is lower than the flowline of the receiving open channel; therefore, water ponds up in the pipe (similar to the bubble-up systems) before it reaches the flowline elevation of the open channel. This causes both standing water in the pipe and a large build-up of sediment and debris from the Panoche Creek flood waters within the pipe. This is a burden to maintain.

Flows from the two open channels at the southeast corner of town historically continued in an open channel about a mile southeast of town where it discharged into the Fresno Slough. Earthmoving operations on the agricultural land (orchard trees) blocked this discharge many years ago.

In 2010, the City entered into an agreement with the San Luis & Delta Mendota Water Authority (SLDMWA) to drop water from this open channel into the San Luis Drain (SLD) via a gate valve where the channel crosses the SLD near Belmont Ave, east of State Route 180. This agreement was a good will gesture by the SLDMWA. The agreement has no specific term, and maybe cancelled at any time. The City is currently allowed to store water in a 2-mile stretch of the SLD between the Belmont ditch and Bass Avenue to the north until the stored water reaches a depth of 8-feet. This threshold has been met before. When that happens, city staff must bring a temporary pump to relieve the SLD by pumping water into a future wastewater disposal pond at the City's Wastewater Treatment Plant. Without the SLD, the City would not have any means to sufficiently manage their storm water, but this arrangement won't work at such time as the City begins utilizing more of the ponds at the Wastewater Treatment Plant to deal dispose of additional treated effluent from the growing city.

The current system of storm water management does not include a discharge to the Fresno Slough, Mendota Pool, San Joaquin River or other regulated body of water. It relies on the SLD and vacant waste water treatment ponds; neither of which are sustainable.

The planning team identified areas of localized stormwater flood problems. The drainage system for storm- and wastewater is an intricate system that spans across the entire City. There are only three

pumps in the system, one that pumps the water from one gutter under the McCabe Elementary school grounds to the gutters on the other side, one to minimize the constant flooding across Highway 33 in town, and one to move water past the railroad tracks. The City often utilizes an additional temporary pump to minimize the flooding along the west side of the railroad tracks. The rest of the system relies on gravity and was not designed to convey typical stormwater flows. There are several points along the system that will pool water, as the slope is so minimal that the water does not move through the system quickly enough.

The Chowchilla Canal Bypass, constructed by the State of California, reduces flood potential in the Mendota-Firebaugh area. The bypass starts approximately five miles east (upstream) of the City of Mendota and can carry approximately 9,000 cfs of San Joaquin River floodwater around the two communities to return it to the river at a point where channel capacity is great enough to carry the flow.

Previous flood events that impacted the City include the following:

- **October 1, 1976:** This flood damaged 15 homes and 12 businesses for an estimated \$44,430 loss. Rains in the hills west of Mendota contributed to runoff in the Panoche-Silver Creek and water flooded into City limits. The flooding occurred along Belmont Avenue. Agricultural and infrastructure damage is unknown. According to a report from the American Red Cross, the organizations provided “canteen service” to about 300 people on the levee and sheltered 75 people at their church shelter.
- **1991:** Rains in the hills west of town caused massive flooding along Belmont Avenue and cut the high school off from the rest of the City. The flooding also limited the ability for Highway 180 traffic to pass through, which decreased potential business traffic in the City. Additional costs to the City were associated with temporary dams constructed by the Public Works Department.
- **1995:** Floodwaters, caused by Panoche Creek runoff channeled along Belmont Avenue, filled streets and caused widespread damage.
- **July 2016:** A summer rain event that occurred in the Coastal Range overflowed Panoche Creek and flooded Belmont Avenue and downtown Mendota. This occurred with no rain falling in the vicinity of Mendota. Estimated cost of damages and clean-up was documented at \$25,000.

According to FEMA’s 2005 Flood Insurance Study, damaging floods also occurred in the area in April 1958 and January-February 1969. Details on these events follow:

- **April 1958:** In this flood, a discharge of 5,090 cfs was recorded on Panoche Creek. Flooding began approximately 10 miles west of the City of Mendota and spread in a fan shape to the northeast for 5 to 10 miles. Approximately 9,700 acres of agricultural land (mostly west of the City of Mendota) and some residential property in the southwest part of the City were flooded. Damage was estimated at \$460,000. Up to five feet of floodwater remained in some areas for as many as 30 days. Crops were destroyed, or production was severely reduced, extensive cleanup and restoration of agricultural land and improvements were required, streets and homes were damaged, and traffic was disrupted. Extensive flood fighting prevented flood damage that otherwise would have occurred.
- **January-February 1969:** The largest known discharge on Panoche Creek (5,400 cfs) was recorded in February 1969, which was during the largest rainfall season on record. Flooding began approximately 10 miles west of the City of Mendota and spread in a fan shape to the northeast for 5



to 10 miles. Approximately 18,400 acres, predominantly agricultural, were flooded. Damage approximated \$1.8 million. Large quantities of silt and debris were deposited on fields and orchards, and oil and gas pipelines were undermined. Residential damage in Mendota was minor due to flood fighting efforts.

- **February 1998:** Runoff from heavy rains in the hills west of Mendota caused a major flood. The drainage system, which was designed to handle 300 cfs, received 7,000 cfs, causing three feet of water to flood and close Belmont Avenue. This event cut off the high school from the rest of City and severely limited the ability for traffic on Highway 180 to pass through. This event also caused business losses due to inability for most vehicles to access the City commercial area. The only recorded costs for the flood are from the Public Works Department: approximately \$32,500 in labor and equipment was spent to fight and clean up the flood.

One recent flood event that occurred in Mendota is described below.

- **3/02/2019:** A strong storm system on March 2 brought light to heavy precipitation to central California, with thunderstorms causing flooding and a tornado near Mendota. The Southern Sierra Nevada received 1 to 3 inches of liquid precipitation, while the San Joaquin Valley and Kern County Mountains accumulated up to an inch of rain. The storm, which initially held snow levels above 8000 feet, exited the region by March 3 after dropping snow levels to around 5000 feet and leaving the Kern County Deserts with up to half an inch of rainfall.

VALUES AT RISK

Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a flood map for the City of Mendota was created (see **Figure 6. City of Mendota Flood Hazard Areas**). **Table 10. City of Mendota's FEMA 1% Annual Chance Flood Hazard by Property Type** and **Table 11. City of Mendota's FEMA .2% Annual Chance Flood Hazard by Property Type** summarize the values at risk in the City's 100-year and 500-year floodplain, respectively.



Table 10. City of Mendota's FEMA 1% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Primary Use Not Designated	2	\$0	\$0	\$0	\$0
Single-Family Residence	5	\$812,913	\$256,398	\$1,069,311	\$267,328
Vacant	3	\$20,670	\$255,251	\$275,921	\$68,980
Unknown	161				
Total	171	\$833,583	\$511,649	\$1,345,232	\$366,308

Sources: Fresno County Parcel and Assessor data; FEMA 2009 FIRM

Table 11. City of Mendota's FEMA .2% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Single-Family Residence	7	\$1,457,645	\$355,832	\$1,793,477	\$488,369
Total	7	\$1,457,645	\$355,832	\$1,793,477	\$488,369

Sources: Fresno County Parcel and Assessor data; FEMA 2009 FIRM

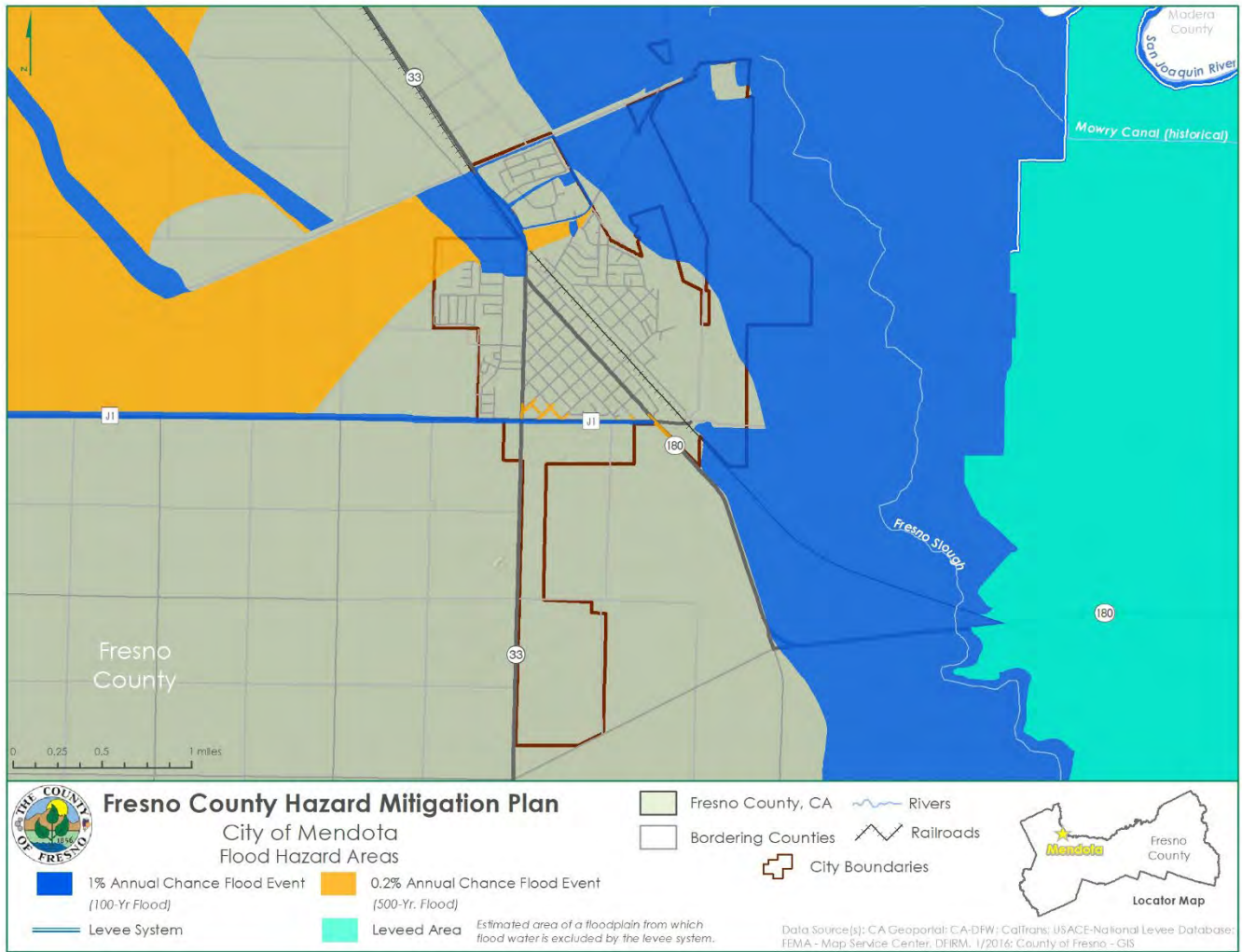
Based on this analysis, the City of Mendota has assets at risk to the 100-year and greater floods. There are 171 parcels within the 100-year floodplain for a total value of roughly \$1.3 million. There are 7 additional parcels valued at \$1.8 million within the 500-year floodplain.

Applying the 20 percent damage factor, there is a 1 percent chance in any given year of a 100-year flood causing roughly \$366k in damage in the City of Mendota. There is a 0.2 percent chance of a 500-year flood causing roughly \$488k in damage. Properties at risk to flooding are shown in **Figure 6. City of Mendota Flood Hazard Areas Buildings at Risk** and **Figure 7. City of Mendota Flood Hazard Areas Buildings at Risk**.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

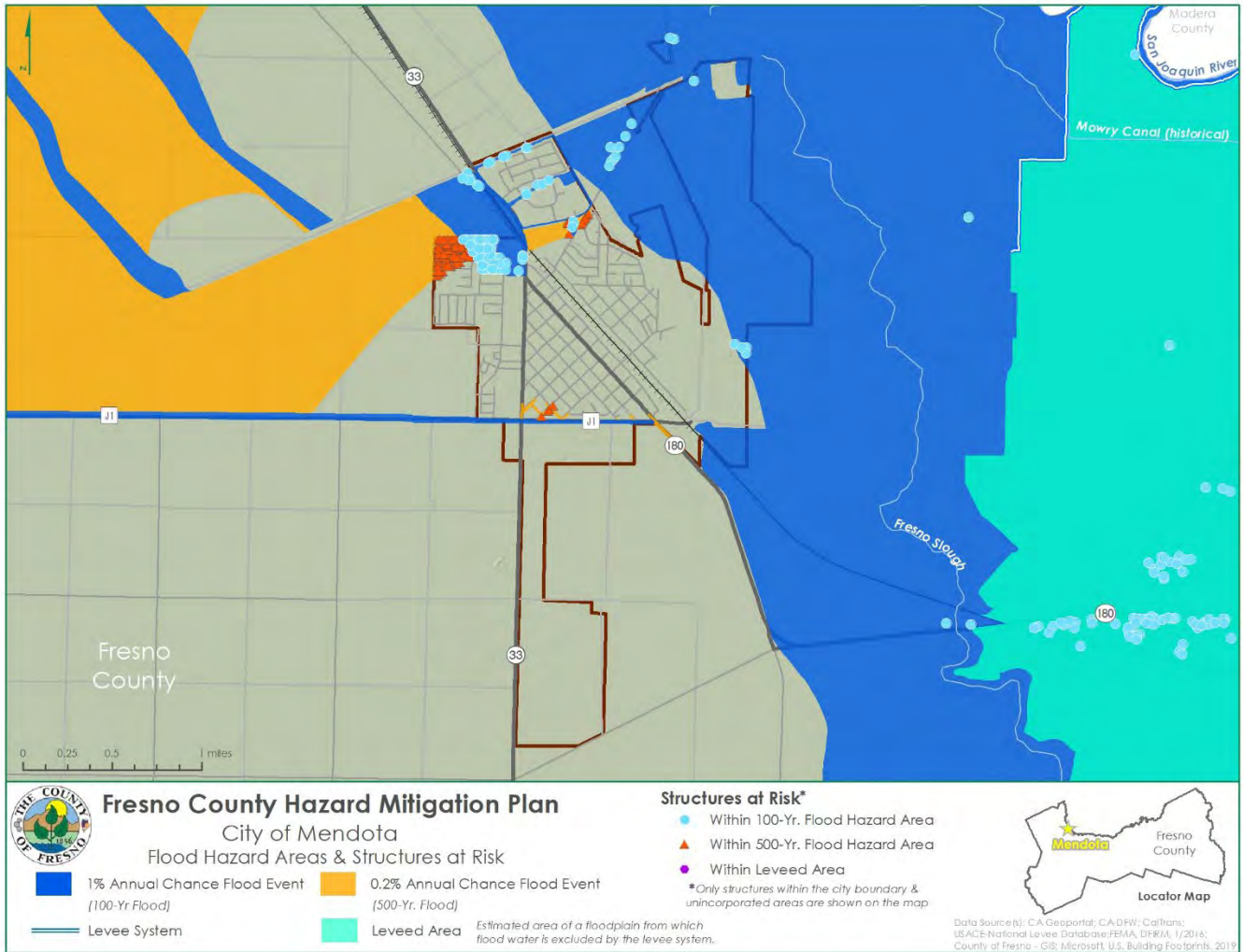


Figure 6. City of Mendota Flood Hazard Areas



Source: CA Geoportal-DFW; CalTrans; USACE- National Levee Database; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS

Figure 7. City of Mendota Flood Hazard Areas Buildings at Risk



Source: CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database; FEMA, DFIRM, 1/2016; County of Fresno – GIS; Microsoft, U.S. Building Footprint, 2019



INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Mendota joined the National Flood Insurance Program (NFIP) on September 1, 1981. NFIP Insurance data indicates that as of March 19, 2024, there were 16 flood insurance policies in force in the City with \$10,873 in total premium or total paid. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties and zero claims located in the jurisdiction.

POPULATION AT RISK

Based on 2020 census tract data, the planning team estimates the following number of people at risk in Mendota from 100-year and 500-year floods:

- 100-year flood—14,267 people
- 500-year flood—0 people
- Total flood—14,267 people

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.²

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. According to data from Fresno County GIS and the digital flood insurance rate map, there is only one critical facility in Mendota's floodplains, which is a fire station in the 100-year floodplain.

While Mendota High School itself is not in the floodplain, it is on Belmont Avenue, where Panoche Creek runs during big winter storms. The water can get more than one foot deep as it goes past the high school and can cut off the school from the rest of town (as has happened in the past).

The locations of critical facilities were also compared to the USACE mapped 200-year floodplain. An airport and one CalARP hazardous materials facility are located within the 200-year floodplain.



HAZARDOUS MATERIALS INCIDENT (MEDIUM)

There have been zero hazardous materials incidents from 2017-2022 that have occurred in the City of Mendota.³ Additionally, there are two CalARP hazardous materials facility located in the City of Mendota.

SEVERE WEATHER: EXTREME HEAT (MEDIUM)

Heat is one of the greatest threats to the migrant farm workers and elderly. The temperatures in the City of Mendota rise to over 100°F, occasionally exceeding 105°F, each summer. During the summer of 2007, the City of Mendota was asked by the Fresno County Office of Emergency Services to make available its City Hall and Senior Center as a cooling shelter for the better part of a week. The City works with the Fresno County Office of Emergency Services during extreme heat events. There are no designated shelters, but the Mendota City Hall often serves as a cooling center. These events can also affect the City economically due to increased water usage.

Communities most at risk to heat include but are not limited to: children, older adults, people experiencing homelessness, people with pre-existing conditions, people with disabilities, indoor and outdoor workers, emergency responders, incarcerated people, low-income communities, pregnant people, and athletes.⁴

SOIL HAZARDS: EXPANSIVE SOILS (MEDIUM)

Expansive soils occur throughout the City. In new buildings, a soils report is required prior to building, and appropriate measures are incorporated to address the hazard. In older buildings, these soils cause problems for foundations and can increase risk.

WILDFIRE (MEDIUM)

In the previous plan update, there was greater wildfire risk in the Fresno Slough due to weedy vegetation growth. However, based on the latest Wildfire Hazard Severity Zone data, the City of Mendota is unlikely to experience significant impacts from the flames of wildfires. However, smoke produced by wildfires outside of the community can still pose health risks to community members. In particular, individuals with existing health conditions, the elderly, young children, and those experiencing homelessness are at an increased risk of adverse health impacts resulting from exposure to wildfire smoke. These health impacts can include short-term conditions such as irritation and difficulty breathing, as well as long-term conditions like heart and lung diseases.

³ 2024 Fresno County Hazard Mitigation Plan
May 2024
California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>

⁴ <https://www.heat.gov/pages/who-is-at-risk-to-extreme-heat>

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O' Brien's consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Mendota's capabilities remain unchanged since the last update and are summarized below.

REGULATORY MITIGATION CAPABILITIES

Table 12. City of Mendota's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Mendota.

Table 12. City of Mendota's Regulatory Mitigation Capabilities

Regulatory Tool	Yes/No	Comments
General plan	Yes	
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Site plan review requirements	Yes	
Growth management ordinance	No	
Floodplain ordinance	Yes	
Other special purpose ordinance (stormwater, water conservation, wildfire)	Yes	Water Conservation Ordinances
Building code	Yes	
Fire department ISO rating	N/A	No local fire department, County provides fire protection services
Erosion or sediment control program	No	
Stormwater management program	No	
Capital improvements plan	Yes	
Economic development plan	Yes	
Local emergency operations plan	Yes	
Other special plans	No	



Regulatory Tool	Yes/No	Comments
Flood Insurance Study or other engineering study for streams	Yes	FEMA Flood Insurance Study, 2016
Flood Insurance Study or other engineering study for streams	Yes	FEMA Flood Insurance Study, 2016
Elevation certificates	No	

PLANNING MITIGATION CAPABILITIES

Table 13. City of Mendota Planning Capabilities identifies the plans related to mitigation and loss prevention in Mendota.

Table 13. City of Mendota Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	No		
Climate Resiliency or Adaptation Plan	No		
Community Wildfire Protection Plan (CWPP)	No		
Comprehensive Emergency Management Plan	No		
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No		
Continuity of Operations Plan (COOP)	No		
Disaster Recovery Plan	No		
Economic Development Plan	No		
Emergency Operations Plan (EOP)	No		
Evacuation Plan	No		
Flood Response Plan	No		
Floodplain Management Plan/Flood Mitigation Plan	No		
Hazard Mitigation Plan	Yes	Yes	
Historic Preservation Plan	No		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	No		
Threat Hazard Identification and Risk Assessment	No		

CITY OF MENDOTA GENERAL PLAN

The City of Mendota General Plan is the official statement of the City regarding future growth and quality of development in the planning area. The current general plan was adopted in August 2009. Policies contained in the plan's Land Use Element are designed to enhance Mendota's existing urban environment. Further, they seek to encourage new urban growth and development, provided that such growth will have minimal adverse impacts upon the environment (which will mitigate hazards), among other things. It is intended to serve as a basis for local decision makers to determine development and land utilization patterns in the City.

FLOODPLAIN MANAGEMENT ORDINANCE

The purpose of the Floodplain Management Ordinance is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas. In order to accomplish this purpose, it includes methods and provisions to:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities;
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction;
- Control the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters;
- Control filling, grading, dredging, and other development that may increase flood damage; and
- Prevent or regulate the construction of flood barriers that will unnaturally divert floodwaters or that may increase flood hazards in other areas.

The ordinance applies to all areas of special flood hazards within the jurisdiction of the City of Mendota. Notably, it requires that a permit be obtained before construction or other development begins within any area of special flood hazard. It appoints the City manager as floodplain administrator to administer, implement, and enforce the ordinance by granting or denying development permits in accord with its provisions and describes the accompanying duties and responsibilities.

WATER CONSERVATION ORDINANCE

The Water Conservation Ordinance regulates the use of water supplied by the City of Mendota. It identifies requirements that apply at all times (e.g., limiting wasteful uses and the use of hoses without a positive pressure nozzle on the end) and defines three stages of water conservation and the use restrictions associated with each. During stage 1 water conservation, there is a voluntary conservation to limit water from May through September. Stage 2 involves a mandatory ban on water usage, such as limited times to wash vehicles, nonoperation of ornamental fountains, and limiting restaurants to only serve water when asked by customers. Stage 3 applies further limitations, including a ban on the times when vegetation may be irrigated and the prohibition of vehicle washings that are not in the immediate interests of public safety, health, and welfare, and the filling, refilling, or adding of water to swimming pools. Citations are used to enforce these regulations.

EMERGENCY OPERATIONS PLAN

The City of Mendota's Emergency Operations Plan was prepared to ensure the most effective and economic allocation of resources for the maximum benefit and protection of the community in time of emergency. It establishes the emergency organization, assigns tasks, specifies policies and general procedures, and provides for coordination of planning efforts among the City's emergency staff and service elements. The objective of the plan is to incorporate and coordinate City facilities and personnel in an efficient organization capable of responding to, and recovering from, any emergency.

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

City of Mendota staffing is limited in capacity due to the number of full-time staff. Education and outreach activities are conducted as a component of daily interactions. **Table 14. City of Mendota's Administrative and Technical Mitigation Capabilities** identifies the personnel responsible for activities related to mitigation and loss prevention in Mendota.

Table 14. City of Mendota's Administrative and Technical Mitigation Capabilities

Personnel Resources	Department/Position
Planner/engineer with knowledge of land development/land management practices	Contracted City Engineer
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Contracted City Engineer
Planner/engineer/scientist with an understanding of natural hazards	Contracted City Engineer
Full time building official	Director of Public Works
Floodplain manager	City Manager
Emergency manager	City Manager
Grant writer	Multiple people fill this role (no official position, depends on the nature of the grant)
Other personnel	Multiple/varied (various positions constitute the Emergency Management Team in accordance with the Mendota Emergency Plan)
Warning systems/services Reverse 911, outdoor warning signals	Fresno County Office of Emergency Services (the County can provide assistance in this capacity)

As far as personnel resources are concerned, employees of the City of Mendota have diverse expertise, including engineering, risk management, and incident command. The City has an emergency operations plan (see above) that optimizes response to a disaster, and they have secured what technologies they can in regard to limiting the damage and risk from hazards, but they do not have GIS capabilities.

FISCAL MITIGATION CAPABILITIES

Table 15. City of Mendota's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities. There are currently no specific funding sources for hazard mitigation.

Table 15. City of Mendota's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	
Capital improvements project funding	Yes	
Authority to levy taxes for specific purposes	Yes	
Fees for water, sewer, gas, or electric services	Yes	Water and sewer
Impact fees for new development	Yes	
Incur debt through general obligation bonds	Yes	Can but currently do not
Incur debt through special tax bonds	Yes	Can but currently do not
Incur debt through private activities	No	
Withhold spending in hazard prone areas	No	

One of the challenges to mitigation in Mendota involves fiscal capabilities. Mendota is a small city with an agriculturally based economy and high unemployment that suffers from one of the lowest revenues in the state. Execution of mitigation actions is limited due to this financial limitation.

OTHER MITIGATION EFFORTS

The City of Mendota has undertaken improvements to mitigate damage from flood, one of its most dramatic and regular hazard events. The City has installed a long running underground pipe along Belmont Avenue, one of the major floodways, in conjunction with the California Department of Transportation. The City has also built humps into the streets along this floodway to limit water flows entering residential streets and homes to the north.

OPPORTUNITIES FOR ENHANCEMENT

In addition to these existing capabilities, there are also opportunities to expand or improve on the policies and programs to further protect the community. The City of Mendota is interested in leveraging partnerships (with Fresno County or neighboring jurisdictions) to enhance their outreach and education activities. Additional opportunities for enhancement of the City's mitigation program remain the same as those set forth in the prior hazard mitigation plan and are related to the city's identified mitigation actions. These include:

- Develop a Drought Contingency Plan that will help to create a framework for drought response and mitigation in the City of Mendota.
- Improve stormwater drainage system capability through developing and implementing a Stormwater Management Program.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Mendota adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy. These goals and objectives are consistent with Mendota's mitigation priorities, which have not changed since the previous plan.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The City of Mendota has not identified any specific planning mechanisms into which information for the 2018 Fresno County Hazard Mitigation Plan was incorporated. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Building Department may utilize the hazard information when reviewing building permit applications. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Mendota will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1981. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.

MITIGATION ACTIONS

The planning team for the City of Mendota identified the following mitigation action based on the risk assessment. Background information and information on how the action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are included.

In addition to implementing the mitigation action below the City of Mendota will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program, with an emphasis on drought. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.



1. BUILD A STORMWATER DETENTION/DESILTING BASIN

Hazard(s) Addressed: Flood

Issue/Background: Mendota has historically experienced flooding during the rainy season, which has resulted in damage of approximately \$75,000 (for those events that documentation is available). A contributing factor is the flood flows from the Panoche-Silver Creek, which runs heavy annually and often spills over and down into the City. Adding to this is the lack of an adequate storm drain system to capture and channel the water.

Ideas for Implementation: The plan is to capture and channel the storm flows into a 40-acre detention basin. The system currently is not designed for the flows that come in from the Panoche- Silver Creek. The basin will allow for the collection of the excess water to keep water off the streets and out of homes and to restrict the flow so that it stays within the capacity of the City's storm drain system. Project should take approximately 12 months from funding based on environmental work, land acquisition, excavation, etc.

Other Alternatives: No action

Responsible Office: City of Mendota City Manager

Priority: High

Cost Estimate: \$2.25 million for the full 40 acres

Potential Funding: General Fund, HMGP, BRIC

Benefits (Avoided Losses): Already, there has been approximately \$75,000 in damage. If one looks at the figures, the costs are increasing over time. The last documented event consumed roughly half this amount. Extrapolating from this data, one can assume that within the next 10 years, the project will likely save over \$100,000, and more over time.

Schedule: 1-3 years

Status: 2009 project; implementation in progress

2. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought

Issue/Background: The Delta-Mendota subbasin underlays the City of Mendota and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Mendota being a local agency (as defined by §10723 of the Water Code) which overlays the Delta-Mendota basin, the City has become a GSA for the portion of the basin which the city boundaries overlays. The Mendota GSA is required to develop and implement a Groundwater



Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. The Mendota GSA is part of a multi-agency GSP that is being prepared by the San Joaquin River Exchange Contractors Water Authority. The City of Mendota and Mendota GSA will actively participate in the development and implementation of the planning process. The development of the City of Mendota GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Mendota.

Other Alternatives: No action

Responsible Office: Public Works Director and Mendota GSA

Priority: High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: Project is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: 2018 project; implementation in progress

Annex I: City of Reedley





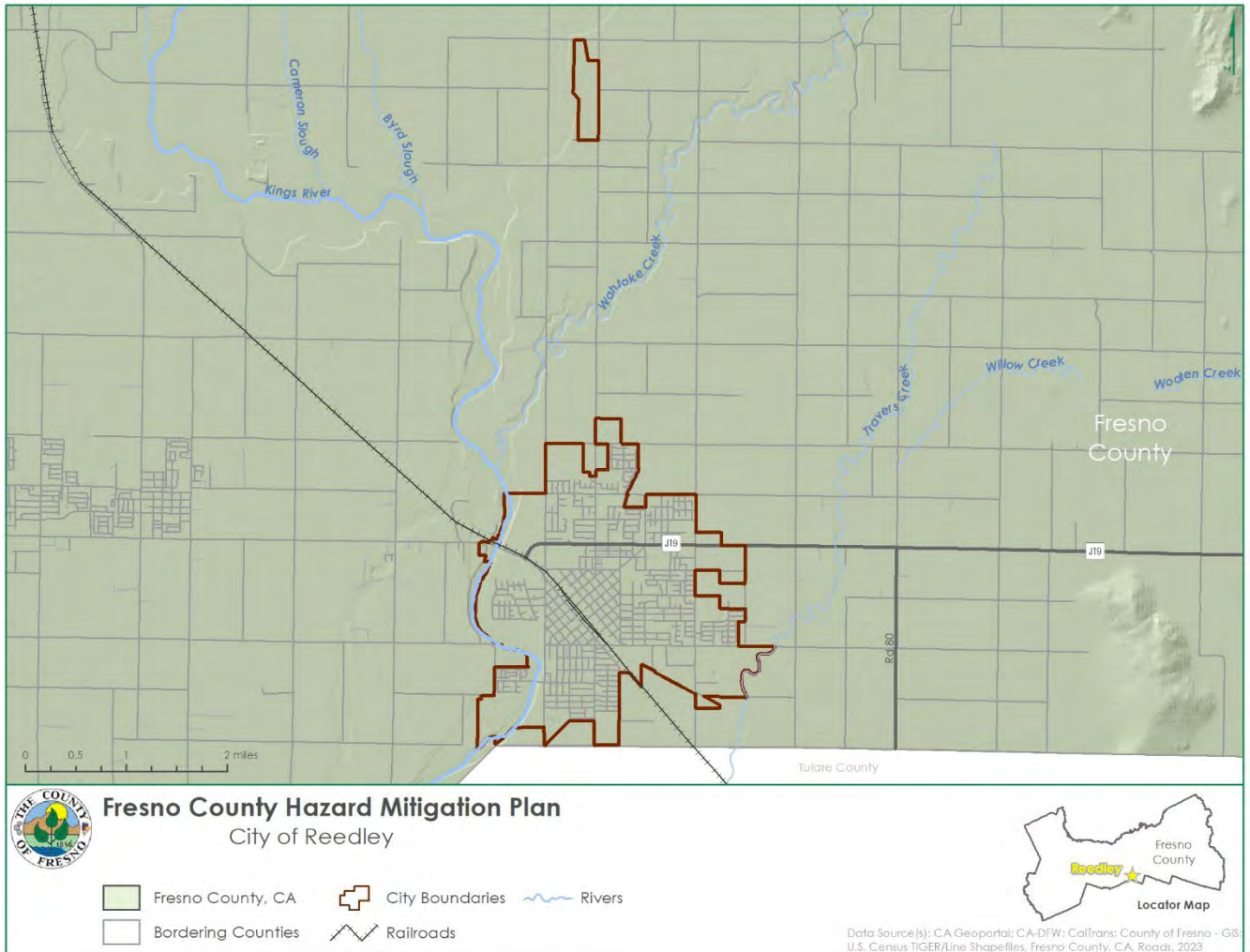
PARTICIPATION

To update the City of Reedley’s jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O’Brien’s consulting team provided opportunities for the City of Reedley’s input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of Reedley did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee (identified in Appendix B) or conduct additional rounds of public outreach.

COMMUNITY PROFILE

Figure 1. City of Reedley Boundaries displays a map and the location within Fresno County of the City of Reedley and its Sphere of Influence.

Figure 1. City of Reedley Boundaries



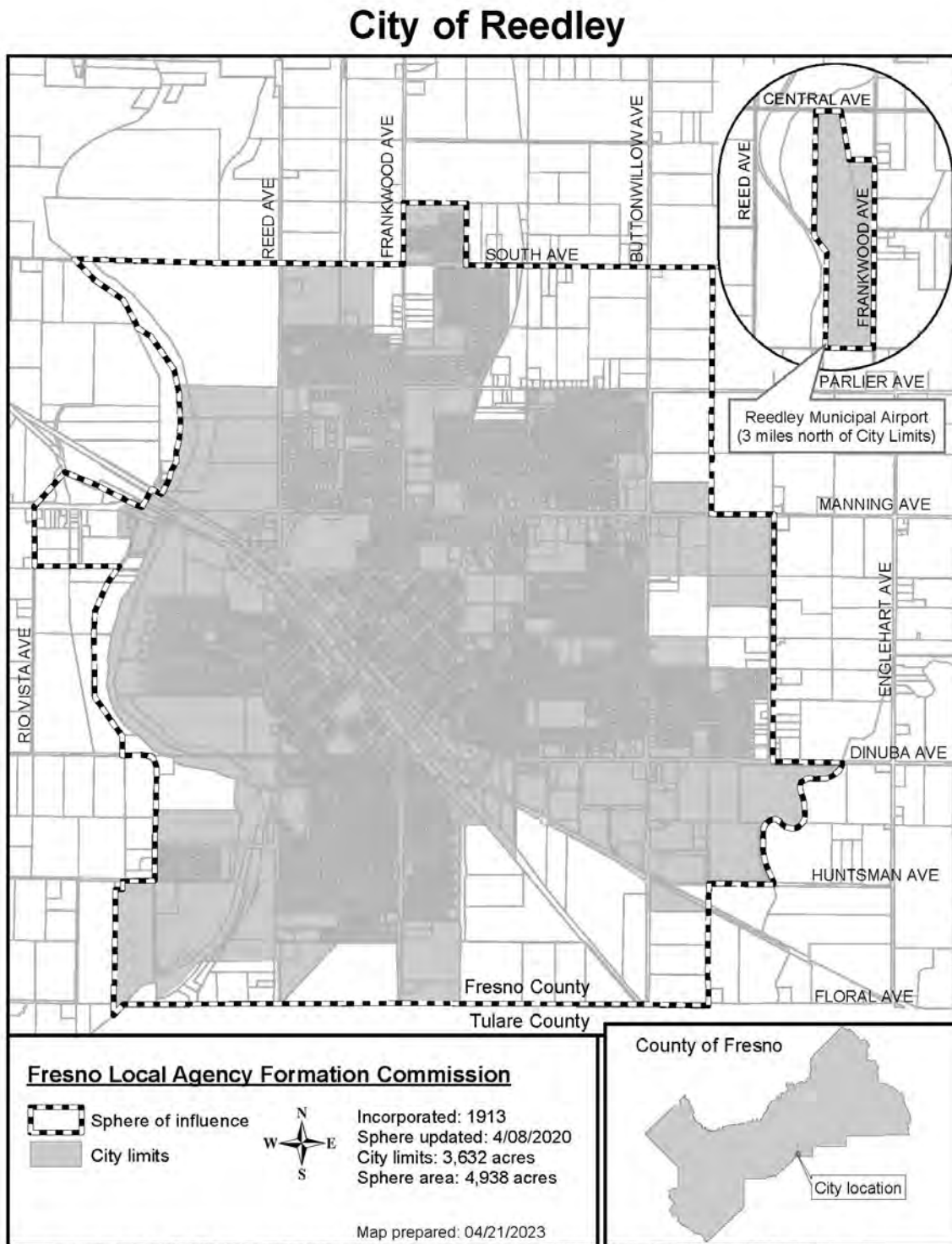
Source: CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA Roads, 2023



GEOGRAPHY AND CLIMATE

Reedley is situated approximately 25 miles southeast of the City of Fresno and equidistant from the City of Visalia, which is southeast of Reedley. The planning area encompasses approximately 8,570 acres. The current city limits consist of 3,632 acres and the sphere of influence (SOI) contains approximately 4,938 acres, shown in **Figure 2. City of Reedley Limits and Sphere of Influence**. The proposed SOI expansion includes an additional 2,860 acres, totaling approximately 7,913 acres.

Figure 2. City of Reedley Limits and Sphere of Influence



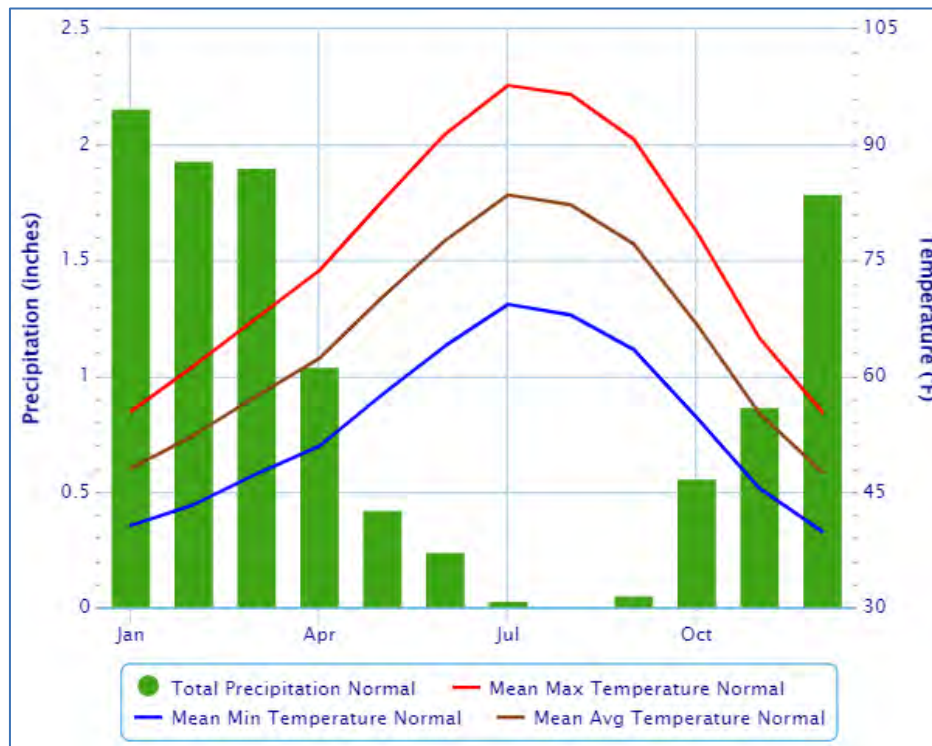
Source: Fresno Local Agency Formation Commission,
https://www.fresnolafco.org/files/0f2f1eb70/Reedley_04212023_Portrait.pdf

Manning Avenue, a four-lane divided major arterial street, connects the City with State Highway 99 which is 12 miles to the west. State Highway 180 is located eight miles north of the City, and both highways are heavily used by local, regional, and national residents, travelers, and motor carriers. In addition to its location near these major highways, the community lies adjacent to the Tulare Valley Railroad and the Southern Pacific Railroad lines.

Reedley is located in the central San Joaquin Valley portion of California, lying inland between the State's coastal mountain ranges and the Sierra Nevada Mountains. Reedley's economy continues as predominantly based upon agricultural production and agriculturally oriented industry. The valley floor is the richest intensive agricultural production area in the world. Although there has been economic diversification in recent years, local economy continues to be significantly dependent upon the underlying agricultural character of the region.

The nearest National Weather Service weather station is located at the Fresno International Airport which is approximately 20 miles north of the City of Reedley. Reedley has a Mediterranean climate, averaging over 300 sunny days per year and little or no measurable precipitation from June through September. Annual rainfall averages 11 inches and the City's prevailing winds are typically light and from the northwest. **Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)** describes the monthly normal precipitation and temperatures for the City of Reedley in more detail.

Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: National Weather Service (NWS)



HISTORY

The lands within the Planning Area have a long history of human habitation, including habitation by the Southern Valley Yokut Indians. The Reedley area was the territory of the Wechikit or Wechikit Yokuts.

As was the case all over California, the arrival of the railroad, even miles away, stimulated commercial agricultural development. In 1884, Civil War veteran Thomas Law Reed moved to what is now Reedley and began farming more than 2,000 acres. Reed settled in the area to provide wheat for Gold Rush miners. Reed's land included what was to become the entire Reedley town site of 360 acres. His donation of land for a railroad station site established the town as the center of the Valley's booming wheat business. Railroad officials commemorated his vision by naming the fledgling City in his honor. When wheat demand slackened, Kings River water was diverted for crop irrigation, and the region began its over 100-year tradition of bountiful field, tree, and vine fruit harvests. With water and railroad services in place, farming families of European immigrants were recruited, and the settlement was incorporated in 1913, with Ordinance No. 1 adopting and prescribing the style of a Common Seal on February 25, 1913. An important element in the early town was a colony of German Mennonites, whose strong traditions and values still shape Reedley's culture.

ECONOMY

Reedley contributes a wide variety of agricultural products to the County's economy. The area's rich, fertile soil produces the finest fruit, nut, vegetable, grain and cotton varieties. Since 1946, Reedley has been known as the Fruit Basket of the World because it leads the nation in the shipping of fresh fruit. Thirty fruit and vegetable packing and cold storage facilities, including the world's largest plant, along with nearby wineries, supply tree and vine fruit products. Related manufacturing industries in Reedley include boxes and packing machinery, and automatic packing equipment. The Council-Manager form of government administers a general fund operating budget of over \$20,165,000 with a total budget in excess of \$50,795,000. The City has had a Planning Commission since the 1940s and provides full City services, including a municipal airport, water system, sewer plant, and trash collection. A modern, acute-care hospital with a new birthing center provides comprehensive medical coverage. The active Greater Reedley Chamber of Commerce is responsible for significant on-going revitalization and is a catalyst for business growth in the city.

Select estimates of economic characteristics for the City of Reedley are shown in **Table 1. City of Reedley's Economic Characteristics**.

Table 1. City of Reedley's Economic Characteristics

Characteristic	City of Reedley
Families below poverty level	11.8%
All people below poverty level	16.0%
Median family income	\$66,774
Median household income	\$61,629
Per capita income	\$22,826
Population in labor force	11,477
Population employed	10,173
Unemployment	7.1%



Characteristic	City of Reedley
Number of Companies	N/A

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Reedley's Employment by Industry and **Table 3. City of Reedley's Employment by Occupation** detail how the City of Reedley's labor force breaks down by industry and occupation based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Reedley's Employment by Industry

Occupation	# Employed	% Employed
Agriculture, Forestry, Fishing and Hunting, and Mining	2,768	27.21%
Educational Services, and Health Care and Social Assistance	2,425	23.84%
Retail Trade	783	7.70%
Manufacturing	797	7.83%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	439	4.32%
Professional, Scientific, and Mgmt., and Administrative and Waste Mgmt. Services	580	5.70%
Other Services, Except Public Administration	420	4.13%
Transportation and Warehousing, and Utilities	385	3.78%
Public Administration	442	4.34%
Construction	339	3.33%
Wholesale Trade	452	4.44%
Finance and Insurance, and Real Estate and Rental and Leasing	329	3.23%
Information	14	0.14%
Total	10,173	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Reedley's Employment by Occupation

Occupation	# Employed	% Employed
Natural Resources, Construction, and Maintenance Occupations	2,906	28.57%
Management, Business, Science, and Arts Occupations	2,439	23.98%
Management, Business, and Financial Occupations	(743)	(30.46%)

Occupation	# Employed	% Employed
Computer, Engineering, and Science Occupations	(148)	(6.07%)
Education, Legal, Community Service, Arts, and Media Occupations	(1,152)	(47.23%)
Healthcare Practitioner and Technical Occupations	(396)	(16.24%)
Service Occupations	1,652	16.24%
Sales and Office Occupations	1,655	16.27%
Production, Transportation, and Material Moving Occupations	1,521	14.95%
Total	10,173	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

POPULATION

Reedley is a community of many converging cultures and peoples, from Asian, African, Central American, European, Mexican, Native American and South American. This diverse community provides exposure to a mix of social and cultural influences.

According to the U.S. Census Bureau's 2022 Population Estimates, the population estimate for the City of Reedley was estimated at 25,441. Select demographic and social characteristics for the City of Reedley from the 2018-2022 ACS are shown in **Table 4. City of Reedley's Demographic and Social Characteristics**.

Table 4. City of Reedley's Demographic and Social Characteristics

Characteristic	City of Reedley
Gender/Age	
Male	49.0%
Female	51.0%
Median age	31.1
Under 5 years	9.4%
Under 18 years	30.3%
65 years and over	10.3%
Race/Ethnicity	
White	50.6%
Asian	1.3%
Black or African American	1.2%
American Indian/Alaska Native	0.6%
Hispanic or Latino (of any race)	81.3%
Education	
High school graduate or higher	66.8%
Disability Status	



Characteristic	City of Reedley
Population 5 years and over	9.8%%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Reedley's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Reedley (see **Table 6. City of Reedley - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Reedley.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Reedley - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Moderate	12 to 24 hours*	Less than 24 hours*	High
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours	Medium*
Drought	Possible	Critical	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Catastrophic	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Likely	Critical	Small	More than 24 hours	Less than 1 week	Medium*
Hazardous Materials	Possible	Critical	Large	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Highly Likely	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Likely	Limited	Large	More than 24 hours	Less than 1 week	Medium*
Fog	Likely	Limited	Large	More than 24 hours	Less than 24 hours	Medium*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Winter Storm	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Soil Hazards						
Erosion	Likely	Limited	Moderate	N/A	N/A	Medium
Expansive Soils	Possible	Limited	Large	N/A	N/A	Medium
Land Subsidence	Possible	Limited	Small	N/A	N/A	Medium*
Landslide	Unlikely	Minor	Negligible	12 to 24 hours*	Less than 6 hours*	Low
Volcano	Possible	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Possible	Critical	Negligible	12 to 24 hours*	More than 1 week*	Low*

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.

Note: Transportation and Rail Incidents were not assessed as a hazard to the planning area, thus they are not included in the table above. Nonetheless, it is important to note that transportation hazards are a concern for the City of Reedley.



VULNERABILITY ASSESSMENT

The intent of this section is to assess San Joaquin's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Figure 6. Table 6. City of Reedley - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Reedley's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

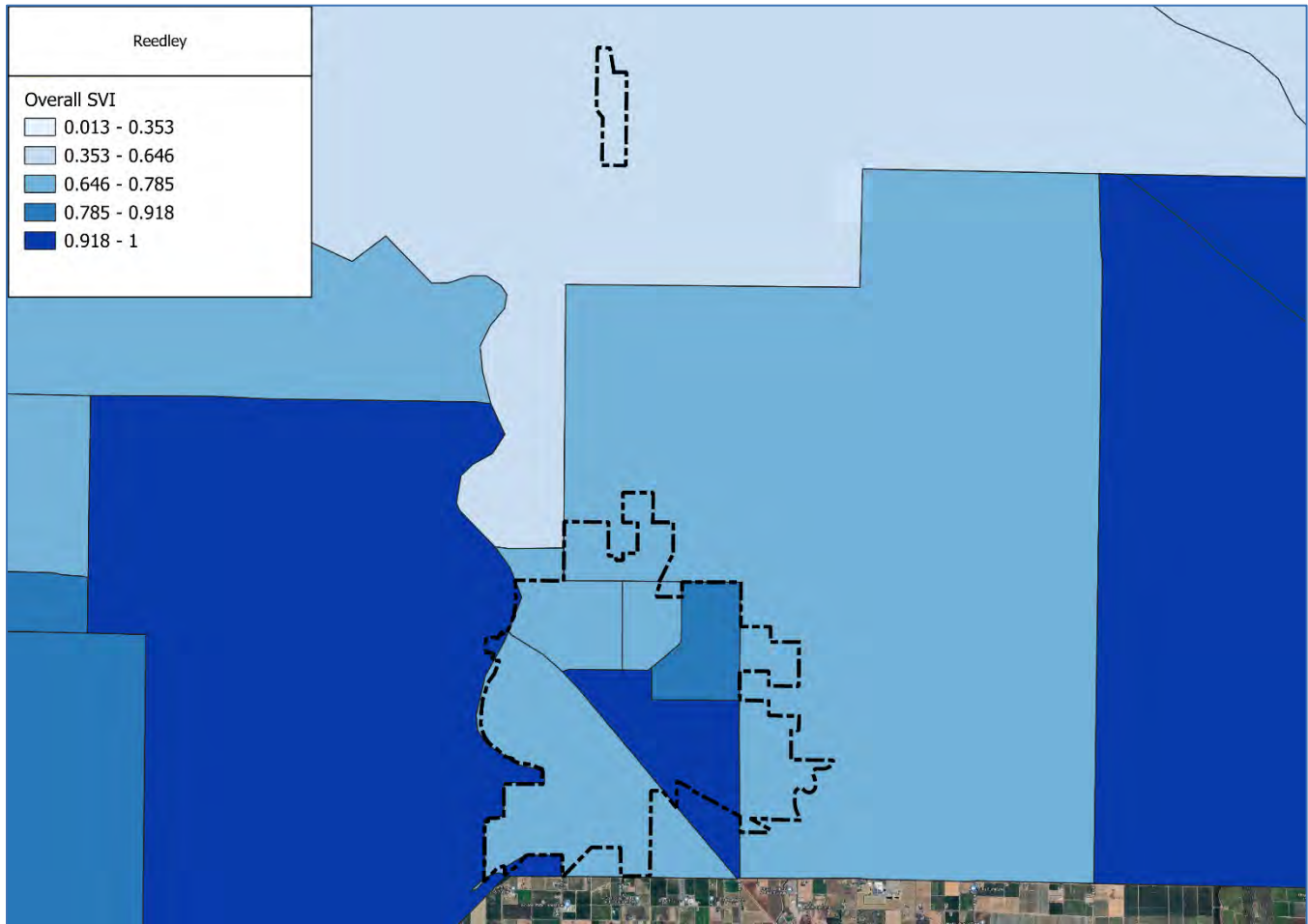
The hazard summaries in **Table 6. City of Reedley - Hazard Summaries** reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Reedley, census tracts with a higher SVI are clustered near central and eastern portion of the City, as shown in **Figure 4. City of Reedley Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.).¹

Figure 4. City of Reedley Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Reedley City Boundary

ASSETS AT RISK

This section considers Reedley's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation.

An inventory of critical facilities in the City of Reedley is provided in **Table 7. City of Reedley's Critical Facilities** and shown in **Figure 5. City of Reedley Critical Facilities**. Specific facilities and their hazard specific issues as identified by the city's hazard mitigation planning team are listed in **Table 8. City of Reedley's Hazard Specific Issues for Critical Facilities**.

Table 7. City of Reedley's Critical Facilities

Critical Facilities Type	Number
Airport	2
CalARP	8
Colleges & Universities	1
Fire Station	1
Health Care	1
Waste Water Treatment Facility	1
Police	1
School	17
Total	32

Source: Fresno County

Table 8. City of Reedley's Hazard Specific Issues for Critical Facilities

Name of Asset	Type*	Hazard Specific Issues
Reedley City Hall / Police Dept.	EI	Security / Proximity to Rail
Reedley Fire Department	EI	Security
Reedley Municipal Airport	VF	Security
Kings Canyon Unified School District (X Schools)	VF	Security
Immanuel Schools	VF	Security
Reedley College	VF	Security / Proximity to Rail
Manning Avenue Bridge	VF	Major Transportation Route
Olson Avenue Bridge	VF	Major Transportation Route
Burlington Northern/ Santa Fe Railroad	VF	Vulnerability / Commerce
Reedley Community Center	VF	Security

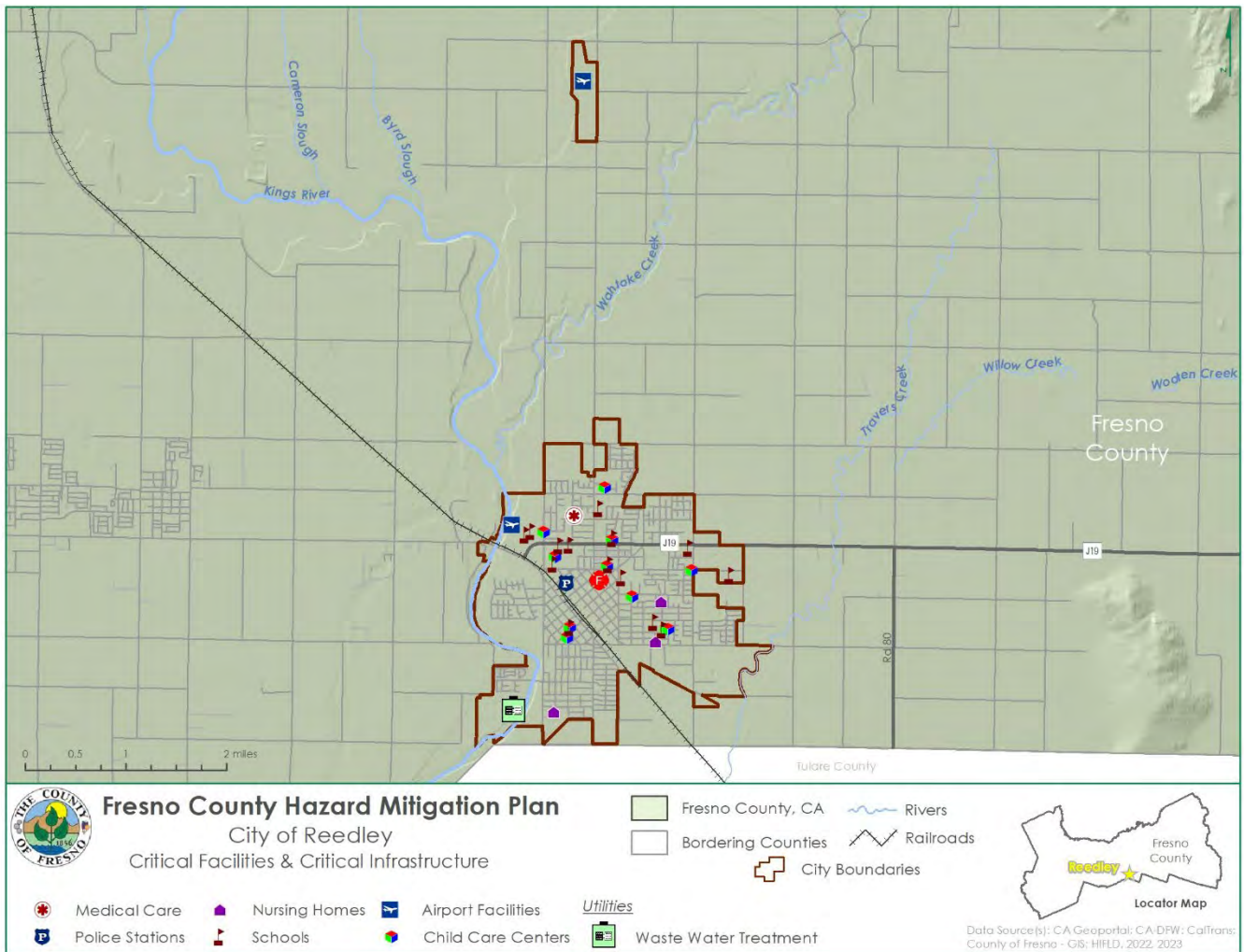


Name of Asset	Type*	Hazard Specific Issues
Reedley Wastewater Treatment Facility	EI	Security
Reedley Sports Park Hydropillar	EI	Security
Reedley Municipal Well Sites (7)	EI	Security
Central Valley Transportation Center	VF	Security
Fueling Stations (8)	VF	Security
Hamilton Packing / Cold Storage	VF	Food Processing (Economic)
Aslan Packing / Cold Storage	VF	Food Processing (Economic)
Thiele Manufacturing	VF	Manufacturing (Economic)
Moonlite Packing / Cold Storage	VF	Food Processing (Economic)
Gerawan Farming / Cold Storage	VF	Food Processing (Economic)
Reedley Lumber Company	VF	Security
City of Reedley Public Works Maintenance Yard	VF	Security / Proximity to Rail
Adventist Hospital, Reedley	EI	Security
Sequoia Safety Council (Ambulance Provider)	VF	Security
Reedley Opera House	VF	Earthquake Collapse (Historic)
Palm Village Retirement Center	VF	Security
Golden Living Center	VF	Security
Sierra View Homes	VF	Security
Reedley City Museum	VF	Security / Proximity to Rail(Cultural)

Source: Fresno County

*EI: Essential Infrastructure; VF: Vulnerable Facilities

Figure 5. City of Reedley Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; HIFLD, 2022, 0223



HISTORIC RESOURCES

According to the Southern San Joaquin Valley Archaeological Information Center at California State University Bakersfield, 30 recorded cultural resources are found in and within a 1-mile radius of the project area. Four of these sites are Native American archaeological sites or isolates, while the remainders are historic buildings and sites. Two sites are listed on the National Register of Historic Places and on the California Register of Historic Resources, the Reedley Opera House and the Old Bank of America Building.

ECONOMIC ASSETS

In 2016, Fresno County produced agricultural goods eclipsing \$6.18 Billion in value. Thousands of local jobs – ranging from manufacturing, warehousing, transportation, technical services and beyond – are supported by this industry within the City of Reedley. The Fresno County Department of Agriculture, under the direction of the California Department of Food and Agriculture, is responsible for conducting regulatory and service functions pertaining to the multi- billion-dollar agricultural industry in Fresno County. These functions are mandated by state and federal laws and regulations and by local measures and ordinances by the Fresno County Board of Supervisors. The City works closely with Fresno County, the Fresno Council of Governments, the Fresno County Farm Bureau, and other local and regional agencies in the region to address legislation, regulations, and policies that that address preparations and response for public health emergencies, which includes the potential for agro-terrorism, in an effort to protect the area’s most significant economic asset.

GROWTH AND DEVELOPMENT TRENDS

Between 1990 and 2010, Reedley experienced an average annual growth rate of 2.73% per year. Since 2010, that number has ranged annually between 2.35% & 3.59% per year – with numbers trending consistently up in the most recent years. This trend is one of the major indicators of the City’s potential growth over the life of the Agency’s General Plan (2030). By analyzing past growth trends, in comparison to the State Department of Finance projections for growth in the San Joaquin Valley, an average annual growth rate of 3% was utilized in the Reedley General Plan. While the vast majority of housing structures in the community are traditional or “site-built”, the City permits manufactured housing on a permanent foundation in all zones allowing single family residential uses.

Bounded by the Fresno County/Tulare County line along the southern portion of the City; as well as the Kings River to the West, paced and contiguous growth will take place to the north and east. These areas do not contain any known hazard-related concerns, such as soil hazards, excessive flooding or wildfire. Capacity for critical infrastructure is either in place or appropriately planned for. Design, placement and protection of these items will be a most crucial concern. Additionally, the protection and conservation of water resources will continue to be a major priority, as the area is prone to drought conditions.

The City’s General Plan Land Use Map, adopted in February 2014 and last updated in March 2020, is shown in **Figure 6. City of Reedley Land Use Map**. The General Plan projects that Reedley’s population will reach 47,369 by year 2030.

Table 9. City of Reedley’s Change in Population and Housing Units shows how the City has grown in terms of population and number of housing units between 2017 and 2022. As of 2020, the population of Reedley was 25,248 with an average growth rate of negative .67 percent.

**Table 9. City of Reedley's Change in Population and Housing Units**

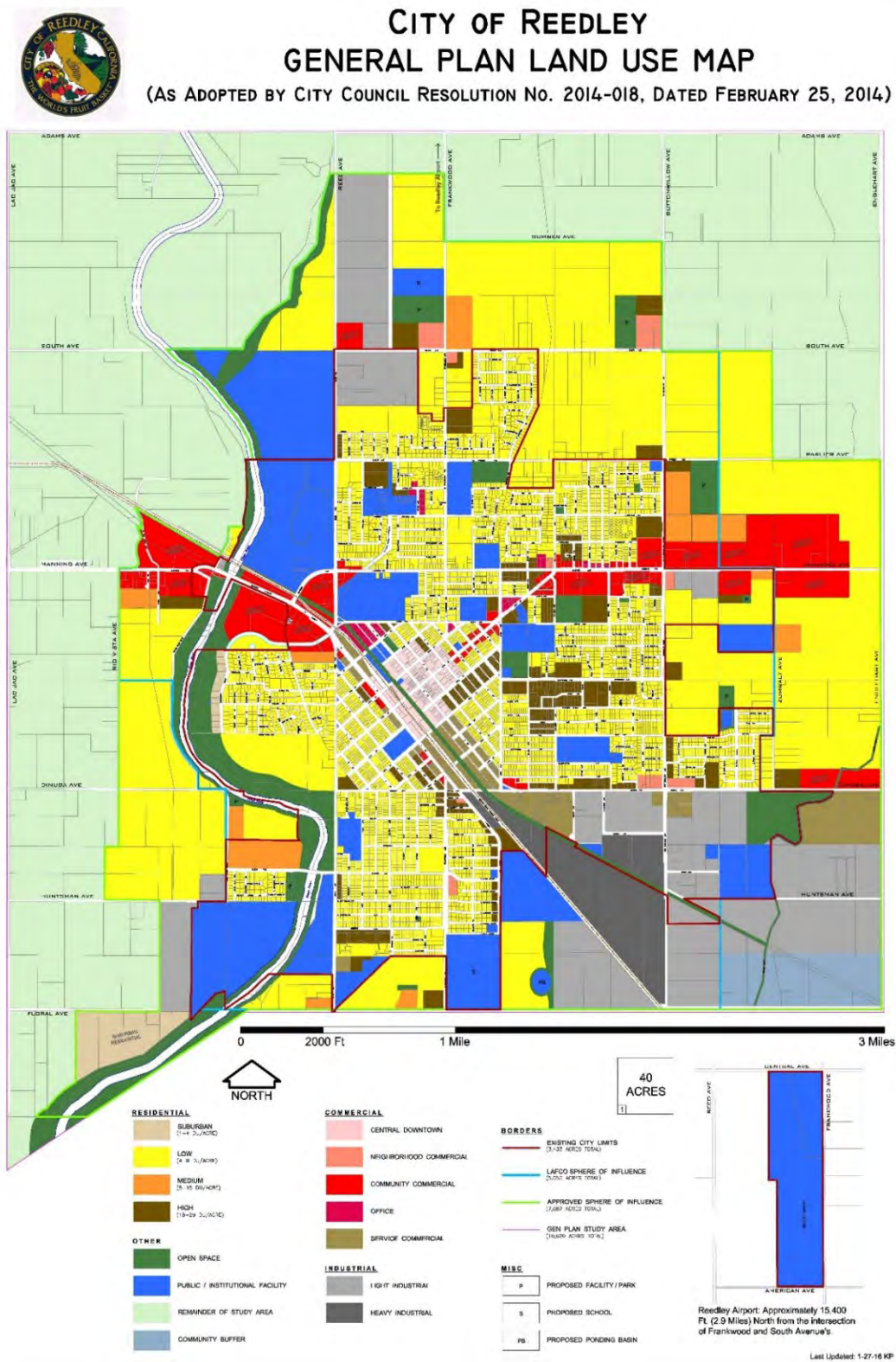
2017 Population	2022 Population Estimate	Estimated Percent Change 2017- 2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017- 2022
25,419	25,248	-0.67%	7,653	7,320	-4.35%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates

Of the 7,320 housing units in Reedley, 95.2 percent are occupied. Owner-occupied units account for 59.5 percent of all occupied housing. Single family detached homes comprise 74.9 percent of the housing stock in the City.

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk section of the main plan.

Figure 6. City of Reedley Land Use Map



ESTIMATING POTENTIAL LOSSES

Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Regarding these types of structures, there are currently 62 parcels in the 100-year floodplain and 157 parcels in the 500-year floodplains in the City of Reedley. No further information on vulnerable structures is available. Impacts of past events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County as a whole).

AGRICULTURAL HAZARDS (HIGH)

Among the largest impacts to agricultural production is the changing weather patterns seen within the Valley over the past decade. More extreme weather threatens the proper growth and maintenance of crops, and harbors the introduction of pest infestation, various plant diseases, and increased fire hazards. Since the plan update in 2018, agriculture has increased in productivity despite challenges from a significant drought period from 2020 to 2023. However, weather-related hazards still pose a significant threat to the agricultural industry in and around the City of Reedley.

DAM FAILURE (MEDIUM)

Reedley is in the mapped inundation area of Pine Flat Dam. Pine Flat Reservoir is located in the foothills of the Sierra Nevada Mountains, approximately 20 miles northeast of Reedley. The construction of the 440-foot Pine Flat Dam on the Kings River was completed in 1954. The project's primary purposes are flood control, irrigation, water conservation, and recreation. When completely full, Pine Flat Reservoir is 20 miles long, holds 1 million acre-feet of water, and covers 5,790 acres with 67 miles of shoreline. The upper Kings River is the main tributary that fills the reservoir. According to the Kings River Conservation District, the water management agency encompassing Fresno, Kings and Tulare counties, "In the event of a major release from Pine Flat Dam, downstream flooding could occur over agricultural lands near the riverbanks and possibly within the Cities of Reedley and Kingsburg." The Kings River runs through the western section of the City of Reedley limits.

Dam failures can result from earthquakes, erosion of the face or foundation, improper sitting, rapidly rising floodwaters, structural/design flaws or acts of terrorism. The Pine Flat Dam is a concrete gravity dam. The Jeff L. Taylor Pine Flat Power Plant is a hydroelectric generation station operated by Kings River Conservation District and is located at the base of the dam.

A dam failure will cause loss of life, damage to property, and other ensuing hazards, as well as the displacement of persons residing in the inundation path. Damage to electric transmission lines could impact life support systems in communities outside the immediate hazard areas. A catastrophic dam failure, depending on size of dam and population downstream, could exceed the response capability of local communities. Damage control and disaster relief support would be required from other local governmental and private organizations, and from the state and federal governments. Mass evacuation of the inundated areas would be essential to save lives, if warning time should permit. Extensive search and rescue operations may be required to assist trapped or injured persons. Emergency medical care, food, and temporary shelter would be required for injured or displaced persons. The identification and burial of many dead persons would pose difficult problems; public health would be a major concern. Many families would be separated, particularly if the failure should occur during working hours.



These and other emergency/disaster operations could be seriously hampered by the loss of communications, damage to transportation routes, and the disruption of public utilities and other essential services. Governmental assistance could be required and may continue for an extended period. Actions would be required to remove debris and clear roadways, demolish unsafe structures, assist in reestablishing public services and utilities, and provide continuing care and welfare for the affected population including, as required, temporary housing for displaced persons.

The following events occurred due to significant water releases from the Pine Flat Dam described in more detail below.

- **6/19/2017:** Between June 18 and June 29, significant water releases from Pine Flat Dam caused flooding along the Kings River, prompting evacuations and levee breaches near Kingsburg, affecting homes, and prompting a large-scale sandbagging operation. The second levee breach on June 24 threatened 90 homes in Tulare County, leading to the evacuation of 300 people and damaging 7 structures. Water levels receded by June 29 after releases from the dam were reduced on June 26, ending the immediate flood threat.
- **5/29/2019:** Following cool temperatures, the area warmed up on May 28, leading to seasonable conditions and daily afternoon showers and thunderstorms due to abundant moisture. On May 31, storms in the mountains contributed to heavy rainfall, snowmelt, and significant runoff, causing river levels in the San Joaquin Valley to rise rapidly, notably along the Kings River due to Pine Flat Dam releases. This led to flooding at Lindy's Landing campground near Reedley and the Kings River Golf and Country Club near Kingsburg from May 29, continuing beyond month's end.
- **6/01/2019:** Because of continued increased releases at Pine Flat Dam. Runoff continued to produce flooding at Lindy's Landing campground near Reedley, and the Kings River Golf and Country Club near Kingsburg well into June. The releases were cut back during the middle of the month and the flood waters receded by the evening of June 19.
- **4/17/2023:** Increased releases at Pine Flat dam due to heavy snow melt runoff resulted in flooding near the Kings River downstream of Pine Flat Dam. The increased runoff produced flooding at Lindy's Landing campground near Reedley, and the Kings River Golf and Country Club near Kingsburg.

DROUGHT (HIGH)

Groundwater is the source of domestic water supply for Reedley. The groundwater basin is recharged primarily by rainfall and infiltration, storm water runoff, infiltration from irrigated ditch flows and seepage in the Kings River bottom, and water conservation recharge to natural sloughs in the nearby agricultural area. Agriculture on the west side of the San Joaquin Valley relies largely on water transferred through the Sacramento-San Joaquin Delta from Northern California. The effects of multi-year droughts over the past several decades have severely narrowed the periods in which massive pumps can be used to move water from north to south. Less water means less acreage planted, creating a spike in unemployment and economic hardship for farm laborers and their communities. The geologic drought has shown how agriculture affects many lives, impacting communities well beyond the farm sector. For the past several years, the City's water utility has been operating at maximum peak performance due to the drought conditions.



EARTHQUAKE (MEDIUM)

A major earthquake and ground shaking can cause significant social disruption and damage to buildings and infrastructure in the City of Reedley due to the close proximity of earthquake faults. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. A significant earthquake could occur and exceed the response capabilities of the City of Reedley. Response and disaster relief support would be required from other cities, private organizations, and from the state and federal governments.

Reedley has experienced several noticeable ground movement incidents, such as the 1983 Coalinga earthquake and the 1989 Watsonville earthquake, but no local damage was sustained.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Reedley's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (MEDIUM)

The Kings River begins on the western slope of the Sierra Nevada and flows westerly to Pine Flat Reservoir. Twenty-five miles downstream of this reservoir, the river passes along the west side of Reedley as it flows to the Valley floor. The supply of surface water for the Kings River Basin area comes primarily from two sources, the Kings River and the San Joaquin River. The Kings River flows are regulated by Pine Flat Dam, with a storage capacity of 1,000,000-acre feet. Flows in the river at Reedley come from releases from Pine Flat Dam and tributary inflow. The dam, completed in 1954, was constructed for flood control, irrigation, recreation and water conservation.

The annual flow in the Kings River, as measured at the Reedley Narrows gaging station located three miles upstream of Reedley for the period 1963 to 1987, averages approximately 1,000,000 acre-feet per year. The highest average monthly flows occur in late spring with a maximum flow of approximately 3,000 cubic feet per second (cuffs), while the lowest flows generally occur in late fall with a minimum flow of approximately 290 cfs. Flooding in the Reedley area can occur due to high flows in the Kings River or as a result of local runoff from intense rainfall.

The most recent FEMA Flood Insurance Rate Map (FIRM) affecting the City of Reedley was updated in February 2009. According to the FIRM, portions of the Planning Area west of Reed Avenue are subject to 100-year (or 1-percent-annual-chance) flooding by the Kings River, areas in the northern plan area are subject to a 100-year flooding by the Wahtoke Creek and areas in the eastern plan area are subject to 100-year flooding by the Travers Creek.

According to FEMA's 2016 Flood Insurance Study (FIS), damaging floods occurred in Reedley and the surrounding area in 1867, 1914, 1950, 1958, 1967, 1969, and 1978. Details on some of these events follow:

- **January 1914**—Kings River overtopped and damaged the Manning Avenue bridge. The river reached almost a half mile wide, and the river banks and surrounding agricultural land were scoured and eroded.
- **November 1950**—High flows on the Kings River washed out the Olsen Avenue bridge and threatened the Manning Avenue bridge.
- **January-February 1969**—A discharge of 17,100 cfs at the community of Piedra resulted in the City's most costly flood.

Recently, The City of Reedley experienced some flooding in May 2019 at Lindy's Landing campground, and again June 2019 and April 2023. Flooding occurred in March 2023 but fortunately did not cause any injuries, deaths, or damages.

The City of Reedley's objectives and policies for managing flood risk are based on the Fresno County Safety Element and on Federal Insurance Administration regulations. The similarity between the City and County Safety Elements should ensure that the City of Reedley and Fresno County follow a uniform approach toward the management of the Kings River flood-prone areas.

VALUES AT RISK

Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a flood map for the City of Reedley was created (see **Figure 7. City of Reedley Flood Hazard Areas**). **Table 10. City of Reedley's FEMA 1% Annual Chance Flood Hazard by Property Type** and **Table 11. City of Reedley's FEMA 0.2% Annual Chance Flood Hazard by Property Type** summarize the values at risk in the City's 100-year and 500-year floodplain, respectively. These tables also detail loss estimates for each flood.

Table 10. City of Reedley's FEMA 1% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Primary Use Not Designated	12	\$0	\$0	\$0	\$0
Vacant	1	\$0	\$9,066	\$9,066	\$2,267
Unknown	49				
Total	62	\$0	\$9,066	\$9,066	\$2,267

Source: City of Reedley parcel data; National Flood Insurance Program Flood Mapping Data

Note: The "Exempt" property type includes government, school, and church owned building for which building value is not given.

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Table 11. City of Reedley's FEMA 0.2% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Primary Use Not Designated	9	\$0	\$0	\$0	\$0
Single-Family Residence	144	\$39,218,838	\$12,958,384	\$52,177,222	\$13,044,306
Vacant	4	\$0	\$582,617	\$582,617	\$145,654
Total	157	\$39,218,838	\$13,541,001	\$52,759,839	\$13,189,960

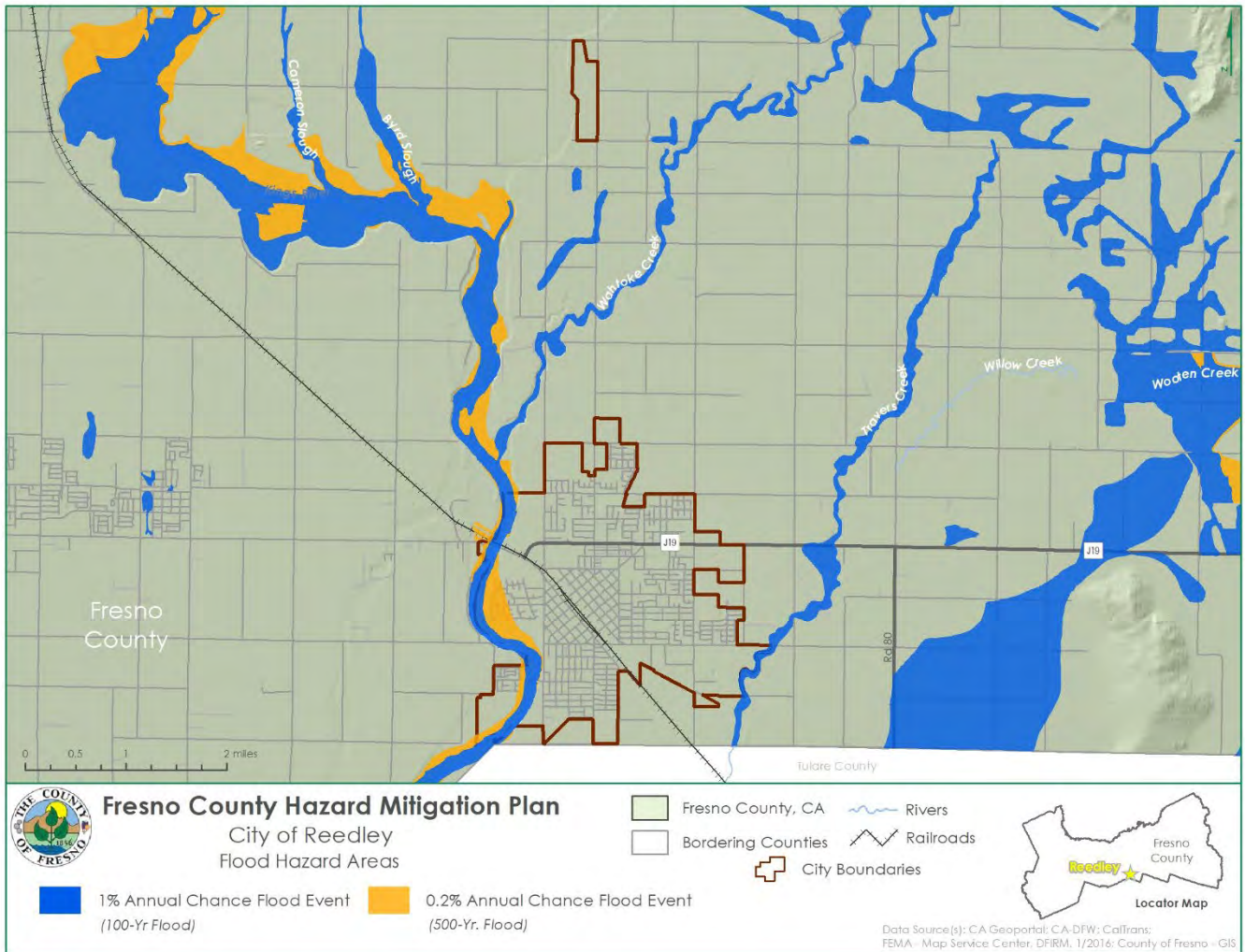
Source: City of Reedley parcel data; National Flood Insurance Program Flood Mapping Data

Based on this analysis, the City of Reedley has limited assets at risk to the 100-year and 500-year floods. 62 parcels are located within the 100-year floodplain, with a total value of \$9,066. An additional 157 parcels valued at over \$52 million fall within the 500- year floodplain.

Applying the 25 percent damage factor, there is a 1 percent chance in any given year of a 100-year flood causing roughly \$2,267 in damage, and a 0.02 percent chance of a 500-year flood causing \$13 million in damage. This information is detailed in **Figure 8. City of Reedley Flood Hazard Area Buildings at Risk.**

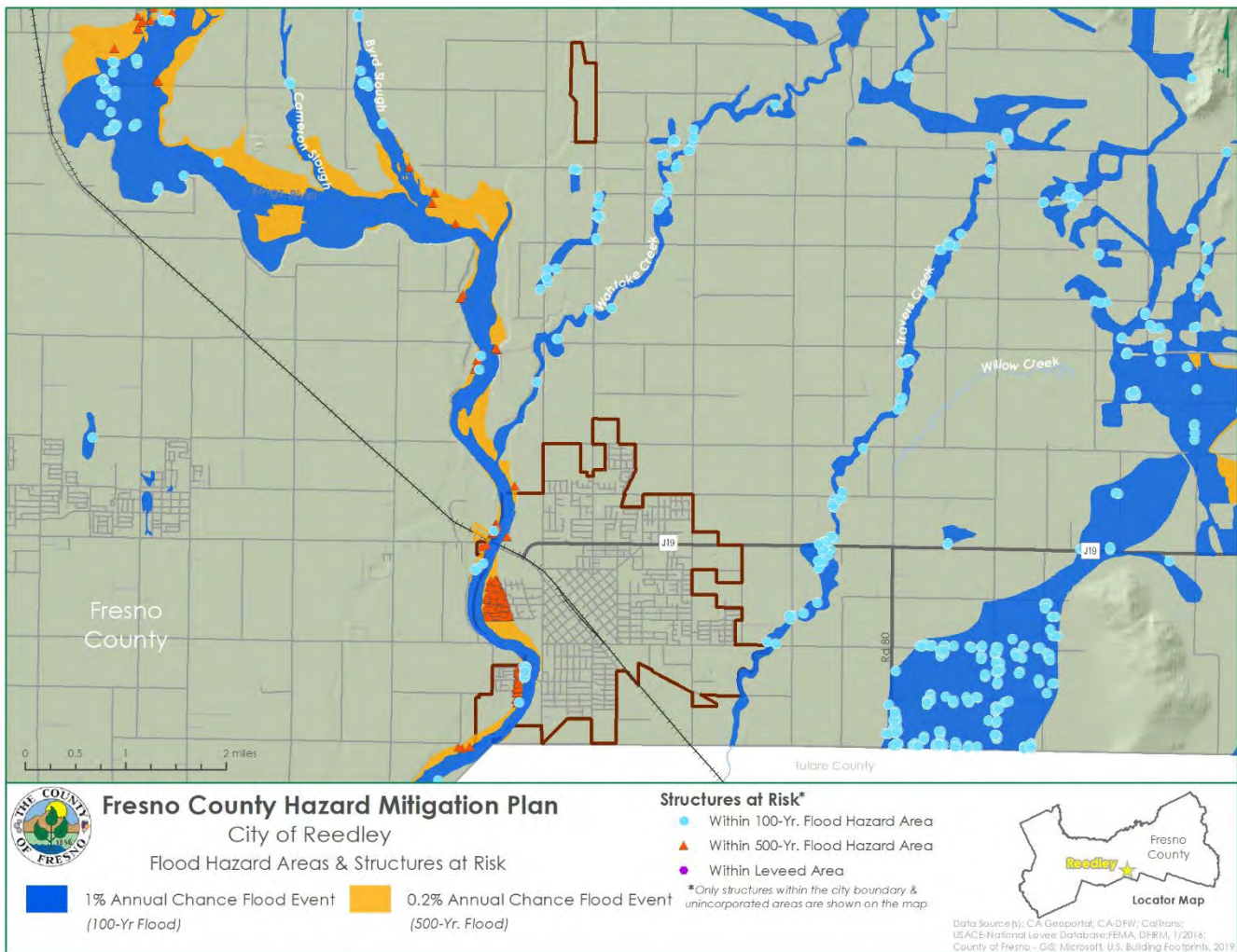
Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are likely below the actual market values. Thus, the actual value of assets at risk may be higher than those included herein.

Figure 7. City of Reedley Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS

Figure 8. City of Reedley Flood Hazard Area Buildings at Risk



Source: CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database; FEMA, DFIRM, 1/2016; County of Fresno – GIS; Microsoft, U.S. Building Footprints, 2019



POPULATION AT RISK

Using 2020 census data and the digital flood insurance rate map, population at risk was calculated for the 100-year and 500-year floods based on the number of residential properties at risk and the average number of persons per household (3.17). This analysis found that approximately 16,628 people are at risk of impacts from a 100-year flood, and 11,547 additional people are at risk of being impacted by a 500-year flood.

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.²

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Reedley joined the National Flood Insurance Program (NFIP) on September 30, 1982, NFIP data indicates that as of March 19, 2024, there were 18 flood insurance policies in force in the City with \$19,231 in total premium or total paid. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties, and zero claims located in the jurisdiction.

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. In the City of Reedley there are no critical facilities located in the 100- or 500-year floodplain.

HAZARDOUS MATERIALS INCIDENT (HIGH)

The City of Reedley is susceptible to hazardous materials release from the result of transportation accidents or spills of stored materials used at an industrial business. The significance of the problems to the environment, property, or human health is dependent on the type, location and quantity of the material released.

Manning Avenue and the San Joaquin Valley Railroad both run through the heart of Reedley. There is the potential for hazardous material spills on these transportation routes. Numerous commercial transportation vehicles travel Manning Avenue with various types and quantities of hazardous materials. The San Joaquin Valley Railroad is strictly a commercial freight transportation system. Large quantities and numerous types of hazardous materials are transported through Reedley by rail on a daily basis. Of particular concern is the large number of liquefied petroleum gas vessels that are transported on the system. A derailment and fire, with large exploding liquefied petroleum gas vessels, could cause widespread damage to the City. Although warning devices have been installed to decrease the potential for a rail incident, increased rail and vehicle traffic in the City allow for the occurrence in the future.



There are also stationary quantities of hazardous materials used by the agricultural industry that are stored and used within Reedley and in the surrounding areas. There is the potential for hazardous materials releases from large industrial plants in Reedley. Facilities such as these throughout the City are less of a threat due to current laws and regulations requiring them to have contingency and evacuation plans. The Reedley Fire Department is responsible to check compliance of these facilities and maintain records of stored quantities of hazardous materials.

Additional causes of hazardous materials spills could be clandestine dumping of toxic or hazardous waste on public or private property. As the costs and restrictions increase for legitimate hazardous waste disposal sites, illegal dumping of hazardous materials may also increase proportionately. Besides the immediate effect of hazardous materials incidents on scene, there are also ancillary effects such as the impact on waterways and drainage systems, and the evacuation of schools, business districts, and residential areas.

There have been 2 hazardous materials incidents from 2017-2022 that have occurred in the City of Reedley. Of the 2 incidents, there have been 2 fixed hazardous materials incidents. There were no injuries, damage, or deaths during the time period. One incident required evacuation however, the number of evacuees is unknown.³ There are eight CalARP hazardous materials facilities located in the City of Reedley.

SOIL HAZARDS: EROSION (MEDIUM)

Because the topography of the Reedley area is relatively flat, erosion does not have a significant impact in the area. Moderate-to-severe water erosion potential does exist, however, along the bluffs of the Kings River as a result of the steep slope conditions found in that area. Gullies can be started at the onset of the rainy season; and, once started, they can cut back into the adjacent level soils. It is generally more difficult to control such gullies than to prevent them. In areas of the bluff where there are gopher or squirrel burrows, tunnel erosion may result since such burrows can collapse. As a result, water and rodent management may be needed on the bluffs.

A band of Atwater (AoA) soil is found in the northeastern portion of the Planning Area. This soil consists of stabilized old dunes of wind-sorted materials which are susceptible to moderate-to- severe wind erosion during infrequent periods of high wind.

SOIL HAZARDS: EXPANSIVE SOILS (MEDIUM)

Severe expansive soil conditions which could cause heavy damage to buildings, roads, and other structures are rare within the Planning Area. They are limited to the Cometa (CzaD) soil, with its dense clay subsoil, which is found in the far northwestern portion of the Planning Area. Although, according to the Soils Conservation Service, this soil has a severe limitation rating for most urban type land uses, its relatively isolated location will insure that it will not adversely impact Reedley's future development.

Moderately expansive soils – including soils in the Ramona (Rb; Rc) and San Joaquin (ScA; SeA) Series – are found in a relatively large area within the northeastern and eastern portions of the Planning Area. Although these areas are generally planned for urban uses, moderately expansive soils will usually cause damage only to substandard structures and to flatwork such as streets and patios. In addition, foundations can usually be especially engineered to minimize damage due to these moderately expansive soils. The Ramona and San Joaquin soils, however, also have a severe

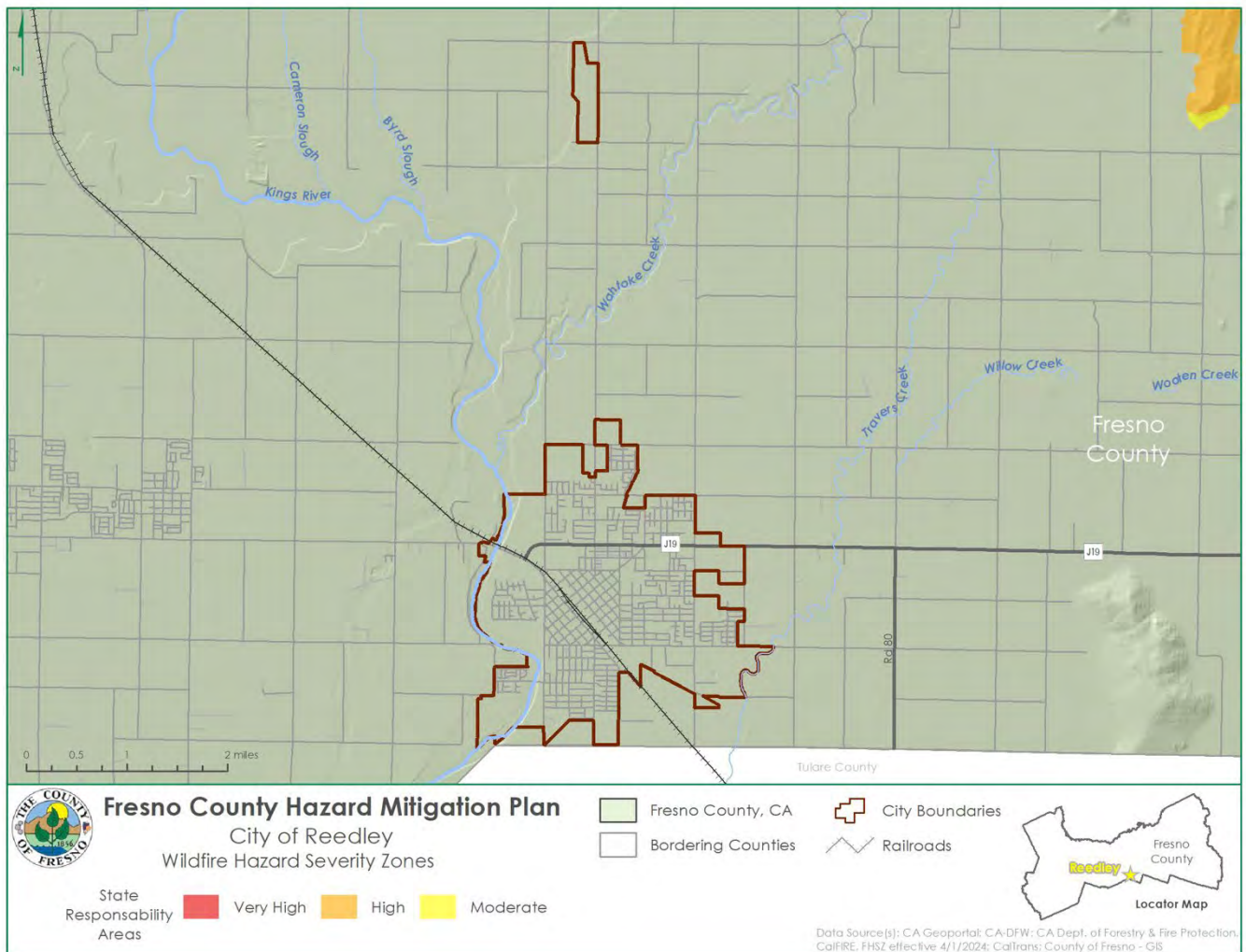
³ California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>

limitation rating for use as septic tank absorption fields and storm drainage basin sites because of their slow permeability.

WILDFIRE (LOW)

Wildfires are a low risk for the City of Reedley, as the Wildfire Hazard Severity Zone is outside of the city limits, shown in **Figure 9. City of Reedley Wildfire Hazard Severity Zones.**

Figure 9. City of Reedley Wildfire Hazard Severity Zones



Source: CA Geoportal; CA-DFW; CA Department of Forestry and Fire Protection, CalFIRE, FHSZ effective 4/1/2024; CalTrans; County of Fresno - GIS

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Reedley's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 12. City of Reedley Mitigation Capability Summary**.

Table 12. City of Reedley Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Fiscal Capability		X	
Available Staff		X	
Political Support/Interest			X
Community Support			X

REGULATORY MITIGATION CAPABILITIES

Table 13. City of Reedley's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Reedley.

Table 13. City of Reedley's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X		12/2022			



Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Community Emergency Response Team (CERT)		X			X	
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X			X	
Fire Code	X		12/2022			
Firewise Community		X			X	
Floodplain Management/Flood Damage Prevention Ordinance	X		02/1995			
Land Use/Development Planning	X		03/2020			
National Flood Insurance Program (NFIP)	X		09/1982			
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X			X	
Storm Ready		X				
Stormwater Management Plan/Ordinance	X		04/2016			
Subdivision Regulations/Ordinance	X		04/2000			
Two Weeks Ready		X				
Unified Development Ordinance		X			X	
Zoning Ordinance	X		09/1980			

PLANNING MITIGATION CAPABILITIES

Table 14. City of Reedley Planning Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Reedley.

Table 14. City of Reedley Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes		06/2023 adopted/updated
Climate Resiliency or Adaptation Plan	No	No	
Community Wildfire Protection Plan (CWPP)	No	No	



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Comprehensive Emergency Management Plan	Yes		08/2017 adopted/updated
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes		03/2020 adopted/updated
Continuity of Operations Plan (COOP)	Yes		08/2017 adopted/updated
Disaster Recovery Plan	Yes	No	08/2017 adopted/updated
Economic Development Plan	No	No	
Emergency Operations Plan (EOP)	Yes	Yes	08/2017 adopted/updated, expected completion Fall 2024
Evacuation Plan	Yes		08/2017 adopted/updated
Flood Response Plan	Yes		08/2017 adopted/updated
Floodplain Management Plan/Flood Mitigation Plan	Yes		02/1995 adopted/updated
Hazard Mitigation Plan	Yes	Yes	
Historic Preservation Plan	No	No	
Natural Resources Protection Plan (NRPP)	Yes		03/2020 adopted/updated
Open Space Management Plan (Parks and Rec/Greenway Plan)	Yes		2009 adopted/updated
Threat Hazard Identification and Risk Assessment	Yes		08/2017 adopted/updated

CITY OF REEDLEY GENERAL PLAN 2030

The purpose of the General Plan 2030 Update is to develop a document that includes the vision of the City of Reedley, is easy to read and complies with the laws of California. This General Plan will supersede the previously adopted General Plans and is directing expansion and diversification of the City's economic base. The City recognizes that residential growth is beneficial; however, it is also understood that growth must be balanced with local employment opportunities, City services, and increased sales tax revenues to support continued City services. The General Plan addresses the need for master planning local infrastructure to accommodate growth. The document will define what kind of community Reedley should be in the future. The general plan includes eight out of the nine state mandated elements including land use, circulation, housing, conservation, noise, open space, safety, air quality. The latest plan update does not include the newly required environmental justice element. Relevant elements and information to the hazard mitigation plan are outlined below.

CONSERVATION, OPEN SPACE, PARKS AND RECREATION ELEMENT

Hazardous Materials

Table 15. Hazardous Materials Policies

Policy Number	Policy Description
COSP 4.6A	Minimize exposure of the public to toxic air emissions and odors from industrial, manufacturing, and processing facilities.
COSP 4.6.1	The City shall require residential projects and other sensitive receptors to be located an adequate distance from existing and potential sources of toxic emissions such as freeways, industrial sites, and hazardous material locations.
COSP 4.6.2	The City shall require new air pollution point sources such as industrial, manufacturing, and processing facilities to be located an adequate distance from residential areas and other sensitive receptors.
COSP 4.6.3	Require project proponent's to prepare health risk assessments in accordance with SJVAPCD procedures when the proposed industrial process has toxic emissions designated by the state as a toxic air contaminant or, similarly, by the federal government as a hazardous air pollutant.
COSP 4.6.4	Designate industrial land in areas well-separated from sensitive uses. Protect vacant industrial sites from encroachment by residential or other sensitive uses through appropriate zoning

Air Quality

Table 16. Air Quality Policies

Policy Number	Policy Description
COSP 4.7A	Minimize particulate emissions from sources under the jurisdictions of the City of Reedley
COSP 4.7.1	The City shall work with the SJVAPCD to reduce particulate emissions from construction, grading, excavation, and demolition to the maximum extent feasible.
COSP 4.7.2	The City shall require all access roads, driveways, and parking areas serving new development to be constructed with materials that minimize particulate emissions and are appropriate to the scale and intensity of use.
COSP 4.7.3	The City shall reduce PM10 emissions from City-maintained facilities to the maximum extent feasible.
COSP 4.7.4	The City shall include PM10 control measures as conditions of approval for subdivision maps, site plans, and grading permits to assist in implementing the SJVAPCD's Regulation VIII, Fugitive PM10 Prohibitions. In addition to Regulation VIII, apply as feasible the mitigation measures to reduce PM10 emissions contained in Air Quality Guidelines for General Plans, published by the San Joaquin Valley Air Pollution Control District, 2005
COSP 4.7.5	Use strategies to minimize soil disturbance.

SAFETY ELEMENT

Flooding

Table 17. Flooding Policies

Policy Number	Policy Description
SE 5.1A	Minimize the potential for damage caused by inundation in flood hazards areas.
SE 5.1.1	Continue the flood-plain management approach and operation of an overall program of corrective and preventive measures for reducing flood damage and preserving and enhancing, where possible, natural



Policy Number	Policy Description
	resources in the floodplain including, but not limited to, emergency preparedness plans, flood control works, floodplain management regulations and open space plans.
SE 5.1.2	Flood hazard regulations shall be applied to all property subject to a 100-year flood. Staff shall evaluate all permits for development located within a 100-year flood area and apply the following: <ul style="list-style-type: none"> a) Portions of the 100-year flood hazard area to remain free of all new obstructions in order to reasonably provide for the passage of floodwaters of a given magnitude. b) Limited development, subject to City policies and Federal Flood Insurance Program requirements, may be permitted if adequate floodproofing measures are constructed.
SE 5.1.3	Areas identified on floodplain maps are subject to flooding, but on which detailed flood studies (delineating the area and depth of a 100-year flood) are not yet available, shall be treated as Flood-Fringe areas unless conclusive evidence is presented to the contrary. Any development requiring a City permit in these flood-hazard lands shall be subject to review and approval by the City Engineer. The following conditions should apply
SE 5.1.4	Where there are accurate and detailed flood-hazard maps that indicate the exact area and depth of inundation by a 100-year flood,
SE 5.1.5	All flood proofing shall be done in a manner that will not cause floodwaters to be diverted onto adjacent property, increase flood hazards to property located elsewhere, or otherwise adversely affect other property. <ul style="list-style-type: none"> a) Anchorage to resist flotation and lateral movement b) Use of special water resistant paints, membranes, or mortars to reduce seepage of water through walls c) Addition of weight to structures to resist flotation d) Construction of water and waste systems to prevent the entrance of floodwaters e) Construction to resist rupture or collapse caused by water pressure or floating debris f) Location of all electrical equipment, circuits, and installed electrical appliances in a manner that will assure they are not subject to inundation by a 100-year flood g) Flood-proofing shall be required for structural storage facilities containing chemicals, explosives, buoyant materials, flammable liquids, or other toxic materials which could be hazardous to public health, safety, and welfare. These shall be located in a manner which will assure that the facilities are: a) situated at elevation above the height associated with the 100-year flood protection elevation; or b) adequately flood-proofed to prevent flotation of storage containers or damage to storage containers which could result in the escape of toxic materials into floodwaters.
SE 5.1.6	In flood-hazard areas, all public utilities and facilities, such as road, sewage disposal, gas, electrical, and water systems, shall be located and constructed to minimize or eliminate flood damage to the facilities. This work shall be done in a manner that will not adversely affect other property.
SE 5.1.7	Open space uses should be encouraged in flood-hazard areas and Land Conservation Contracts and Open Space and Scenic Easements should be made available by the County to property owners within 100-year flood areas located in the unincorporated area.

Geologic Hazards

Table 18. Geologic Hazard Policies

Policy Number	Policy Description
SE 5.2A	Protect the lives and property of residents of the Reedley area by establishing urban growth patterns and development policies which recognizes the limitations of soils and physical features.
SE 5.2.1	Development should be prohibited in areas where corrective measures to affect the geologic hazard are not feasible.



Fire Hazards

Table 19. Fire Hazards Policies

Policy Number	Policy Description
SE 5.3A	Minimize the loss of life and damage to property as a result of fire.
SE 5.3.9	Provide public safety education and awareness and ensure fire code compliance

Seismic Hazards

Table 20. Seismic Hazards Policies

Policy Number	Policy Description
SE 5.4A	Minimize serious physical damage to structures used for human occupancy and to critical facilities and structures where large numbers of people are apt to congregate.
SE 5.4.1	A building or structure constructed prior to 1948 should be examined to determine the earthquake resistant capacity. If the structure is determined to be below an acceptable standards a program to minimize potential hazard should be established.
SE 5.4.2	Structures of more than 50 feet or four (4) stories, or requiring special design considerations for seismic hazards shall be constructed consistent with State law. Additional factors to be considered, as recommended in the Five County Seismic Safety Element, are as follows <ul style="list-style-type: none"> a) A dynamic analysis procedure shall be used for assessing structural design requirements for structures of more than 50 feet or four (4) stories b) Critical facilities should be designed at double the current seismic design forces required in Zone 3 by the current California Uniform Building Code c) The bracing and anchoring of all mechanical and electrical equipment for critical facilities shall be designed to withstand lateral seismic forces equal to 20 percent of its total dead load.

Hazardous Materials

Table 21. Hazardous Materials Policies

Policy Number	Policy Description
SE 5.6A	Protect the public and the environment from exposure to hazardous materials
SE 5.6.1	Assess the risk involving the transportation, disposal, manufacture, storage and handling of any hazardous materials at all levels of planning.
SE 5.6.2	Residential development in close proximity to heavy industrial zones shall be avoided.
SE 5.6.3	Establish a program to obtain hazardous materials control, technical assistance and cleanup to response to hazardous materials incidents



ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 22. City of Reedley's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Reedley.

Table 22. City of Reedley's Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		City Manager, Police Chief, Fire Chief	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Community Development Department	
Fiscal Management or Procurement Specialists	X		Assistant City Manager	
Floodplain Manager	X		City Manager, Fire Chief, Police Chief	
Land Surveyors		X		
Land Use/Management/Development Planning	X		Community Development Department	
Planners or engineers with an understanding of natural and/or human-caused hazards	X		Engineering Department	
Resource Development Staff or Grant-writing	X		Community Development, Engineering Department	
Scientists familiar with the hazards of the community	X		Fire, Police, Engineering, Public Works	
Staff experienced with Geographic Information Systems (GIS)	X		Engineering Department	
Staff with education or expertise to assess the community's vulnerability to hazards	X		Public Works Department, Fire Department, Police Department	

FISCAL MITIGATION CAPABILITIES

Table 23. City of Reedley's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 23. City of Reedley's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)			X	
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fee				N/A
Water/Sewer Fees			X	
Stormwater Utility Fees				N/A
Development Impact Fees			X	
General Obligation, revenue, and/or Special Tax Bonds			X	
Partnering Agreements or Intergovernmental Agreements			X	
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)			X	
Homeland Security Grants (HSGP)			X	
USDA Rural Development Agency Grants				N/A
US Economic Development Administration Grants				N/A
Infrastructure Investment and Jobs Act (IIJA)				N/A

MITIGATION OUTREACH AND PARTNERSHIPS

The City of Reedley administers a variety of outreach efforts to support mitigation. The City's website offers ongoing and seasonal information pertaining to water conservation and general public safety and maintenance issues. The Reedley Fire and Police Departments provide year- round safety education at schools, downtown public events, service clubs and the annual open house. The Reedley Fire Department also administers the HomeSAFE program which provides smoke alarms for qualifying



households. The “Reedley Communicator” is a quarterly publication by the City of Reedley issued to its residents with various helpful tips and safety information.

OTHER MITIGATION EFFORTS

Based on the capabilities assessment, the City of Reedley has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. Some of the possible opportunities for enhancement of the City’s existing mitigation program are listed below.

- Develop a Drought Contingency Plan that will help to create a framework for drought response and mitigation in the City of Reedley.
- Develop a stormwater management program
- Develop an Evacuation Plan in partnership with the County and specific to hazardous materials incidents.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Reedley adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Community Development Department, specifically the Planning and Building Divisions may utilize the hazard information when reviewing site plan application or when reviewing a building permit application. The Engineering Department may use this information while managing the City's Capital Improvement Program and help to focus future Capital Improvement Projects. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Reedley will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting. The previous 2018 plan was integrated into the city's Drought Mitigation Planning for ponding basins, Back-up Generator Plan for Community Center (EOC), and flood mitigation planning including hardening critical infrastructure assets near the Kings River.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1982. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.



MITIGATION ACTIONS

The planning team for the City of Reedley identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included.

In addition to implementing the mitigation action below the City of Reedley will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program, with an emphasis on drought. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy.

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.

1. BACK-UP GENERATOR FOR COMMUNITY CENTER (DESIGNATED EOC)

Hazard(s) Addressed: Multi-Hazard: agriculture and drought

Issue/Background: Provide backup power generator for the Reedley Community Center which is a designated Emergency Operations Center.

Other Alternatives: None

Cost Estimate: \$150,000

Benefits: Will provide critical continuous emergency capabilities such as communications for response, operations, evacuations, and recovery efforts.

Responsible Office: City of Reedley Public Works

Priority (High, Medium, Low): High

Potential Funding: FEMA HMGP

Schedule: Within 5 years

Status: New action in 2024

Annex J: City of San Joaquin





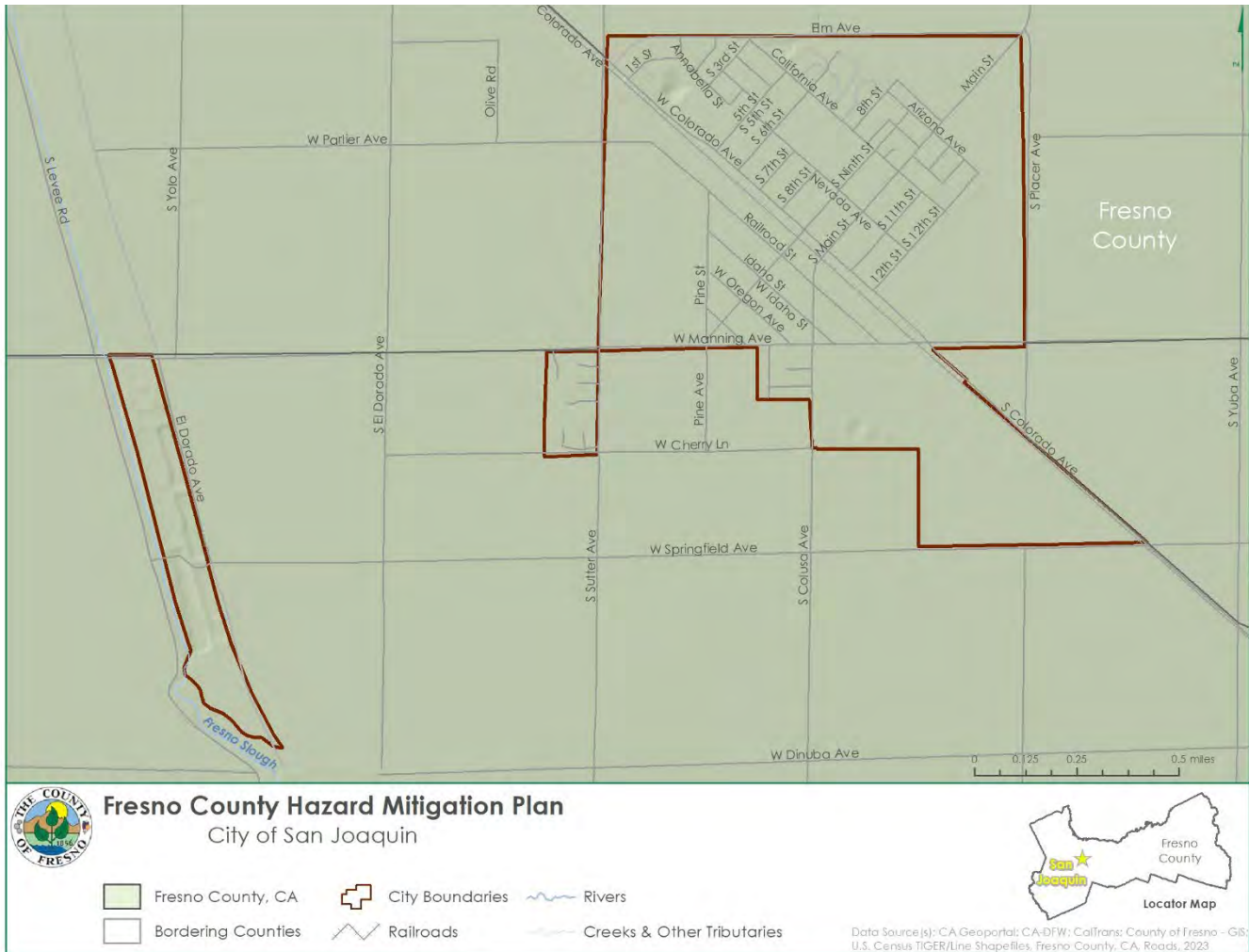
PARTICIPATION

To update the City of San Joaquin's jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of San Joaquin's input. Opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of San Joaquin did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee. These stakeholders are identified in Appendix B.

COMMUNITY PROFILE

Figure 1. City of San Joaquin Boundaries displays a map and the location within Fresno County of the City of San Joaquin.

Figure 1. City of San Joaquin Boundaries



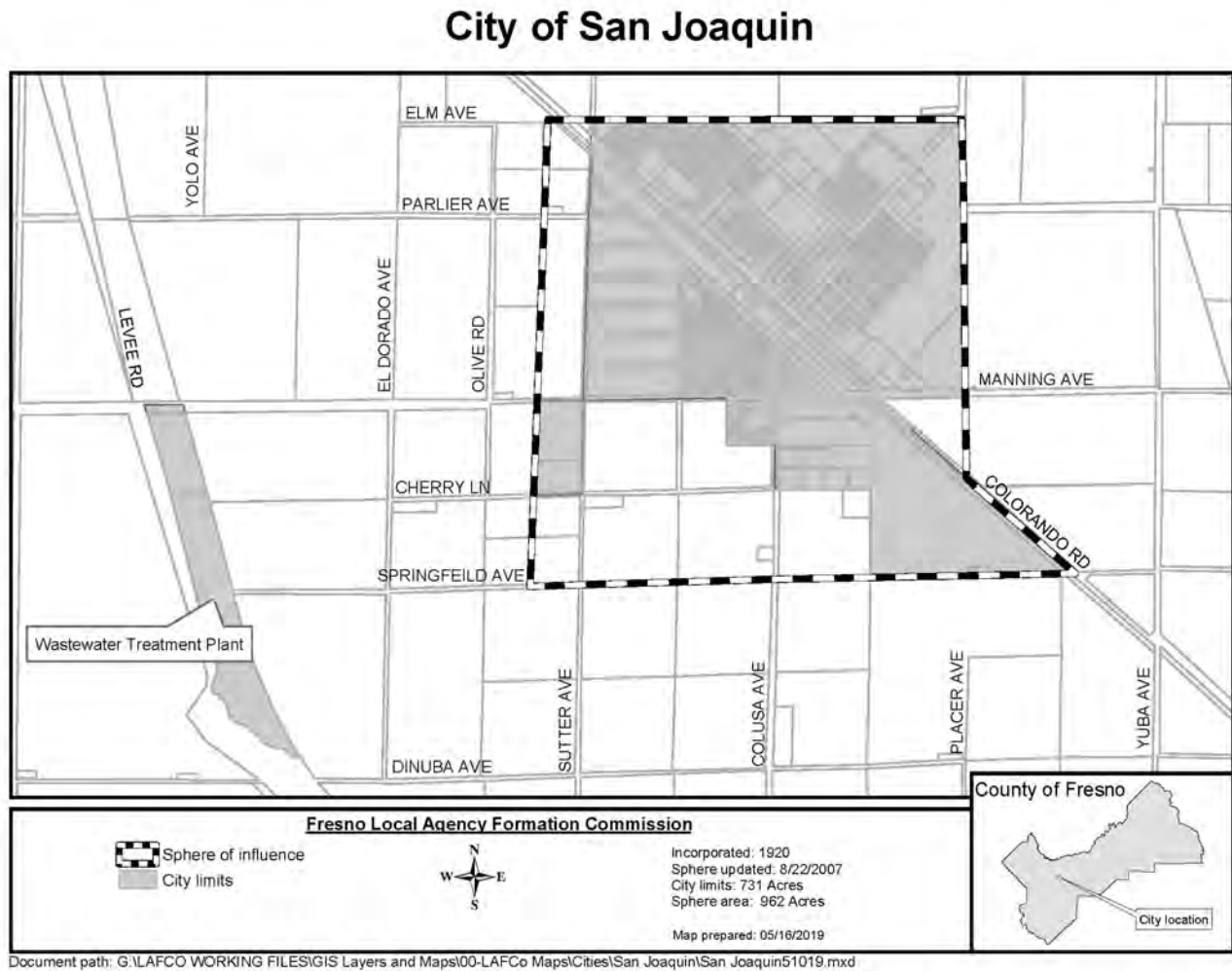
Source: CA Geoportal; CA-DFW: CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA Roads, 2023



GEOGRAPHY AND CLIMATE

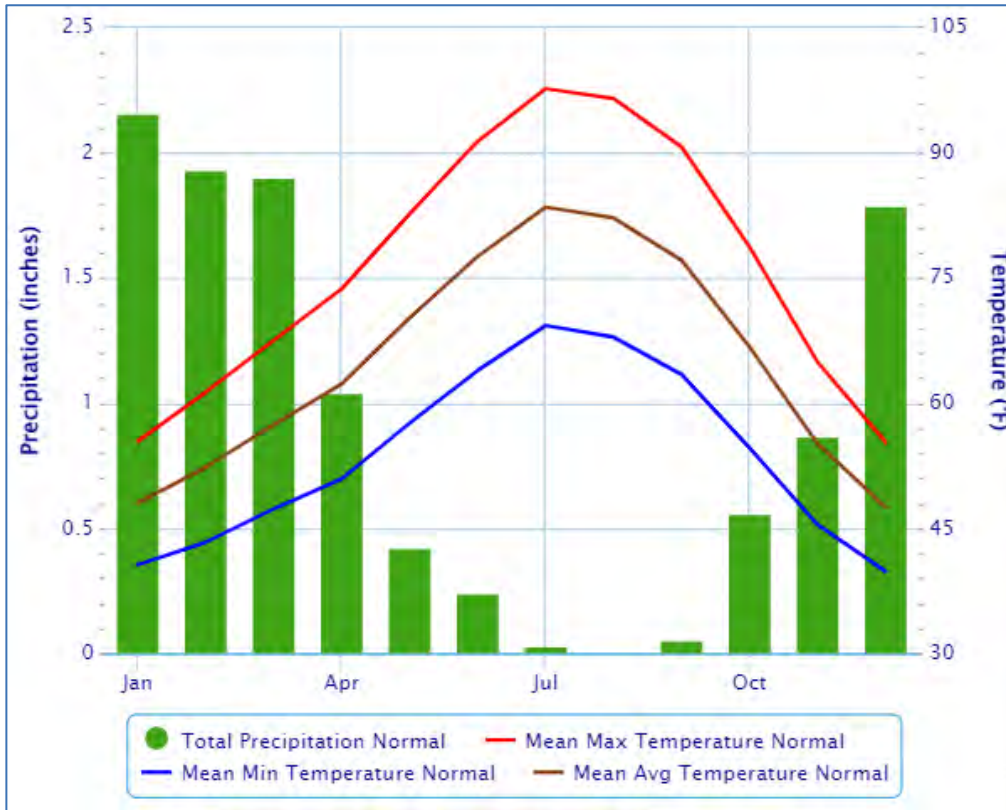
The City of San Joaquin is situated in western Fresno County, approximately 11 miles southwest of the City of Kerman. San Joaquin is the smallest incorporated city in the County; the City and its Sphere of Influence cover a 962-acre area, 731 acres of which is within the City limits, shown in **Figure 2. City of San Joaquin Limits and Sphere of Influence.**

Figure 2. City of San Joaquin Limits and Sphere of Influence



Source: Fresno Local Agency Formation Commission,
<https://www.fresnolafco.org/files/4e4ae8b16/San+Joaquin51019.pdf>

Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: National Weather Service (NWS)

San Joaquin's climate is semi-arid. Based on the general plan, the average precipitation varies between seven and 18 inches per year with an average of about nine inches. Average temperatures range from 82 degrees in July to 46 degrees in January. High temperatures may reach between 100 and 110 degrees in the summer months. Prevailing winds are from the northwest and average 8.5 miles per hour. The nearest National Weather Service weather station is located at the Fresno International Airport which is just under 30 miles to the northeast. **Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)** describes the monthly precipitation and temperatures normal for the Fresno Yosemite International Airport weather station between 1991-2020.

HISTORY

The following is given in the City's 2014 General Plan: San Joaquin was founded in the early 1900s and incorporated in 1920 as a general law city. The City developed with a traditional grid layout, oriented around the railway and served as a center for services in an agricultural area. Throughout its history, the city has been a small community with a strong agricultural presence.



ECONOMY

According to the 2014 General Plan, San Joaquin faces difficulty covering the costs of public services due to lower than average per capita sales tax income, low wages among residents and poor proximity to major trade routes. The major industry in San Joaquin is agriculture; however, the local economy has suffered following a federal program to retire arid farmland around the City, which has greatly reduced employment opportunities.

Select estimates of economic characteristics for the City of San Joaquin are shown in **Table 1. City of San Joaquin Economic Characteristics**.

Table 1. City of San Joaquin Economic Characteristics

Characteristic	City of San Joaquin
Families below poverty level	33.5%
All people below poverty level	33.2%
Median family income	\$47,875
Median household income	\$43,750
Per capita income	\$13,002
Population in labor force	1,264
Population employed*	1,025
Unemployment	9.9%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of San Joaquin's Employment by Occupation and **Table 3. City of San Joaquin's Employment by Industry** detail how the City of San Joaquin's labor force breaks down by occupation and industry based on estimates from the 2018-2022 American Community Survey.

Table 2. City of San Joaquin's Employment by Occupation

Occupation	# Employed	% Employed
Natural Resources, Construction, and Maintenance Occupations	446	43.51%
Management, Business, Science, and Arts Occupations	76	7.41%
Service Occupations	125	12.20%
Sales and Office Occupations	194	18.93%
Production, Transportation, and Material Moving Occupations	184	17.95%
Total	1,025	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/



Table 3. City of San Joaquin's Employment by Industry

Occupation	# Employed	% Employed
Agriculture, Forestry, Fishing and Hunting, and Mining	466	45.46%
Educational Services, and Health Care and Social Assistance	119	11.61%
Transportation and Warehousing, and Utilities	21	2.05%
Manufacturing	32	3.12%
Wholesale Trade	57	5.56%
Retail Trade	123	12.00%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	68	6.63%
Other Services, Except Public Administration	20	1.95%
Construction	22	2.15%
Finance and Insurance, and Real Estate and Rental and Leasing	25	2.44%
Professional, Scientific, and Mgmt., and Administrative and Waste Mgmt. Services	28	2.73%
Public Administration	26	2.54%
Information	18	1.76%
Total	1,025	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

POPULATION

According to the U.S. Census Bureau's 2020 Decennial Census, the population for the City of San Joaquin was 3,701. Select demographic and social characteristics for the City of San Joaquin from the 2018-2022 ACS are shown in **Table 4. City of San Joaquin's Demographic and Social Characteristics**.

Table 4. City of San Joaquin's Demographic and Social Characteristics

Characteristic	City of San Joaquin
Gender/Age	
Male	47.9%
Female	52.1%
Median age	24.5
Under 5 years	11.6%
Under 18 years	38.8%
65 years and over	5.4%
Race/Ethnicity	



Characteristic	City of San Joaquin
White	34.6%
Asian	0.0%
Black or African American	3.2%
American Indian/Alaska Native	0.8%
Hispanic or Latino (of any race)	95.0%
Education	
High school graduate or higher	45.9%
Disability Status	
Population 5 years and over	3.9%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

San Joaquin's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the City (see **Table 6. City of San Joaquin - Hazard Summary**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of San Joaquin - Hazard Summary

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Moderate	12 to 24 hours*	Less than 24 hours*	High
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Unlikely	Minor	Negligible	Less than 6 hours	Less than 24 hours	Low
Drought	Possible	Critical	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Critical	Large	More than 24 hours	More than 1 week	Medium*
Flood/Levee Failure	Unlikely	Critical	Large	More than 24 hours	Less than 1 week	Low*
Hazardous Materials	Possible	Limited	Small	Less than 6 hours	More than 1 week	Medium
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Fog	Possible	Limited	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Limited	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Small	Less than 6 hours	More than 1 week	Low*
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Medium
Soil Hazards						
Erosion	Likely	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Possible	Minor	Large	N/A	N/A	Low
Land Subsidence	Possible	N/A	Large	N/A	N/A	Low*
Landslide	Unlikely	Minor	Negligible	12 to 24 hours*	Less than 6 hours*	Low
Volcano	Unlikely	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Highly Likely	Limited	Small	12 to 24 hours*	More than 1 week*	Low*

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard

*Hazard "Overall Risk" differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on existing capabilities, etc.



Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*



VULNERABILITY ASSESSMENT

The intent of this section is to assess San Joaquin's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of San Joaquin - Hazard Summary**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of San Joaquin's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table 6 reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

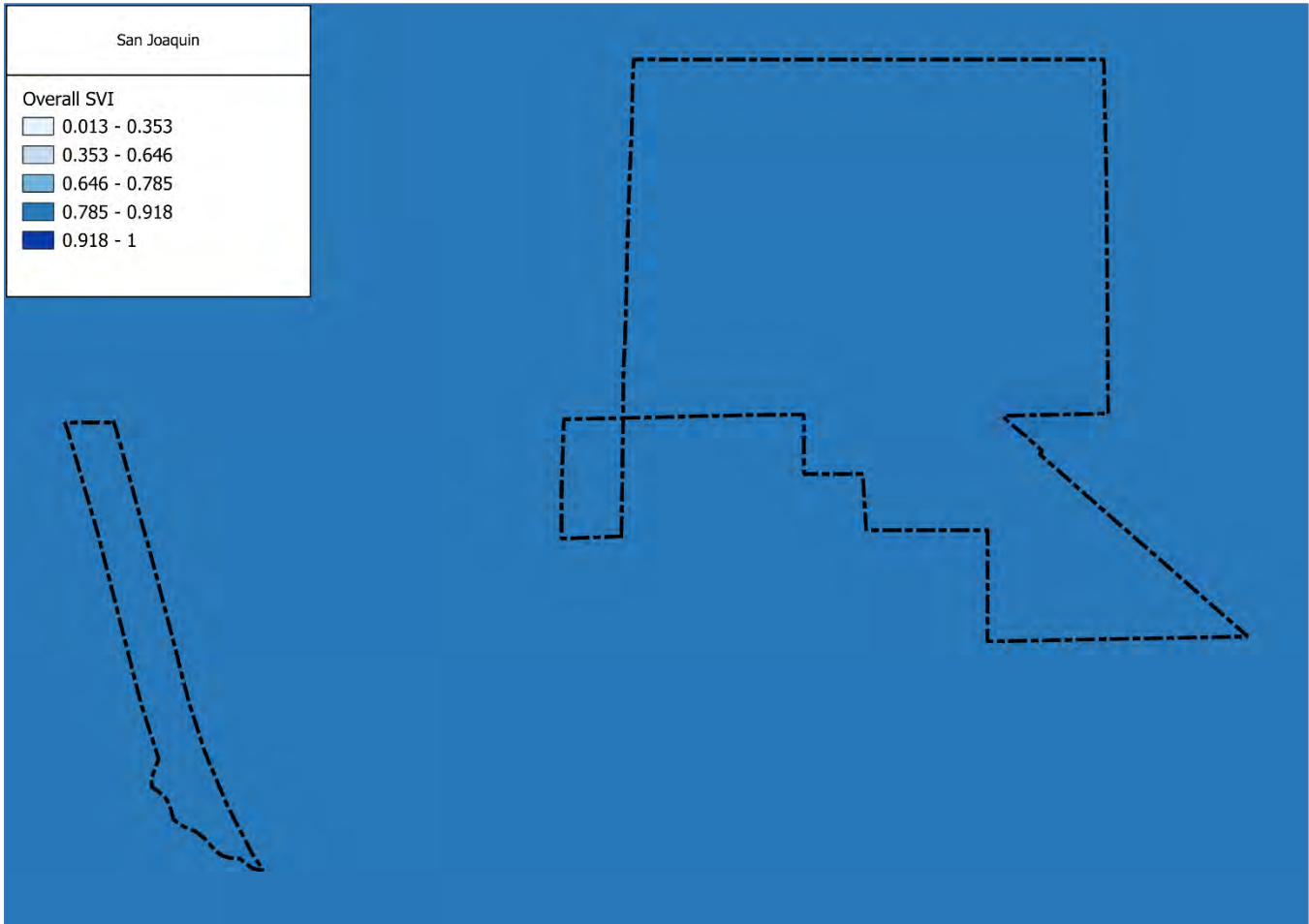
POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of San Joaquin, there is one census tract that has a higher SVI and encompasses the entire City, as shown in **Figure 4. City of San Joaquin Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool for understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.).¹

¹ CDC/ATSDR Social Vulnerability Index (SVI) | Place and Health | ATSDR
May 2024
https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html

Figure 4. City of San Joaquin Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of San Joaquin City Boundary

ASSETS AT RISK

This section considers San Joaquin's assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation.

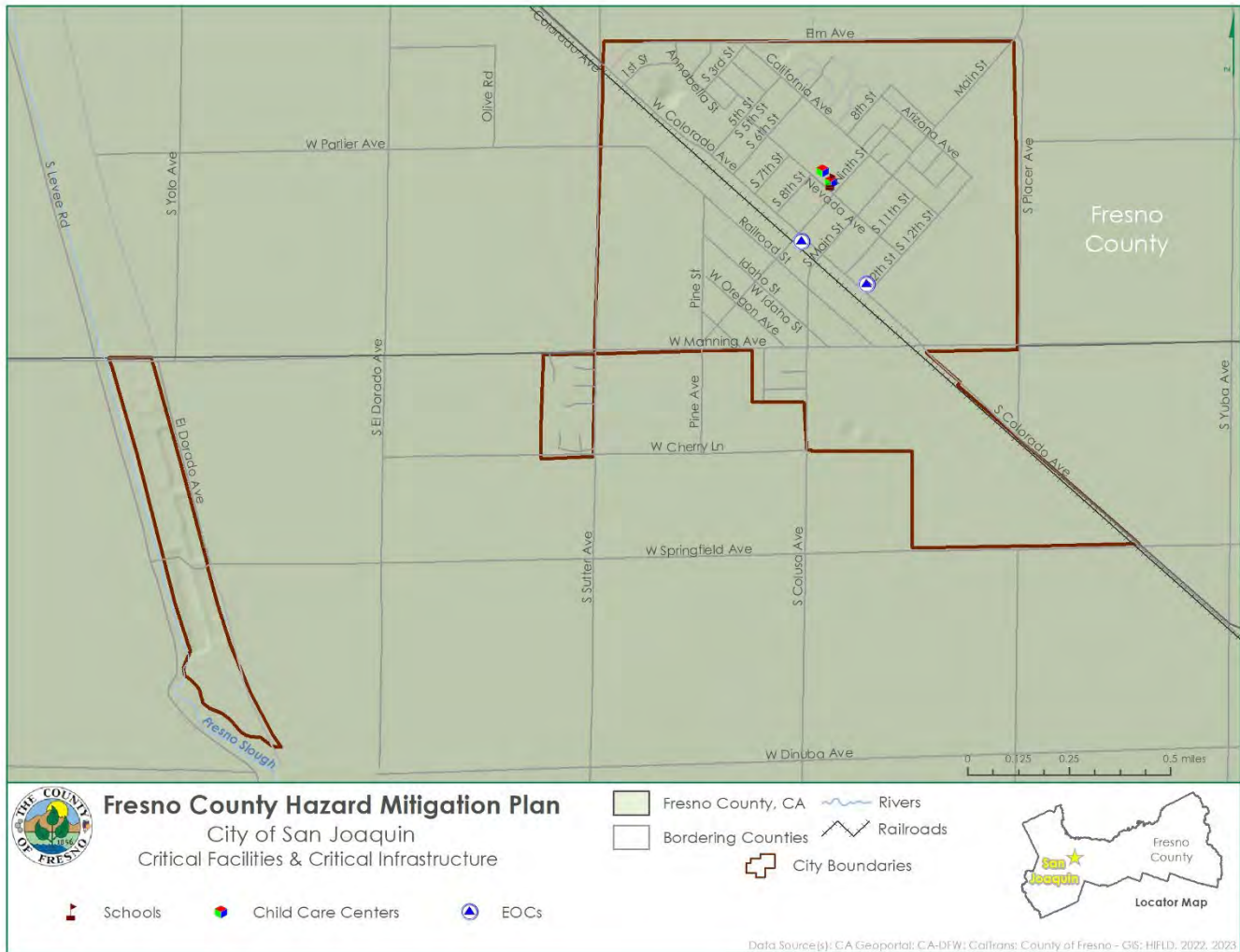
An inventory of critical facilities in the City of San Joaquin identified by Fresno County GIS is provided in **Table 7. City of San Joaquin's Critical Facilities** and mapped in **Figure 5. City of San Joaquin Critical Facilities**. In addition to these facilities, the City also considers City Hall (21900 W. Colorado Avenue) and Veteran Memorial Hall (22001 W. Manning Avenue) to be critical facilities.

Table 7. City of San Joaquin's Critical Facilities

Critical Facilities Type	Number
School	1
Electric Power Facilities	3
EOC's	2
Communication Facilities	1
Total	7

Source: Fresno County

Figure 5. City of San Joaquin Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; HIFLD, 2022, 2023



HISTORIC RESOURCES

The National Register of Historic Places does not list any sites within the City of San Joaquin.

ECONOMIC ASSETS

The City of San Joaquin has a base of ready to go industrial locations including undeveloped parcels that have easy access to infrastructure. The existing buildings in the industrial park have modern amenities and are amendable to easy conversion into a variety of different industrial uses. In addition to space, San Joaquin's other site location strengths include its transportation infrastructure with direct railroad access and connections to I-5, State Highway 41 and U.S. Highway 99. The community's location is in reasonable proximity to agricultural production and processing facilities and is well situated to serve agribusiness. Other community assets in San Joaquin include affordable housing, a rural quality of life and a business-friendly city staff ready to assist new businesses.

GROWTH AND DEVELOPMENT TRENDS

The average population increase for the past ten years has been 2.76 percent and the average increase for the most recent five years has been 3 percent. The need for construction of major facilities (i.e. water wells, sewage treatment plant expansion, and parks) will be directly proportional to growth.

The City's General Plan Land Use Map, revised in September 2013, is shown in **Figure 6. City of San Joaquin Land Use Diagram**.

Table 8. City of San Joaquin Change in Population and Housing Units illustrates how San Joaquin has grown in terms of population and number of housing units between 2017 and 2022. As of 2022, the population of San Joaquin was 3,725 with an average growth rate of only negative 7.45 percent. However, despite minimal population change, the city experienced substantial development of housing units.

Table 8. City of San Joaquin Change in Population and Housing Units

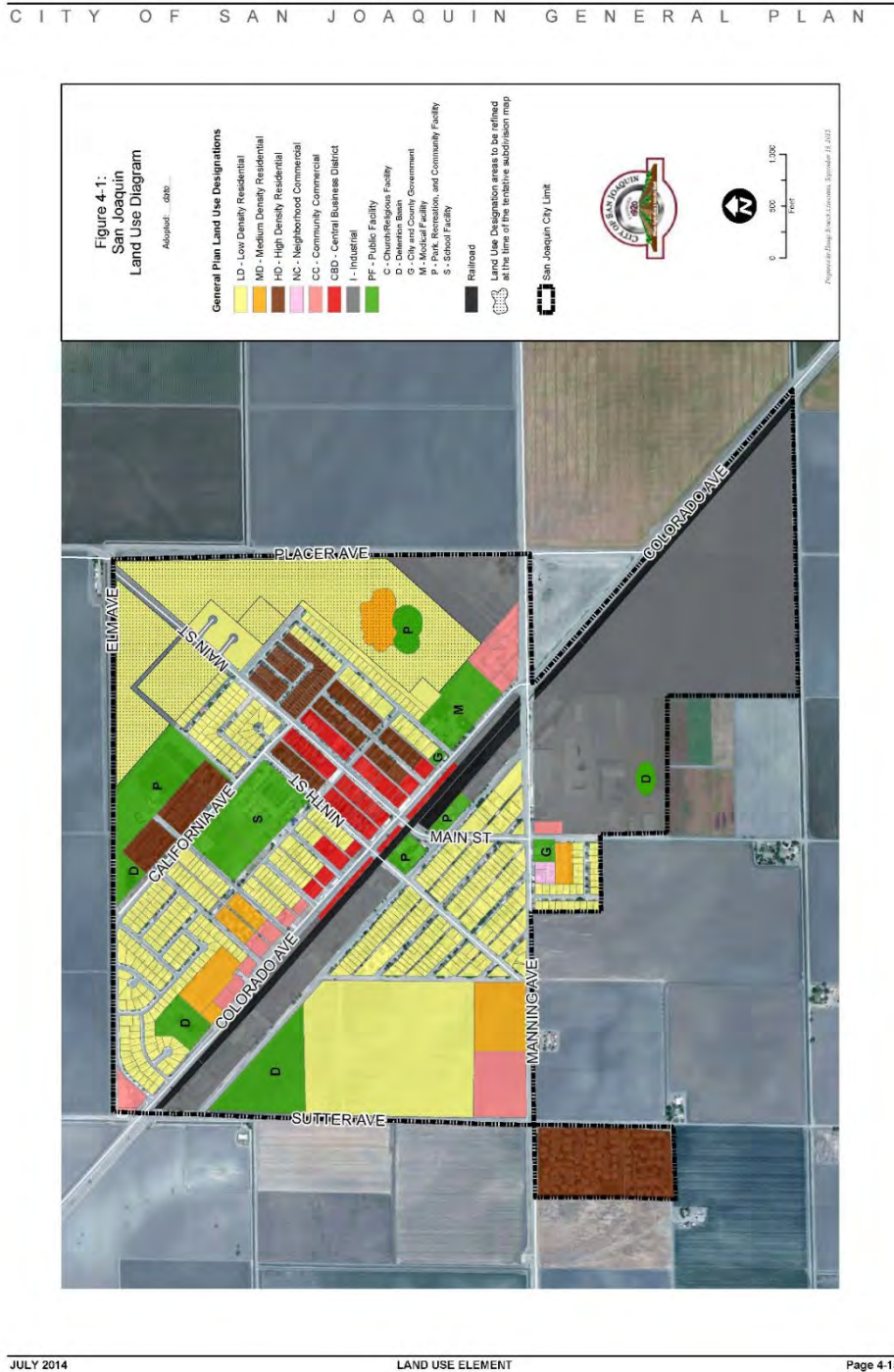
2017 Population	2022 Population Estimate	Estimated Percent Change 2017-2022	2017 # of Housing Units	2022 Estimated # of Housing Units	Estimated Percent Change 2017-2022
4,025	3,725	-7.45%	1,117	850	-23.90%

Source: American Community Survey 2018-2022 5-Year Estimates

Of the 1,044 housing units in San Joaquin, 91.2 percent are occupied. Renter-occupied units account for 62.0 percent of all occupied housing. Single family detached homes comprise 51.1 percent of the housing stock in the City, followed by 2-unit and 3- or 4- unit structures, which together account for 40.2 percent of all housing units.

More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in the Fresno County Vulnerability and Assets at Risk section of the main plan.

Figure 6. City of San Joaquin Land Use Diagram



Source: City of San Joaquin



ESTIMATING POTENTIAL LOSSES

Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Regarding these types of structures, there are no parcels in the 100- or 500-year floodplains in the City of San Joaquin. No further information on vulnerable structures is available. Impacts of past events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County as a whole).

AGRICULTURAL HAZARDS (HIGH)

Agricultural hazards are of high significance for the City of San Joaquin due to the large proportion of the City's economy devoted to agriculture. Agricultural pests or diseases that harm crop yields are likely to cause significant economic distress in the City. A threat to San Joaquin is the ongoing agricultural land retirements that would potentially reduce the commodity output and limit the growth in food processing or packing facilities.

DROUGHT (HIGH)

The HMPC determined that while drought is a significant hazard to the City of San Joaquin, this risk and vulnerability does not differ substantially from the overall risk faced by the County. Details on risk and vulnerability to drought can be found in Chapter 4 Risk Assessment.

EARTHQUAKE (MEDIUM)

There are no known active faults that run through the City. The nearest active fault, the Coalinga Fault, is approximately 40 miles west of the City. The San Andreas Fault is located 50 miles to the west, and the Owens Valley Fault is located approximately 100 miles to the east. The Clovis Fault is northwest-trending and about five miles east of the City of Clovis. It has been determined that the greatest potential for a significant earthquake would be from the San Andreas Fault. Seismic design procedures in the United States no longer use seismic zones. The Uniform Building Code (1997 and earlier editions) derived seismic design forces from seismic zones, zone factors, near-source factors in Zone 4, and source types. The International Building Code (2000 and later editions) derives seismic design forces from two ground motion parameters (SS and S1), site class, and long-period transition period (TL). Thus, current building codes use seismic design parameters with values that vary continuously across a geographic area, as opposed to zones with distinct geographic boundaries. Places located on alluvial deposits, like the City, tend to experience more intense ground shaking than those located on solid rock. Based on the USGS National Seismic Hazard Peak Ground Acceleration (PGA), 2% Probability of Exceedance in 50 years, the City of San Joaquin is categorized as a high-risk level for seismic risk.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.



EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of San Joaquin's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

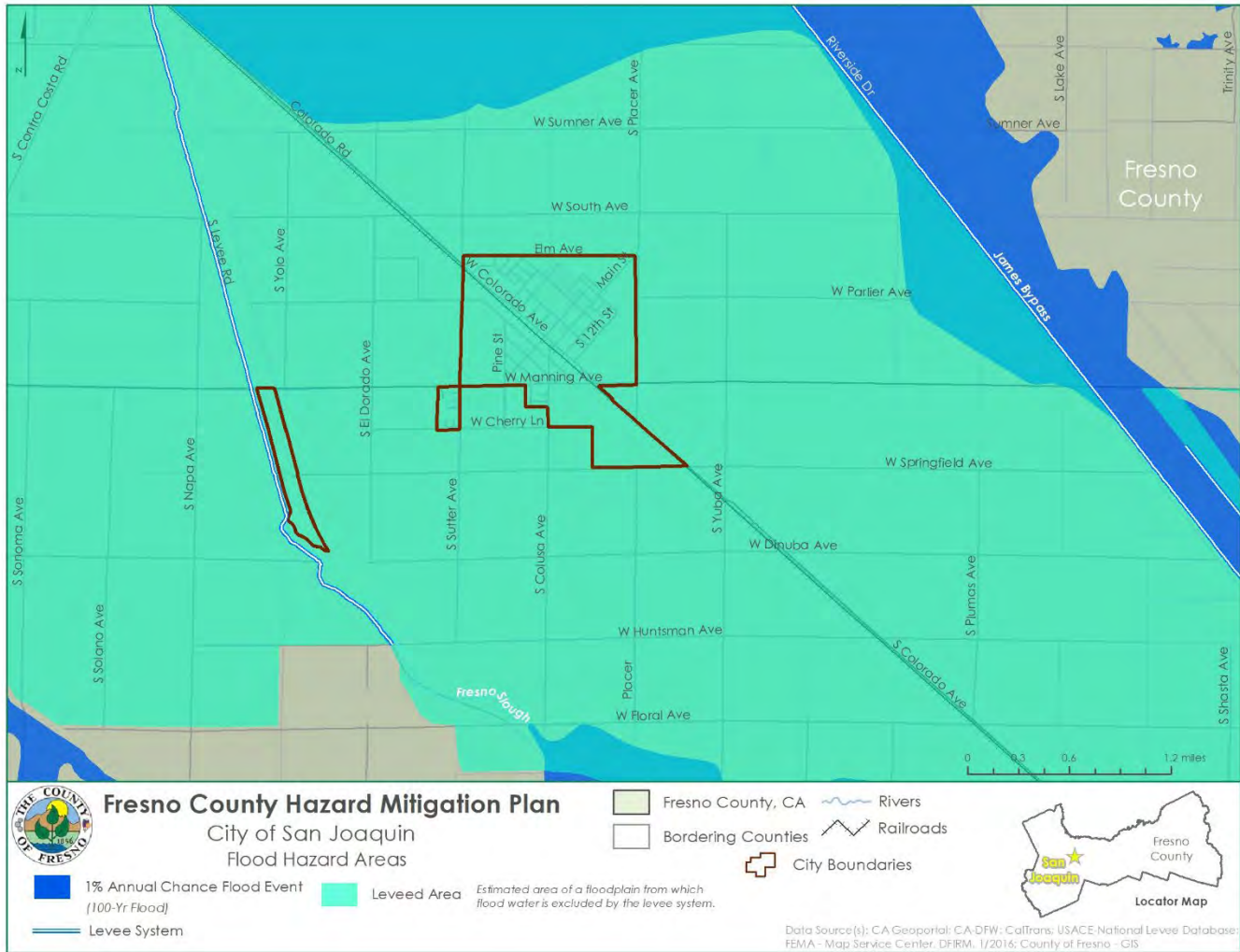
FLOOD/LEVEE FAILURE (LOW)

According to FEMA's 2016 Flood Insurance Study (FIS), San Joaquin faces minimal flood risk. The significance of flood is low compared to the planning area as a whole due to protection provided by a system of levees. According to the FEMA Community Information System data there are no Repetitive Loss or Severe Repetitive Loss properties located in the jurisdiction. However, the City of San Joaquin does face risk of flooding from levee failure. See Chapter 4 Risk Assessment for a map of leveed areas in Fresno County.

VALUES AT RISK

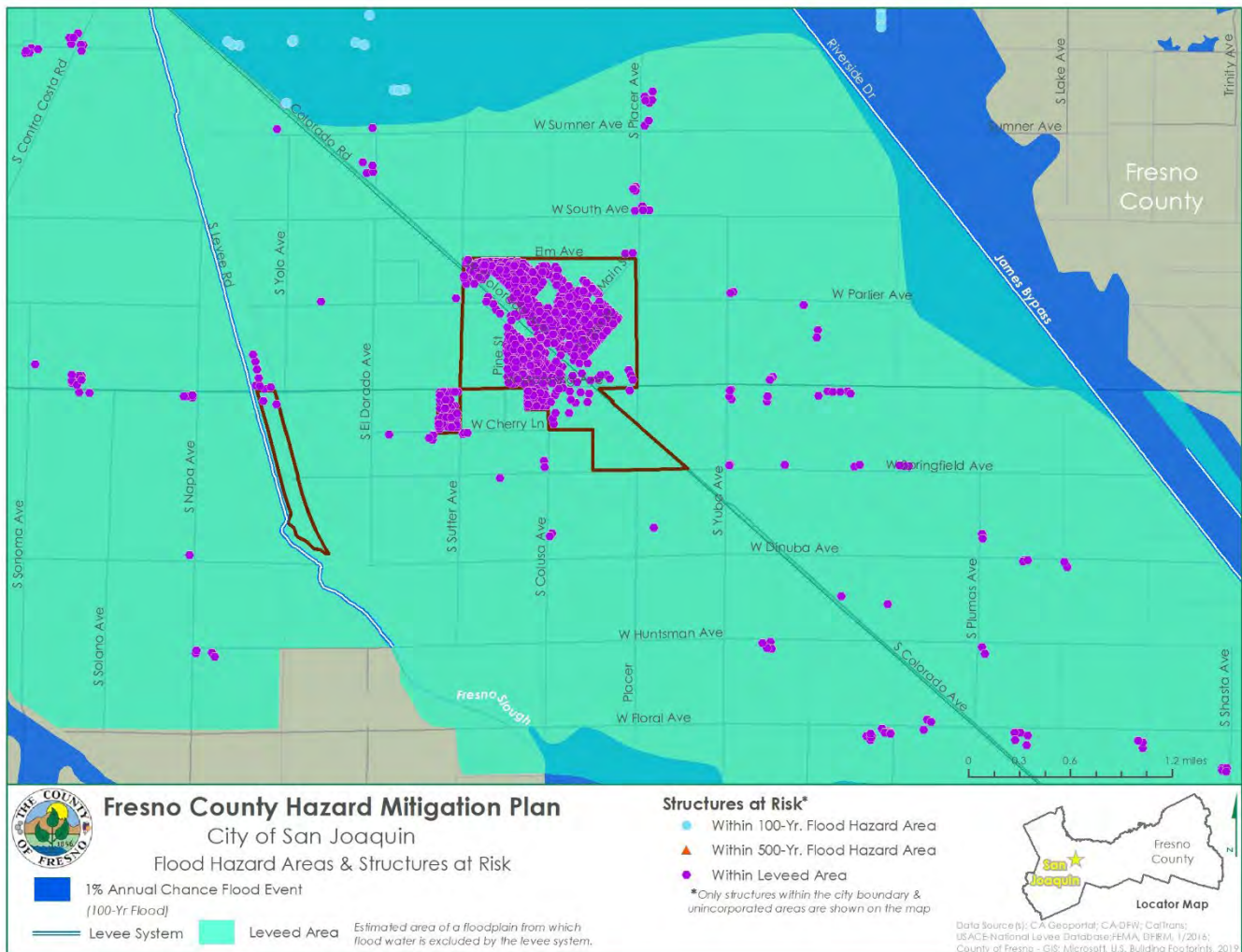
Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a flood map for the City of San Joaquin was created (see **Figure 7. City of San Joaquin Flood Hazard Areas**). None of the City falls within the 100- or 500-year floodplain and no values are at risk from a 100- or 500-year flood event, shown in **Figure 8. City of San Joaquin Structures at Risk to Flooding**. However, all of the City falls within a leveed area, as shown below.

Figure 7. City of San Joaquin Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE National Levee Database ; FEMA – Map Service Center, DFIRM. 1/2016 ; County of Fresno - GIS

Figure 8. City of San Joaquin Structures at Risk to Flooding



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database, FEMA, DFIRM, 1/2016 ; County of Fresno – GIS; Microsoft, U.S. Building Footprints, 2016

POPULATION AT RISK

Using parcel data from the County, population at risk was calculated for the National Levee Inventory leveed area based on the number of residential properties at risk and the U.S. Census Bureau 2016 estimate for the average number of persons per household (3.17). Based on this assessment, 1,975 people are at risk to flooding from levee failure in the City of San Joaquin.

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood



event which can further increase vulnerability based on factors such as age, disability, and access to transportation.²

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of San Joaquin joined the National Flood Insurance Program (NFIP) on April 30, 1982. NFIP Insurance data indicates that as of March 19, 2024, there was one flood insurance policy in force in the City with \$530 in total premium or total paid. There has been one claim in the City, however no amount was provided in the total premium or total paid. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties located in the jurisdiction.

HAZARDOUS MATERIALS INCIDENT (MEDIUM)

There have been 4 hazardous materials incidents from 2017-2022 that have occurred in the City of San Joaquin. Of the 4 incidents, there have been 1 fixed, 2 pipelines, and 1 categorized as other. There were no injuries or deaths during the time period, however, one incident totaled \$122,000.³

² Ermagun, A., Smith, V. & Janatabadi, F. High urban flood risk and no shelter access disproportionately impacts vulnerable communities in the USA. *Commun Earth Environ* 5, 2 (2024). <https://doi.org/10.1038/s43247-023-01165-x>

³ California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of San Joaquin's updated capabilities are summarized in **Table 9. City of San Joaquin Mitigation Capability Summary**.

Table 9. City of San Joaquin Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	X
Administrative and Technical Capability		X	X
Fiscal Capability	X		
Available Staff	X		
Political Support/Interest		X	X
Community Support	X		X

REGULATORY MITIGATION CAPABILITIES

Table 10. City of San Joaquin's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in San Joaquin.



Table 10. City of San Joaquin's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X					
Community Emergency Response Team (CERT)		X				
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X				
Fire Code	X					
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance		X				
Land Use/Development Planning	X					
National Flood Insurance Program (NFIP)	X					
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready	X					
Stormwater Management Plan/Ordinance	X					
Subdivision Regulations/Ordinance	X					
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance	X					

PLANNING MITIGATION CAPABILITIES

Table 11. City of San Joaquin Planning Capabilities identifies the plans related to mitigation and loss prevention in San Joaquin.

Table 11. City of San Joaquin Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	X	X	7/2023 adopted and update ongoing
Climate Resiliency or Adaptation Plan		X	



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Community Wildfire Protection Plan (CWPP)		X	
Comprehensive Emergency Management Plan		X	
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	X	X	12/2024
Continuity of Operations Plan (COOP)		X	
Disaster Recovery Plan		X	
Economic Development Plan		X	
Emergency Operations Plan (EOP)		X	
Evacuation Plan		X	
Flood Response Plan		X	
Floodplain Management Plan/Flood Mitigation Plan		X	
Hazard Mitigation Plan		X	
Historic Preservation Plan		X	
Natural Resources Protection Plan (NRPP)		X	
Open Space Management Plan (Parks and Rec/Greenway Plan)		X	
Threat Hazard Identification and Risk Assessment		X	

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 12. City of San Joaquin's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in San Joaquin.

Table 12. City of San Joaquin's Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		City Manager	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Public Works Director/City Engineering Firm	Engineers are contracted firm
Fiscal Management or Procurement Specialists	X		Finance Department	
Floodplain Manager		X		
Land Surveyors		X		



Land Use/Management/Development Planning	X		City Planning Firm	Planning firm contracted
Planners or engineers with an understanding of natural and/or human-caused hazards		X		
Resource Development Staff or Grant-writing		X		
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)		X		
Staff with education or expertise to assess the community's vulnerability to hazards		X		

FISCAL MITIGATION CAPABILITIES

Table 13. City of San Joaquin's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 13. City of San Joaquin's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming	X			
Community Development Block Grants (CDBG)		X	X	
Special Purpose Taxes (or taxing districts)	X			
Gas/Electric Utility Fee	X			
Water/Sewer Fees		X	X	
Stormwater Utility Fees	X			
Development Impact Fees		X	X	
General Obligation, revenue, and/or Special Tax Bonds	X			
Partnering Agreements or Intergovernmental Agreements	X			



FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)	X			
Homeland Security Grants (HSGP)		X		
USDA Rural Development Agency Grants		X		
US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			

OTHER MITIGATION EFFORTS

Based on the capabilities assessment, the City of San Joaquin has several existing mechanisms in place that will help to mitigate hazards. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. Some of the possible opportunities for enhancement of the City's existing mitigation program are listed below.

- Develop a Drought Contingency Plan that will help to create a framework for drought response and mitigation in the City of San Joaquin.
- Develop a stormwater management program
- Develop an Evacuation Plan in partnership with the County and specific to hazardous materials incidents.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of San Joaquin has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set for in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. Some of the possible opportunities for enhancement of the City's existing mitigation program are listed below.

- Develop a Drought Contingency Plan that will help to create a framework for drought response and mitigation in the City.
- Develop landscaping ordinances that incorporate proper species selection that are drought resistant, and planting and maintenance practices that will not exacerbate the effects of drought.



- Provide training opportunities for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of San Joaquin adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The City of San Joaquin did not identify any specific planning mechanisms into which information from the 2018 Fresno County Hazard Mitigation Plan was incorporated. The information contained within this 2024 plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Public Works Department may utilize the hazard information when implementing new projects as well as when maintain city infrastructure. The Department of Parks and Recreation may utilize the hazard information to better understand the community's vulnerability to drought and maintain the City's park and community centers in a manner to that will not exacerbate the effects of drought. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from San Joaquin will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1982. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.

2018 MITIGATION ACTIONS

The City of San Joaquin has completed part of their previous mitigation action identified in the 2018 plan update. The City completed the construction of a water tank storage noted in the action below. The installation of emergency generators is still in progress. Booster pump stations have been removed from the action as it is no longer necessary.

1. CONSTRUCT A WATER STORAGE TANK AND BOOSTER PUMP STATION; INCLUDING EMERGENCY GENERATORS TO BE INSTALLED AT WATER STORAGE TANK

Hazard(s) Addressed: Multi-Hazard: drought, flood, severe weather, earthquake



Issue/Background: The City currently does not have any water storage capacity, which makes us vulnerable to water shortages and system demands during drought and also susceptible to shortfalls related to fire flows. Additionally, in the event of an emergency and power goes out the City does not have any backup power sources to ensure the wells remain in operation. A number of hazards in the planning area could result in extended power outages.

Other Alternatives: None

Responsible Office: City of San Joaquin Public Works

Priority (High, Medium, Low): High

Cost Estimate: \$3 million

Potential Funding: State Revolving Fund, Community Development Block Grant

Benefits (Avoided Losses): Storage tank will help the City maintain its ability to meet system demands including fire flows and drought reserves. A dedicated emergency generator will ensure the tank and booster station will remain operational during power outages.

Schedule: Construction ongoing

Status: In progress – the community finished construction of the water tank storage, although the installation of the emergency generators has not yet been finalized



MITIGATION ACTIONS

The planning team for the City of San Joaquin identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included.

In addition to implementing the mitigation action below the City of San Joaquin will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.



1. INSTALL EMERGENCY GENERATORS

Hazard(s) Addressed: Multi-Hazard: drought, earthquake, flood, severe weather

Issue/Background: In the event of an emergency and power goes out the City does not have any backup power sources to ensure the wells remain in operation. A number of hazards in the planning area could result in extended power outages.

Other Alternatives: None

Responsible Office: City of San Joaquin

Priority (High, Medium, Low): High

Cost Estimate: Approximately \$2,000 - \$5,000 per generator

Potential Funding: Capital Improvement Project, HMGP

Benefits (Avoided Losses): A dedicated emergency generator will ensure the tank and booster station will remain operational during power outages.

Schedule: Several years

Status: In progress -- planning completed, and implementation is dependent on funding

Comments: generators are scheduled to be installed as part of a capital improvement project being constructed over the next couple of years.

Annex K: City of Sanger



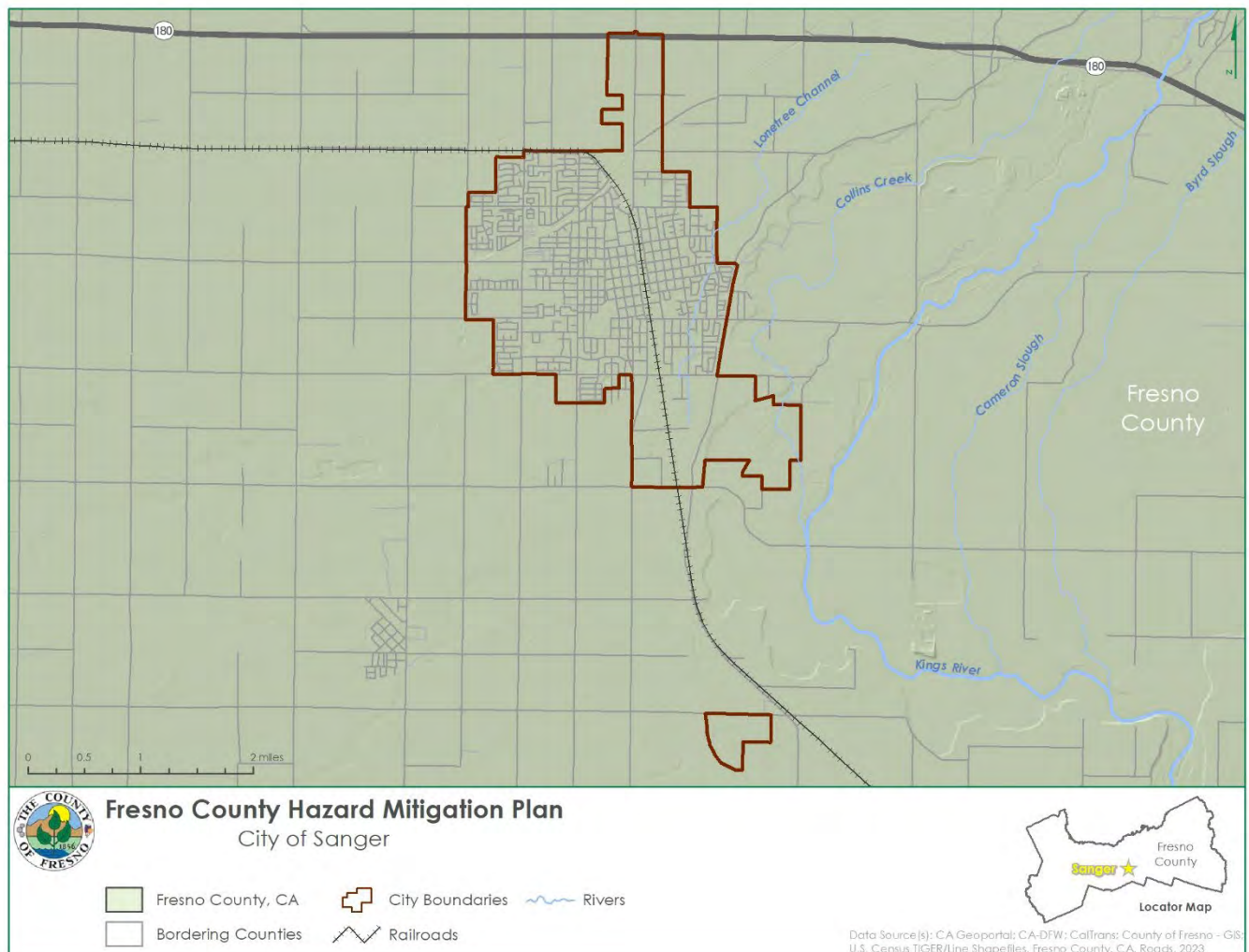
PARTICIPATION

To update the City of Sanger’s jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O’Brien’s consulting team provided opportunities for the City of Sanger’s input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. To update the annex, the City engaged the public through town hall meetings that occur twice per fiscal year to assess the community’s feedback on their public safety priorities. Additionally, the Fire Department completed a Community Risk Assessment in December 2019 which assisted in updating the City of Sanger’s annex.

COMMUNITY PROFILE

Figure 1. City of Sanger Boundaries displays a map and the location within Fresno County of the City of Sanger.

Figure 1. City of Sanger Boundaries



Source: CA-Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA, Roads, 2023

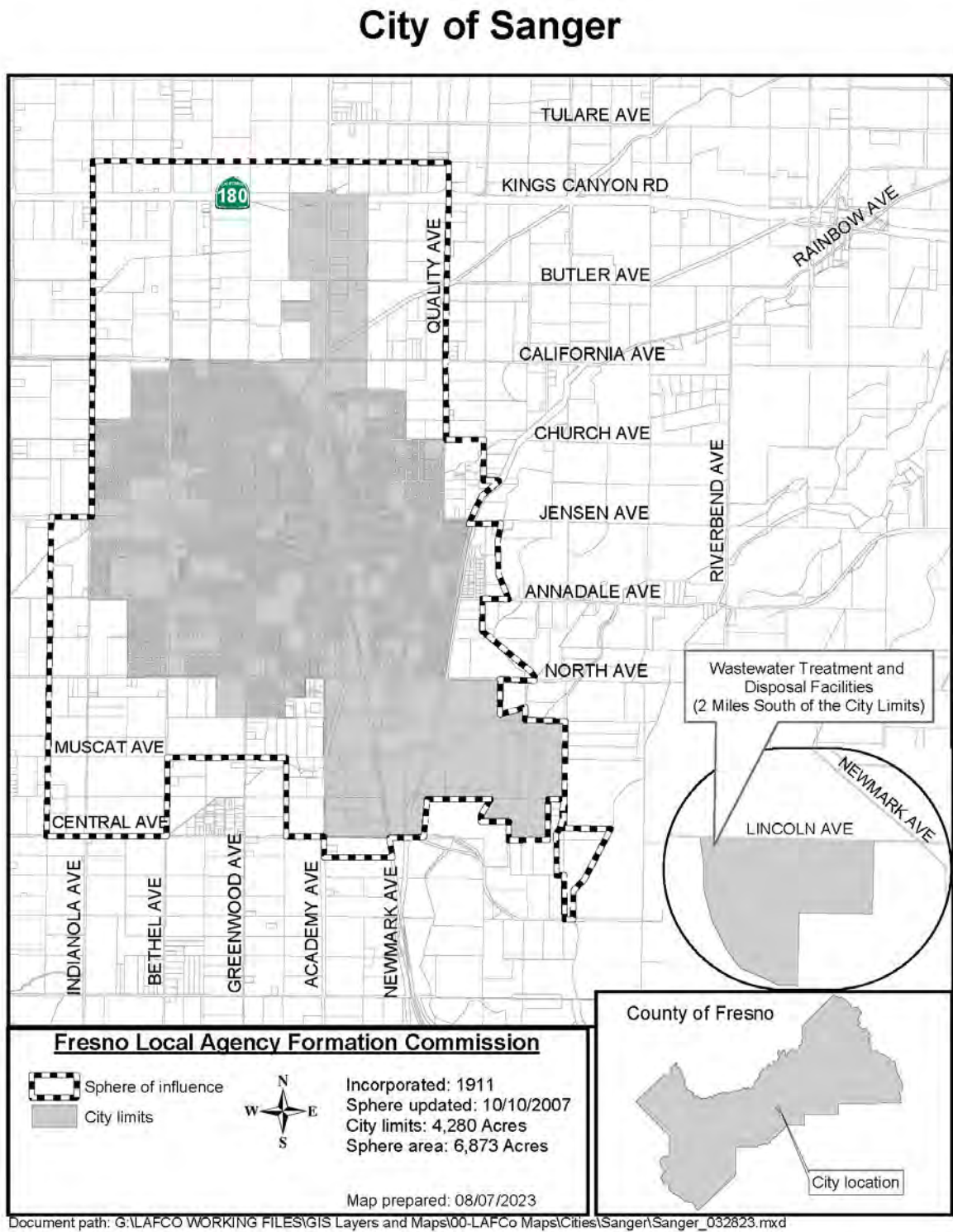
GEOGRAPHY AND CLIMATE

The City of Sanger is located in central Fresno County southeast of the City of Fresno. The City and its Sphere of Influence encompass a 6,873-acre area; the City alone covers 4,280 acres. Over the past decade, the City boundary has remained relatively unchanged with the exception of an area along the western border of the City's Sphere of Influence that was annexed into the City limits, shown in **Figure 2. City of Sanger Limits and Sphere of Influence.**

Sanger has a Central Valley desert climate. The land is generally flat with surface slope of five feet per mile. The City is located on an alluvial plain formed by the Kings River drainage system. Once largely an agricultural community, Sanger is currently undergoing residential development. Summers are hot and dry, and winters are cold and foggy. The annual average precipitation is 10.4 inches of precipitation.

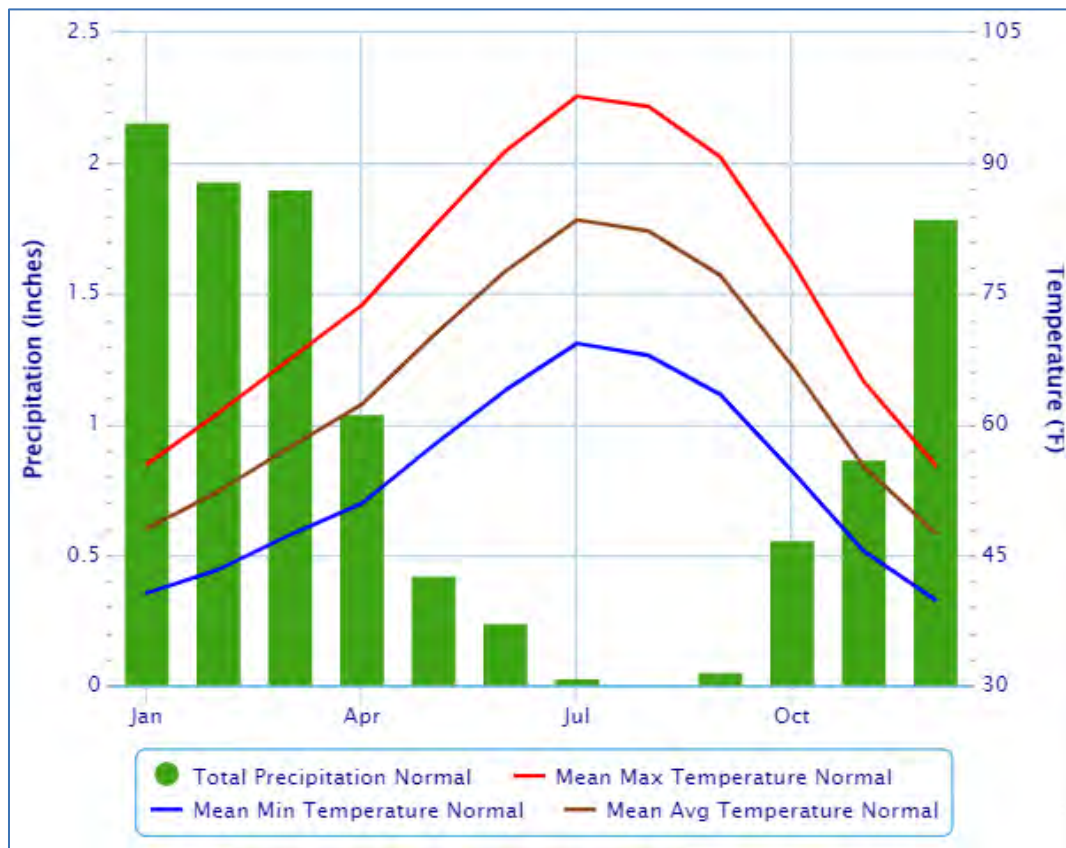
The figure below shows the monthly temperature and precipitation normals for the nearest National Weather Service (NWS) weather station which is at the Fresno-Yosemite International Airport, shown in **Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020).**

Figure 2. City of Sanger Limits and Sphere of Influence



Source: Fresno Local Agency Formation Commission,
https://www.fresnolafo.org/files/3dbaf81a8/Sanger_080723.pdf

Figure 3. Fresno-Yosemite International Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: National Weather Service (NWS)

The figure above shows the monthly precipitation and temperature normal for the Fresno-Yosemite International Airport weather station, which is the closest station to the City of Sanger.

During the summer months, the region has extended periods where temperatures exceed 100°F. While the average temperature is 90°F during the summer, these extended heat waves impact the medically fragile, elderly, and animal populations. In addition to heat waves, the Fresno County region continues to suffer regular drought due to lower than normal snowpack in the Sierra Nevada, which supplies water for agricultural use and replenishes the groundwater supply.

HISTORY

The City of Sanger was founded in 1888 and incorporated in 1911. In 1926, the General Grant Tree was designated the Nation’s Christmas Tree by U.S. President Calvin Coolidge and the U.S. Department of the Interior. In 1949, the City of Sanger was designated as the Nation’s Christmas Tree City by the U.S. Postal Service, and 10 years later, the General Grant Tree was designated as a National Shrine by the U.S. Congress.

The City was named after Joseph Sanger Jr., who at the time was secretary and treasurer of the Railroad Yardmasters Association. He was never in Sanger but was told at an annual convention in

San Francisco that Southern Pacific Railroad officials had named a town in Fresno County for him. At the time, the town was being surveyed.

The history of Sanger is housed in the Sanger Depot Museum, which is actually the Sanger Railroad Depot, once the hub of the town’s growth. Built in 1887, the Sanger Railroad Depot sat beside the Southern Pacific Railroad that ran between Fresno and Porterville, California. Among the cargo that passed through this depot was grain, citrus, and lumber brought down from the mountains by Sanger’s booming lumber operation. When Sanger’s commerce no longer needed the Depot, it was discovered that the building was the oldest in Sanger. It was purchased by a local business family and donated to the Sanger Historical Society. The museum opened in December 1977.

ECONOMY

Sanger offers the conveniences and services of a major city as well as the rural lifestyle prized by so many. Sanger is a full-service city located minutes from California’s fifth largest and fastest growing urban center. Its award-winning school district is a magnet for families looking to combine educational excellence with smaller town amenities.

Sanger business development and job growth are robust. Industrial residents come in all sizes, from Fortune 100 companies such as International Paper and Initiative Foods to numerous small and midsize manufacturers and food processors. Sanger is strategically situated to take advantage of the California market and its over 39 million customers.

The five major employers for the City are Sanger Unified, Walmart, Pitman Farms, ADCO Manufacturing, and International Paper. The City has three high schools, nine elementary schools, three charter schools, and one community day school. Enrollment in 2006 was 9,160.

Sanger’s location at the base of the Sierra Nevada mountain range provides limitless recreational opportunities. In less than an hour, residents can view the world’s largest trees in Sequoia National Park. A few minutes more will bring you to the bottom of the deepest river gorge in the United States, Kings Canyon National Park, or to the powdery slopes of nearby ski resorts. Numerous foothill parks, campgrounds, lakes, and streams provide families with ample choices for daytrips or extended vacations. Select estimates of economic characteristics for the City of Sanger are shown in **Table 1. City of Sanger Economic Characteristics.**

Table 1. City of Sanger Economic Characteristics

Characteristics	City of Sanger
Persons in Poverty	15.9%
Median Household Income `	\$69,333
Median gross rent	\$1,102
Per Capita Income	\$24,460
Employed (16 years +)	62.8%
Unemployment	10.7%
Total employer establishments	N/A

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Sanger Employment by Occupation and **Table 3. City of Sanger Employment by Industry** show how the City of Sanger labor force breaks down by occupation and industry based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Sanger Employment by Occupation

Occupation	# Employed	% Employed
Management, business, science, and arts occupations	3,098	27.3%
Service Occupations	2,107	18.5%
Sales and Office Occupations	2,286	20.1%
Natural Resources, Construction, and Maintenance Occupations	1,804	15.9%
Production, transportation, and material moving occupations	2,065	18.2%
Total	11,360	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Sanger Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care and Social Assistance	1,194	10.5%
Retail Trade	624	5.5%
Professional, Scientific, and Mgmt., and Administrative and Waste Mgmt. Services	948	8.3%
Manufacturing	380	3.3%
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	1,338	11.8%
Construction	587	5.2%
Finance and Insurance, and Real Estate and Rental and Leasing	99	0.9%
Public Administration	411	3.6%
Other Services, Except Public Administration	732	6.4%
Wholesale Trade	2,869	25.3%
Transportation and Warehousing, and Utilities	842	7.4%
Agriculture, Forestry, Fishing and Hunting, and Mining	564	5.0%
Information	772	6.8%
Total	11,360	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

POPULATION

According to the U.S. Census Bureau's 2022 Population Estimates, the total population for the City of Sanger was estimated at 26,600. Select demographic and social characteristics for the City of Sanger from the 2018-2022 American Community Survey are shown in **Table 4. City of Sanger Demographic and Social Characteristics**.

Table 4. City of Sanger Demographic and Social Characteristics

Characteristics	City of Sanger
Gender/Age	
Male	53.4%
Female	46.6%
Median Age	31.8
Under 5 Years	8.0%
Under 18 Years	29.2%
65 Years and Over	10.7%
Race/Ethnicity	
White	46.6%
Asian	3.5%
Black or African American	0.3%
American Indian/Alaska Native	2.4%
Hispanic or Latino (of any race)	76.7%
American Indian and Alaska Native	2.4%
Native Hawaiian and Other Pacific Islander	0.8%
Education	
High school graduate or higher	72.7%
Disability Status	
Persons with a disability, under age 65 years	7.7%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Clovis' planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Clovis (see **Table 6. City of Sanger - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Clovis.

Table 5. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	

Table 6. City of Sanger - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Minor	Minor	12-24 hours*	Less than 24 hours*	Low*
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours*	Medium*
Drought	Possible	Critical	Large	More than 24 hours	More than a week	High
Earthquake	Possible	Critical	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Likely	Critical	Large	More than 24 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
Hazardous Materials	Possible	Critical	Large	Less than 6 hours	Less than 1 week	Medium*
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Tornado	Possible	Minor	Large	Less than 6 hours	Less than 6 hours	Low*
Soil Hazards						
Erosion	Likely	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Possible	Minor	Negligible	N/A	N/A	Low
Landslide	Unlikely	Minor	Negligible	N/A	N/A	Low
Land Subsidence	Possible	Limited	Large	N/A	N/A	Low
Volcano	Unlikely	Minor	Negligible	Less than 6 hours*	More than 1 week*	Low
Wildfire	Possible	Limited	Small	12-24 hours*	More than 1 week*	Low*

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.

Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*

VULNERABILITY ASSESSMENT

The intent of this section is to assess Sanger's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 6. City of Sanger - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Sanger's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

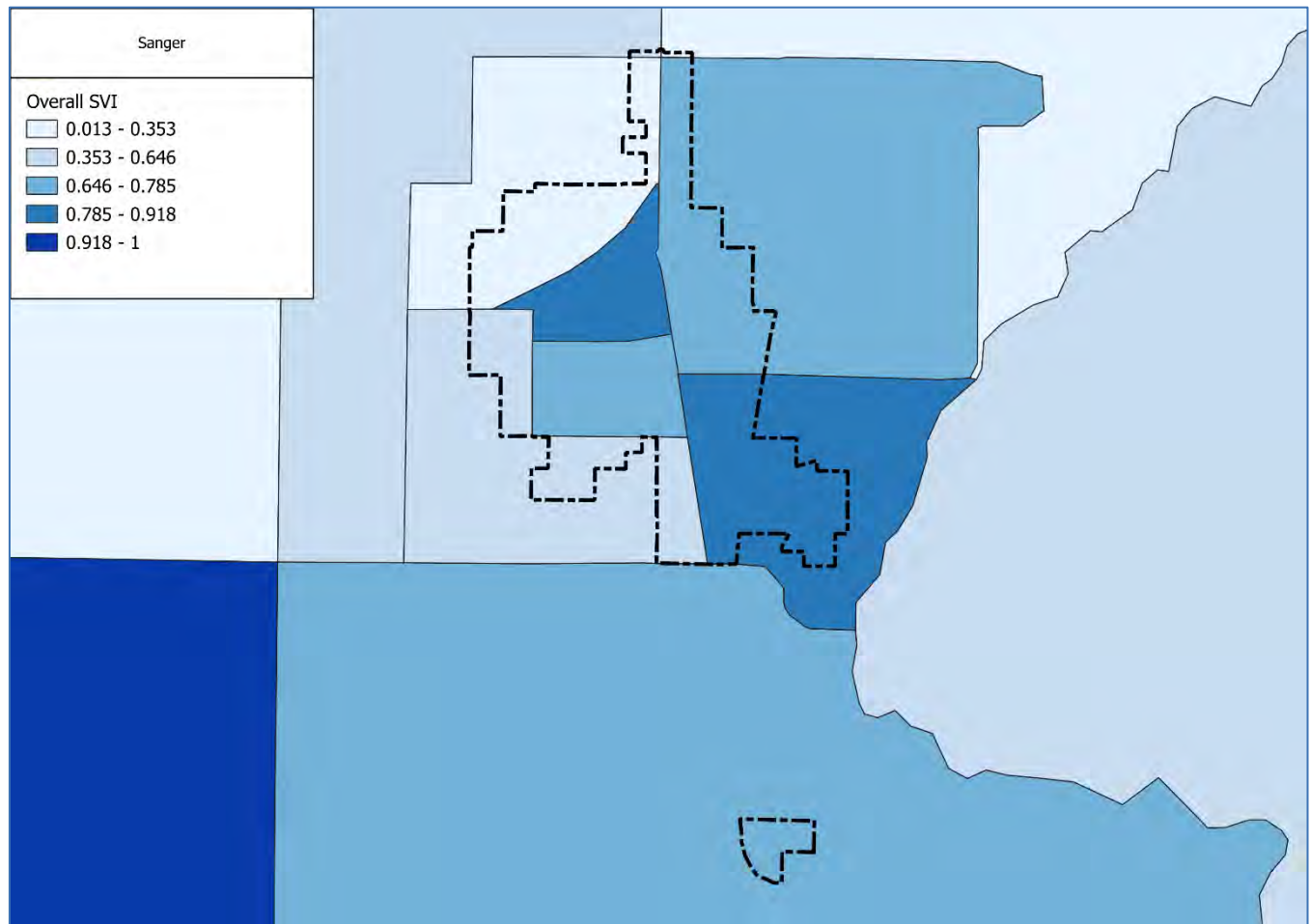
The hazard summaries in Table 6 reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Sanger, census tracts with a higher SVI are near the northcentral and southeastern portion of the City, as shown in **Figure 4. City of Sanger Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.). ¹

Figure 4. City of Sanger Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Sanger City Boundary

ASSETS AT RISK

This section considers Sanger’s assets at risk, including values at risk, critical facilities and infrastructure, historic assets, economic assets, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation.

An inventory of critical facilities in the City of Sanger from Fresno County GIS is provided in **Table 7. City of Sanger Critical Facilities** and in **Figure 5. City of Sanger Critical Facilities and Critical Infrastructure**.

Table 7. City of Sanger Critical Facilities

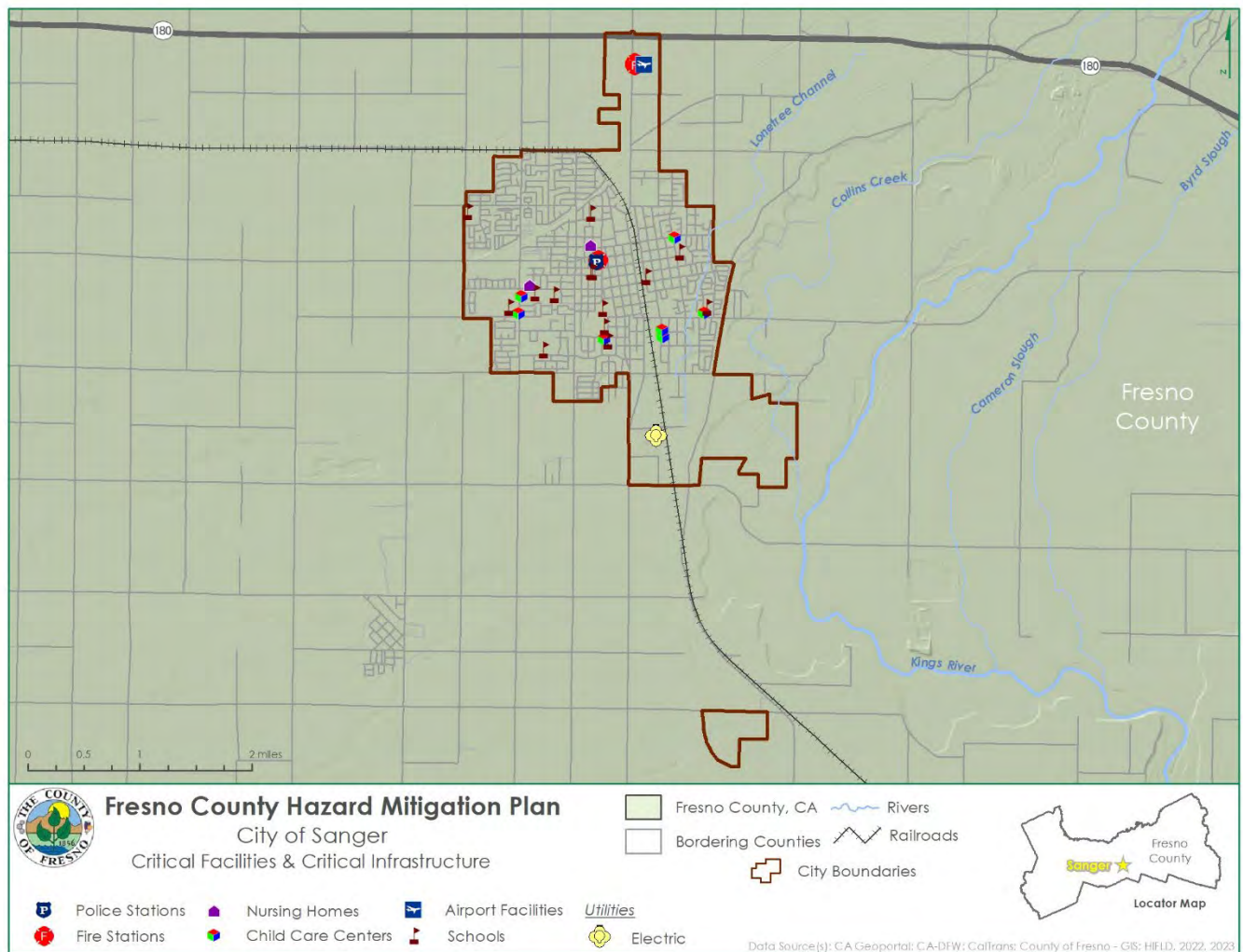
Facility Type	Counts
CalARP	6
Colleges & Universities	0
Fire Station	4
Airport Facility	1
Police	1
School	17
Communications	2
Electric	1
Total	24

Source: Fresno County

The Police and Fire departments are not secured and fenced in. The City has sought grant funding in the past to fence these facilities but has not been successful thus far. Additionally, the City Wastewater Treatment Plant has security fencing but upgrades to the security systems in place are needed.

The City operates and maintains the wastewater collection system, a domestic wastewater treatment plant, and an industrial wastewater treatment plant within the City limits. All of the wastewater that flows from the City is collected and treated at the Sanger wastewater treatment plants. Stormwater in Sanger is piped to stormwater percolation basins and is not treated at the Sanger wastewater treatment plant.

Figure 5. City of Sanger Critical Facilities and Critical Infrastructure



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; HIFLD, 2022, 2023

GROWTH AND DEVELOPMENT TRENDS

The City of Sanger, once largely an agricultural community, is currently undergoing significant residential development. All areas of the City are growing. However, growth is anticipated to be focused on the north and northwest sides of town. The State Road 180 project on the north side of town is expected to spur the major building activity over the next 20 years as the City expands up to the northern limits of the existing Sphere of Influence. Paced growth is also expected to the west, with nominal growth in the south and east. **Figure 6. City of Sanger Land Use** shows the land use map for the City of Sanger.

Table 8. City of Sanger Change in Population and Housing Units, 2015-2020 illustrates how the City has grown in terms of population and number of housing units between 2015 and 2020. As of 2020, the population of Clovis was 26,744 which is about 8.3 percent increase from 2015. Housing units have increased as well since 2015 with a six percent increase.

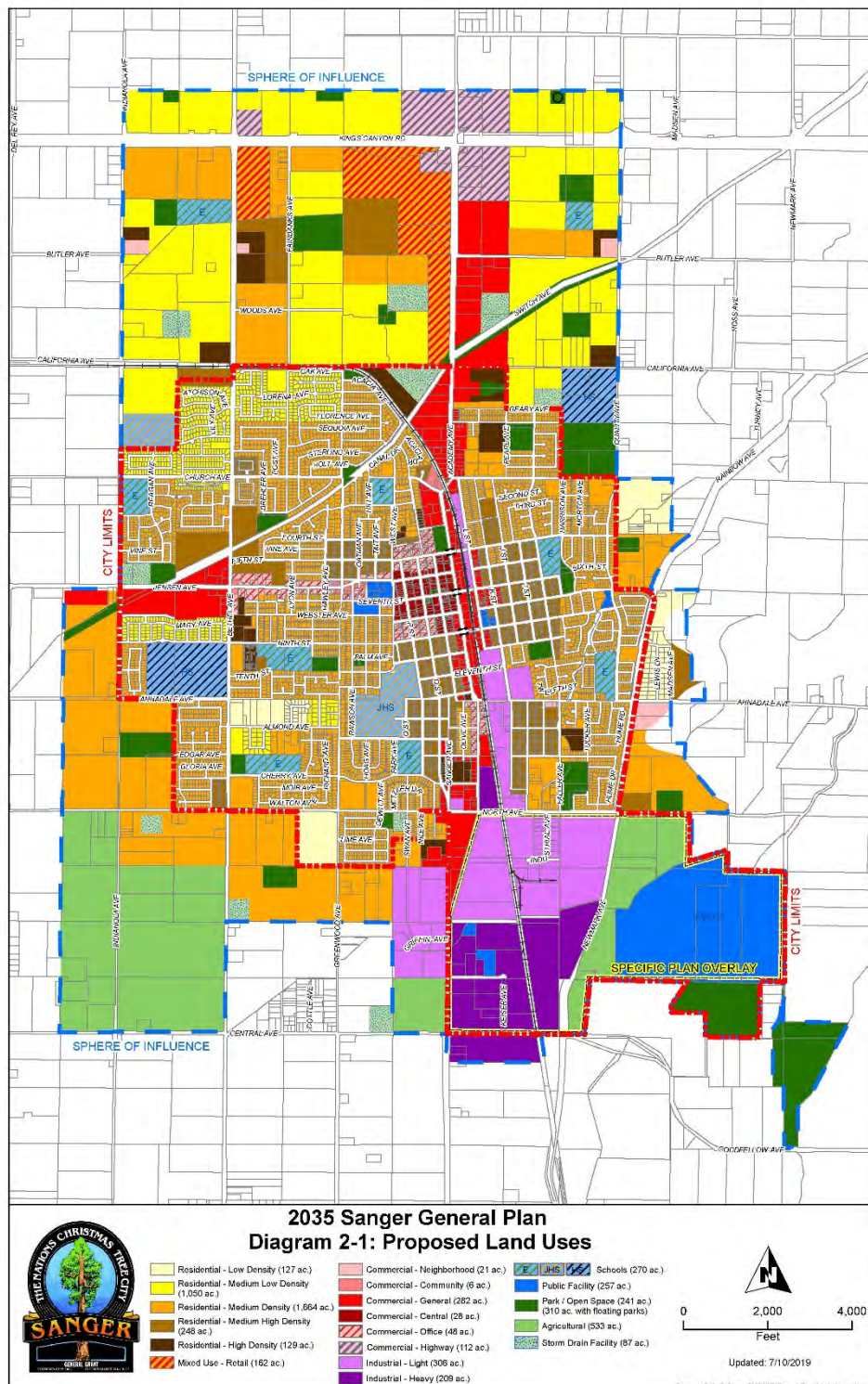
Table 8. City of Sanger Change in Population and Housing Units, 2015-2020

2015 Population Estimate	2020 Population	Estimated Percent Change 2015- 2020	2015 Estimated # of Housing Units	2020 Estimated # of Housing Units	Estimated Percent Change 2015- 2020
24,700	26,744	8.3%+	7,350	7,795	6%+

Source: U.S. Census Bureau

California state law (Government Code Section 65302) requires each city and county to have an adopted general plan, a blueprint for future growth and development that addresses issues directly related to land use decisions. The law specifies that each general plan addresses eight issue areas: land use, circulation, open space, conservation, housing, safety, noise, and an environmental justice element, which has recently been added since the last hazard mitigation plan update.

Figure 6. City of Sanger Land Use



Source: City of Sanger

ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (according to HMPC member input) it differs from that of the overall County.

Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Impacts of past events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County as a whole).

DAM FAILURE (MEDIUM)

The City of Sanger is downstream of the largest dam in the planning area, the Pine Flat dam at 1M acres-feet of capacity. The Pine Flat Dam, managed by the U.S. Army Corps of Engineers, is 16 miles northeast (upstream) of Sanger on the Kings River. Should it fail, a flood-tide would engulf the City in approximately one hour according to Corps inundation studies.

DROUGHT (HIGH)

Groundwater is the sole water supply for the City. The Kings River recharges the groundwater, along with runoff from the foothills, which to date has been sufficient to meet the needs of the area. However, the groundwater storage level is decreasing at an alarming rate in the Sanger area and in the San Joaquin Valley.

In an effort to reduce the effects of a drought, the City has constructed wastewater percolation ponds to help recharge the groundwater basin. In 2020, approximately 311 MG of undisinfected secondary effluent from the Industrial WWTP was applied to 140 acres of City-owned land for agricultural irrigation of folder crops. Additionally, approximately 541 MG of undisinfected secondary effluent was discharged from the Domestic WWTP to the Lincoln Ponds, which percolates into the soil and recharges the groundwater table.

The City recently spent approximately \$3.6 million to replace a number of old water pipelines that were leaking excessively. The City is an active member of several water conservation groups in the San Joaquin Valley. These groups are reviewing and establishing measures to reduce the declining groundwater basin. According to the Urban Water Management Plan during a declared water shortage, the City will implement mandatory or voluntary reduction to water usage to conserve water. ²

EARTHQUAKE (MEDIUM)

There are unreinforced masonry buildings in the downtown area and east of Academy between 5th and 9th Streets and west of "K" Street. Approximately 24 buildings are located in the downtown area, with other unreinforced masonry buildings located within the City limits. Critical facilities in the downtown include a telecommunications hub and a large natural gas line is located in the south end of the City.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Sanger's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (HIGH)

According to FEMA's 2016 Flood Insurance Study (FIS), Sanger's floodplains in general are residential, with some commercial development. Flooding in Sanger, which has flat terrain, is typically the result of local runoff from intense rainfall that exceeds the capacity of storm drainage facilities. There are no well-defined natural drainage channels that carry stormwater away from the City. Hence, the streets fill with water deep enough to impede traffic. Sanger's only flood control structures are detention basins, several up to 20 feet deep that will fill and flood during a 100-year flood. Overflow from the Kings River has caused extensive damage to agricultural properties east and southeast of the City.

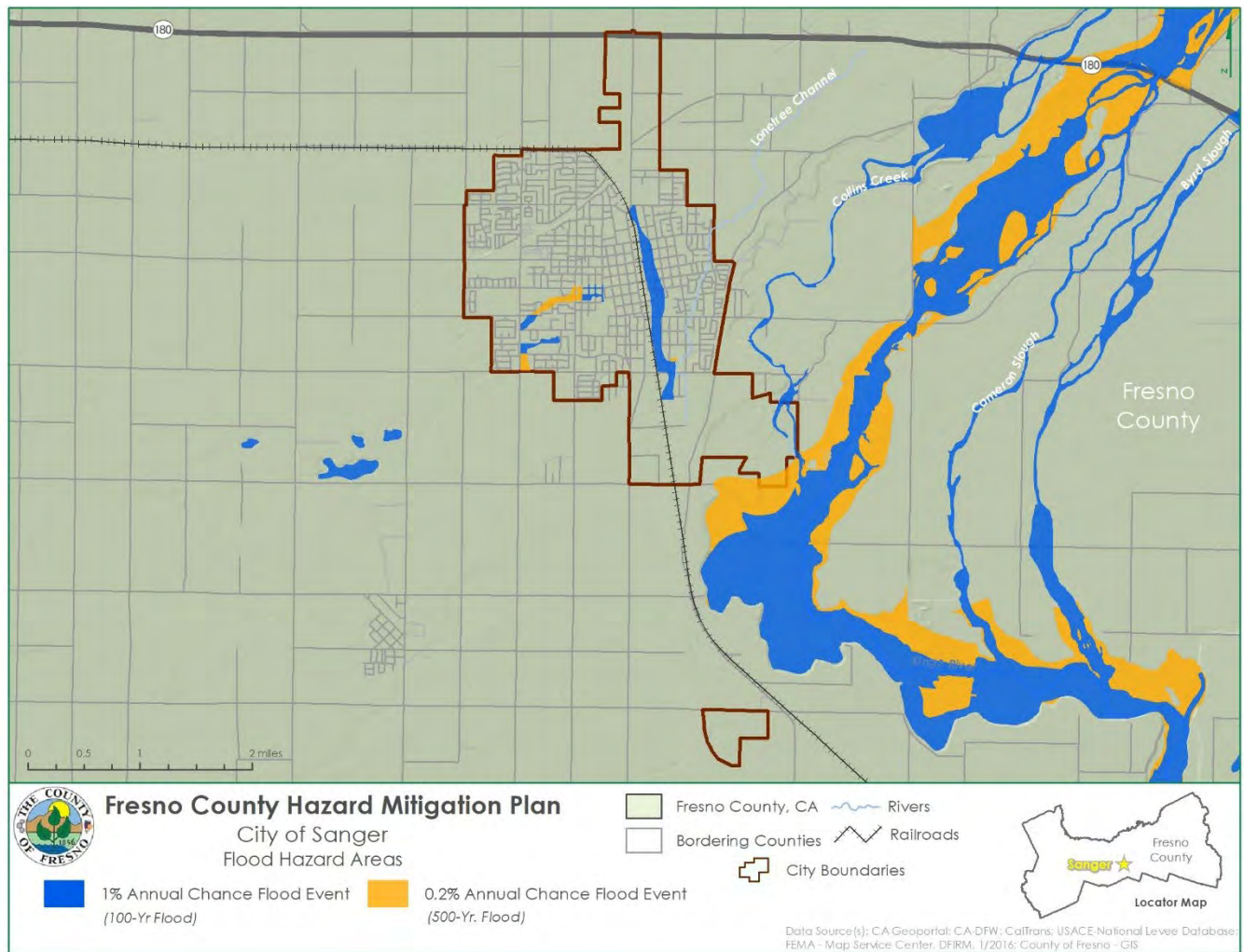
According to the FIS, the flood history of Sanger is not well documented, but flooding reportedly occurred in the area in 1950, 1958, 1967, and 1978. Details on some of these events follow:

- **November 1950**—The Kings River overflowed and drowned cattle and turkeys, damaged farm equipment, eroded agricultural land, and destroyed feed and grain.
- **January 1969**—More than three inches of rain fell in a two-day period and flooded streets and intersections in the City. Overflow was deep enough to stall vehicles and severely disrupt traffic.
- Several flood events occurred within the City of Sanger on May 29, 2019, April 17, 2023, and May 1, 2023. The flood event that occurred on May 1, 2023, claimed 2 lives.

VALUES AT RISK

Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a flood map for the City of Sanger was created (see **Figure 7. City of Sanger Flood Hazard Areas**). **Table 9. City of Sanger’s FEMA 1% Annual Chance Flood Hazard by Property Type** and **Table 10. City of Sanger’s FEMA 0.2% Annual Chance Flood Hazard by Property Type** summarize the values at risk in the City’s 100-year and 500-year floodplain, respectively. These tables also detail loss estimates for each flood.

Figure 7. City of Sanger Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database ; FEMA – Map Service Center, DFIRM, 1/2016 ; County of Fresno - GIS

Table 9. City of Sanger’s FEMA 1% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Primary Use Not Designated	4	\$0	\$0	\$0	\$0
Single-Family Residence	18	\$2,485,504	\$863,661	\$3,349,165	\$837,291
Vacant	1	\$0	\$182,070	\$182,070	\$45,517.50
Unknown	273				
Total	296	\$2,485,504	\$1,045,731	\$3,531,235	\$882,809

Source: City of Sanger parcel data; National Flood Insurance Program Flood Mapping Data

Table 10. City of Sanger’s FEMA 0.2% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Improved Value	Content Value	Total Value	Loss Estimate
Single-Family Residence	35	\$4,916,474	\$1,637,528	\$6,554,002	\$1,638,501
Total	35	\$4,916,474	\$1,637,528	\$6,554,002	\$1,638,501

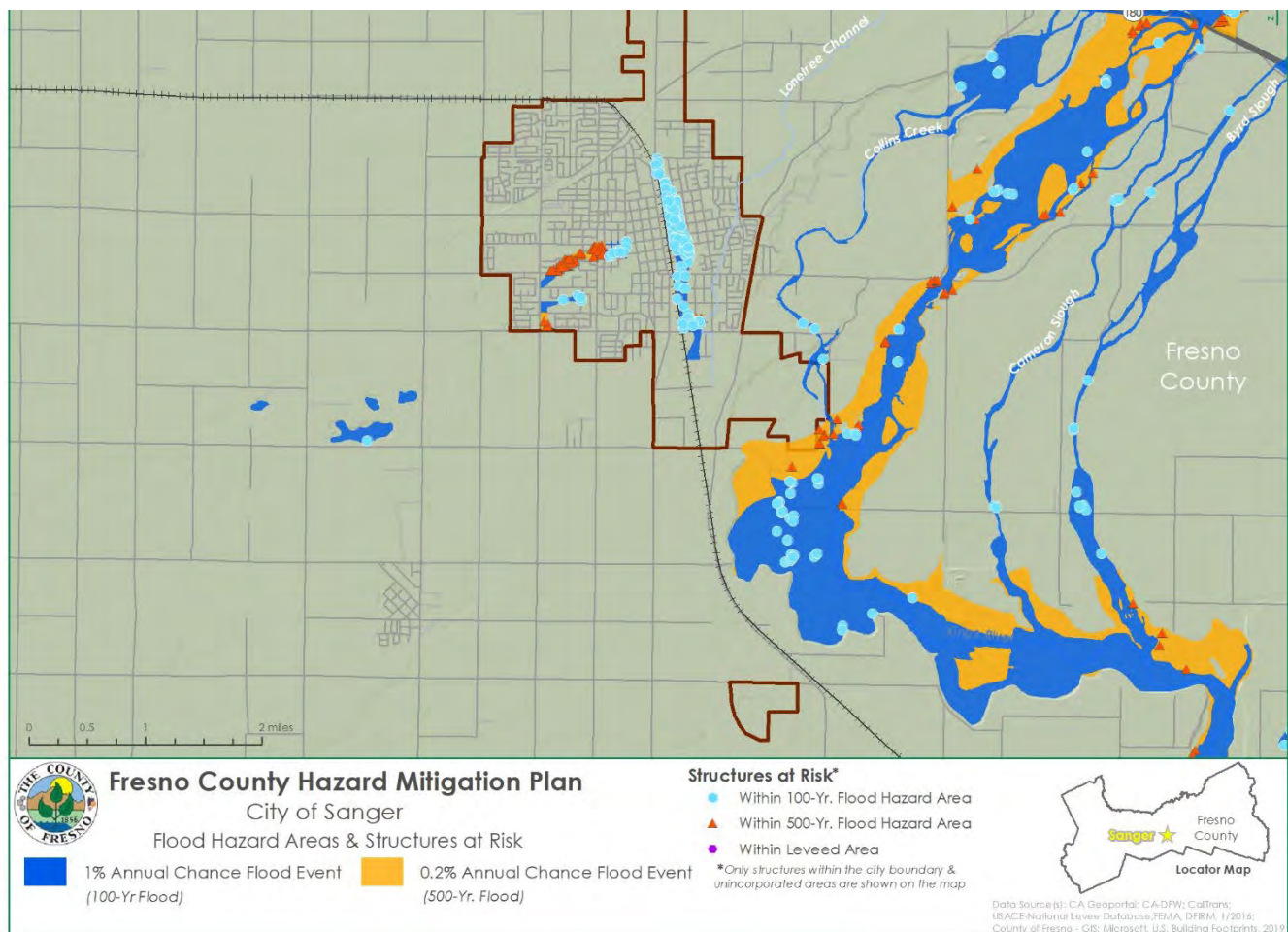
Source: City of Sanger parcel data; National Flood Insurance Program Flood Mapping Data

Based on this analysis, the City of Sanger has significant assets at risk of 100-year and greater floods. There are 296 parcels within the 100-year floodplain for a total value of roughly \$3.5 million. An additional 35 parcels valued at \$6,554,002 million fall within the 500-year floodplain.

Applying the 25 percent damage factor, there is a 1 percent chance in any given year of a 100-year flood causing roughly \$883k in damage in the City of Sanger and a 0.2 percent chance in any given year of a 500-year flood causing roughly \$2.5 million in damage (combined damage from both floods). Properties at risk of flooding are shown in **Figure 8. City of Sanger Flood Hazard Areas and Structures at Risk.**

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Figure 8. City of Sanger Flood Hazard Areas and Structures at Risk



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database, FEMA, DFIRM, 1/2016 ; County of Fresno – GIS; Microsoft, U.S. Building Footprints, 2019

POPULATION AT RISK

Based on 2020 census tract population data, the planning team estimates roughly the following number of people at risk of impacts from flooding:

- 100-year flood—4,406 people
- 500-year flood—0 people
- Total flood—4,406 people

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.

INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Sanger joined the National Flood Insurance Program (NFIP) on December 1, 1982. NFIP Insurance data indicates that as of March 19, 2024, there were 153 flood insurance policies in force in the City with \$453,045 of total premium or total paid.

There have been 24 historical claims for flood losses totaling \$1,475,243. According to the FEMA Community Information System accessed 3/19/2024 there are no Repetitive Loss or Severe Repetitive Loss properties located in the jurisdiction.

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. **Table 11. City of Sanger Critical Facilities in the 100- and 500-Year Floodplains** lists the critical facilities in the City's 100- and 500-year floodplains. The impact to the community could be great if these critical facilities are damaged or destroyed during a flood event.

Table 11. City of Sanger Critical Facilities in the 100- and 500-Year Floodplains

Critical Facility Type	100-Year Floodplain	500-Floodplain
Colleges & Universities	0	0
Nursing Home	0	0
School	1	0
Total	1	0

Source: Fresno County, HIFLD 2017

HAZARDOUS MATERIALS INCIDENT (MEDIUM)

Hazardous materials likely to be involved in a spill or release within the City include herbicides, pesticides, chemicals in gas, liquid, solid, or slurry form; flammables; explosives; petroleum products; toxic wastes; and radioactive substances. The County Health Department is the designated administering agency for the Fresno County area hazardous material monitoring program. There are six CalARP hazardous materials facilities located in the City of Sanger. Additionally, there have been 10 hazardous materials incidents from 2017-2022 that have occurred in the City of Sanger. Of the 10 incidents, there were 7 fixed, 2 mobile, and 1 storage tank incident. There were no injuries, fatalities, or property damage during the time period.³ There are six CalARP facilities within the City of Sanger.

ANHYDROUS AMMONIA

Within the City of Sanger, the use of anhydrous ammonia is necessary for food processing and refrigeration systems. Several facilities such as Del Monte Fresh, CaliFresh, Initiative Foods, Gibson Winery and Pitman Farms utilize anhydrous ammonia in their daily operations. However, the use of this toxic chemical has had a significant increase in accidental releases into the community over the last ten years. Between 2007 and 2010, there were four total responses for anhydrous ammonia leaks within the City. From 2010 to 2016 there were 23 separate incidents due to a release of anhydrous ammonia.

In an effort to reduce the community's risk to these incidents the Fire Department initiated a Community Risk Reduction program and hired a full time Community Risk Reduction Officer to help identify these particular risks and assist industry in abating accidental releases.

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and the Witt O' Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Sanger's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 12. City of Sanger Mitigation Capability Summary**.

Table 12. City of Sanger Mitigation Capability Self-Assessment Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Fiscal Capability	X		
Available Staff	X		
Political Support/Interest	X		
Community Support	X		

REGULATORY MITIGATION CAPABILITIES

Table 13. City of Sanger Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Sanger.

Table 13. City of Sanger Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X		2022 CBC 1/19/2023			

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Community Emergency Response Team (CERT)	X					
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X				
Fire Code	X		2016 CFC	X		Update Winter 2025
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance		X				
Land Use/Development Planning	X		2035 General Plan Adopted February 2020			
National Flood Insurance Program (NFIP)		X				
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready		X				
Stormwater Management Plan/Ordinance		X				
Subdivision Regulations/Ordinance		X				
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance	X		Sanger City Code, Chapter 90			

PLANNING MITIGATION CAPABILITIES

Table 14. City of Sanger Planning Capabilities identifies the plans related to mitigation and loss prevention in Sanger.

Table 14. City of Sanger Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	X		May 2023
Climate Resiliency or Adaptation Plan		X	
Community Wildfire Protection Plan (CWPP)		X	

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Comprehensive Emergency Management Plan		X	
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	X		February 2020
Continuity of Operations Plan (COOP)		X	
Disaster Recovery Plan		X	
Economic Development Plan	X		February 2020 Within 2035 GP
Emergency Operations Plan (EOP)	X		Adopted December 2000 Expectant Completion Fall 2024
Evacuation Plan		X	
Flood Response Plan		X	
Floodplain Management Plan/Flood Mitigation Plan		X	
Hazard Mitigation Plan	X		June 2008 Adopted Spring 2025 expected completion
Historic Preservation Plan		X	
Natural Resources Protection Plan (NRPP)		X	
Open Space Management Plan (Parks and Rec/Greenway Plan)	X		2025 P&R Master Plan Adopted 2006
Threat Hazard Identification and Risk Assessment		X	Expected completion Summer 2025

THE CITY OF SANGER GENERAL PLAN 2035

The City of Sanger General Plan Program serves as the blueprint for future growth and development and provides comprehensive planning for the future. It encompasses what the City is now, and what it intends to be, and provides the overall framework of how to achieve this future condition (see the discussion in the Growth and Development Trends section of this annex). Sanger's general plan consists of seven separate elements:

- Land Use
- Circulation
- Housing
- Noise
- Safety
- Open Space
- Conservation

SAFETY ELEMENT

Policies of this element reduce the risk of death, injuries, property damage, and economic and social dislocation resulting from hazards such as fires, floods, earthquakes, and other hazards. Goals and policies facilitate decision making for minimizing potential safety risks. In 1974, Sanger adopted the Five County Seismic Safety Element for the General Plans of Fresno, Kings, Madera, Mariposa, and Tulare Counties and their Respective Incorporated Cities, further described in **Table 15. City of Sanger Safety Element**.

Table 15. City of Sanger Safety Element

Goal 1: Protect the public health, safety, and welfare and minimize the damage to structures, property, and infrastructure as a result of geologic and flood hazards.	
Policy 1:	Evaluate proposed projects and land use policy decisions based on the environmental hazards identified in this element. Low intensity/occupancy uses (such as agricultural production, recreational uses, or wildlife habitat preservation) shall be preferred in hazard areas.
Policy 2:	Utilize FEMA Flood Insurance Rate Maps to determine the general location of flooding hazard areas when reviewing development proposals. The City shall maintain FIRM maps to reflect currently available information on the Planning Area.
Policy 3:	Continue to maintain the City's Emergency Operations Plan to ensure the safety of residents and to prevent damage to the built and natural environment.

CONSERVATION ELEMENT

The conservation element discusses the presence of native plants and animals and in particular, native species regarded as rare, threatened, or endangered. In addition to inventorying these species, the element must plan for their preservation. **Table 16. City of Sanger Mitigation-Related Goals, Policies, and Actions** describes the various goals and policies in the conservation element that supports hazard mitigation.

Table 16. City of Sanger Mitigation-Related Goals, Policies, and Actions

Goal 1: Hydrology and Water Quality: Manage the City's water resources to provide for urban uses while protecting the environment.	
Policy 1:	Protect and preserve water resources in order to provide sufficient quantities of water that meet State quality standards to serve the domestic water demand for build-out of the General Plan.
Policy 2:	Protect and preserve watershed and recharge areas, including those critical for the replenishment of domestic water supplies.
Goal 2: Storm Drainage: Collect and convey storm water in a manner that least inconveniences the public, reduces, or prevents potential water related damage, and protects the environment.	
Policy 1:	Maintain a reliable source of revenue to fund citywide storm drainage improvements, including replacement, repair, or relocation of storm drain facilities.
Policy 2:	Encourage the use of natural storm water drainage systems in a manner that preserves and enhances natural features and consider recreational opportunities and aesthetics in the design of storm water detention/retention and conveyance facilities.
Policy 3:	Improve the quality of runoff from urban and suburban development through use of appropriate and feasible mitigation measures or best management practices. Examine the impact of proposed urban developments with regard to water quality and effects on drainage courses.

Goal 3: Geology and Soils: Preserve and enhance unique geologic features and soils for future generations to use and enjoy.	
Policy 1:	Identify and protect geologic resources within the City limits.
Policy 2:	Coordinate the management of mineral resources adjacent to the planning area, working with mining operators, and County and state departments.
Policy 3:	Provide for the preservation of soil resources through the creation of an agricultural greenbelt. Conserve soil resources, particularly to provide a continuing base for agricultural productivity and the City's economy by working with agricultural interests to develop practices that minimize the impacts of tilling and grading on soil erosion.

MUNICIPAL CODE CHAPTER 14 BUILDING AND BUILDING SERVICES

This ordinance adopts the building code of the City and lists the building conditions that must be met for the building inspector to authorize final connection of utility services and certificate of occupancy.

MUNICIPAL CODE CHAPTER 26 EMERGENCY SERVICES

This ordinance provides for the preparation and carrying out of plans for the protection of people and property within the City in the event of an emergency, the direction of the emergency organization established by the code, and the coordination of the emergency functions of the City with all other public agencies, corporations, organizations, and affected private people. The ordinance establishes the City's disaster council and designates the membership of the council. Membership includes the mayor (chairperson), the director of emergency services (vice- chairperson), the assistant director of emergency services, and other people as provided for in the City's current emergency plan. The council's powers include the development of emergency and mutual aid plans and agreements and the ordinances and resolutions to implement them.

MUNICIPAL CODE CHAPTER 30 FIRE PROTECTION AND PREVENTION

This ordinance provides for fire protection and prevention of fire relative to the adoption of the 2013 California Fire Code. Additionally, there are amendments to the California Fire Code to help mitigate hazards in the City of Sanger that are either reasonably necessary for local climatic, geographical or topographical conditions. These changes include variations on solar photovoltaic panel installations, fire sprinkler system requirements and regulations on woodworking, lumber yard, recycling and waste handling facilities.

MUNICIPAL CODE CHAPTER 34 FLOODS, 2001

The purpose of the flood ordinance is to promote health and safety and prevent public and private losses due to flooding in identified flood hazard areas. It designates the city manager as the floodplain administrator.

URBAN WATER MANAGEMENT PLAN, 2020

Water planning is an essential function of water suppliers and is critical as California continues to deal with ongoing drought conditions and expected long-term climate changes. Prior to the adoption of the

Urban Water Management Planning Act (UWMPA) in 1983, there were no specific requirements for water agencies to conduct long-term resource planning. The UWMPA provided the foundation for the development of the UWMP, which provides the framework for long-term water planning. Additionally, the UWMP informs the public about water agencies long-term resource planning efforts that will ensure adequate water supplies for existing and future demands. This 2020 UWMP documents the availability of an appropriate level of reliability of water service sufficient to meet the needs of the City during normal, single dry and 5-consecutive dry years. A long-term reliable supply of water is essential to protect the productivity of the City and California’s business and economic climate. This 2020 UWMP is intended to serve as a general, flexible, and open-ended document that can be periodically updated to reflect changes in regional water supply trends and water use efficiency policies. This UWMP, along with other City of Sanger planning documents, will be used by City staff to guide water use and management efforts through the year 2025, when the UWMP is required to be updated.

EMERGENCY OPERATIONS PLAN

The City of Sanger prepared the Emergency Operations Plan in an effort to ensure the most effective and efficient use of all resources, material, and staff for the maximum benefit and protection of the Sanger community. The plan is designed to facilitate coordination and management of information and resources amongst City agencies and affected populations to effectively respond to a hazard event.

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 17. City of Sanger Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Sanger.

Table 17. City of Sanger Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		Staff Member	City Manager designated per Sanger Municipal Code.
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Department	Consultant Contract City Engineer
Fiscal Management or Procurement Specialists	X		Department	Administrative Services Director
Floodplain Manager		X		
Land Surveyors	X		Department	Consultant Contract City Engineer
Land Use/Management/Development Planning	X		Department	City Planner
Planners or engineers with an understanding of natural and/or human-caused hazards	X		Department	Consultant Contract City Engineer

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Resource Development Staff or Grant-writing	X		Staff Member	Mgt Analyst in Finance
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)	X		Department	Consultant Contract City Engineer
Staff with education or expertise to assess the community's vulnerability to hazards	X		Department	Fire and Police Departments

FISCAL MITIGATION CAPABILITIES

Table 18. City of Sanger Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities. The city also created an Enhanced Infrastructure Financing District (EIFD) since the creation of the last plan.

Table 18. City of Sanger Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)			X	
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fee	X			
Water/Sewer Fees			X	Ongoing Development Impact Fees (DIFs)
Stormwater Utility Fees			X	Ongoing Development Impact Fees (DIFs)
Development Impact Fees			X	Ongoing Development Impact Fees (DIFs)
General Obligation, revenue, and/or Special Tax Bonds			X	
Partnering Agreements or Intergovernmental Agreements			X	

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)		X		
Homeland Security Grants (HSGP)			X	
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants			X	
Infrastructure Investment and Jobs Act (IIJA)	X			
Created EIFID – Enhanced Infrastructure Financing District	X			Newly Created

MITIGATION OUTREACH AND PARTNERSHIPS

The Sanger Fire Department provides education programs on fire safety, cardiopulmonary resuscitation (CPR) training, and conducts other tours and presentations. The Fire Department has also implemented a Community Emergency Response Team (CERT) with disaster training provided to volunteers free of charge.

The City promotes water conservation by distributing public information through bill inserts, brochures, community speakers, paid advertising, and many special events every year. City water bills show gallons used per billing period for the last billing period compared to the same period the previous year. The City continues to work with the Sanger Unified School District to promote water conservation and to educate students about these issues.

The City has formally joined the Upper Kings Water Forum, a multi-agency effort to integrate the region's water management plans and coordinated the development of the Urban Water Management Plan with the Sanger Chamber of Commerce, County of Fresno, Department of Health Services, Consolidated Irrigation District, and other public agencies.

OTHER MITIGATION EFFORTS

The City of Sanger has identified areas prone to flooding and made improvements to reduce it. The City sets up warming centers during extreme cold/freeze events and cooling centers during extreme heat events.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of Sanger has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. The opportunities for enhancement of the City's existing mitigation program are listed below.

- Develop landscaping ordinances that incorporate proper species selection that are drought resistant, and planting and maintenance practices that will not exacerbate the effects of drought.
- Implement warning systems and develop an evacuation plan in partnership with the County.

MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Sanger adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

Aspects of the 2018 hazard mitigation plan were incorporated into the “Safety” element of the City of Sanger’s General Plan, as well as within its community risk assessment. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Building and Permits Department may utilize the hazard information when reviewing a building permit application. While the Community Development and Public Works Departments may utilize the information to review site plan applications or when developing or updating existing planning documents. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Sanger will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

CONTINUED COMPLIANCE WITH THE NATIONAL FLOOD INSURANCE PROGRAM

The City has been an NFIP participating community since 1982. In addition to the mitigation actions identified herein the City will continue to comply with the NFIP. This includes ongoing activities such as enforcing local floodplain development regulations, including issuing permits for appropriate development in Special Flood Hazard Areas and ensuring that this development mitigated in accordance with the regulations. This will also include periodic reviews of the floodplain ordinance to ensure that it is clear and up to date and reflects new or revised flood hazard mapping.

COMPLETED 2009 MITIGATION ACTIONS

The City of Sanger has not completed any of the actions identified in the 2009 plan. However, implementation has been started on five of the 2009 actions and will be continued as part of the mitigation strategy of this plan.

There are three actions from the City of Sanger 2009 mitigation strategy that the City has decided not to carry forward and recommend for implementation in this plan. These deleted actions and the reasons for their deletion are as follows:

- Implement a Flood Awareness Program for the Public – determined to no longer be a priority; the City implemented flood awareness programs targeted toward areas known for small, localized flooding from clogged storm drains instead
- Install Battery Back-Up Systems at Traffic Signals in the City of Sanger on Major Transportation Routes – No longer considered a priority

- Improve City's Floodplain Management Program and Apply to Community Rating System – Participation in the CRS no longer considered a priority

COMPLETED 2018 MITIGATION ACTIONS

- Add Potable Water Storage Capacity (500,000 Gallon above Ground Tank) to the City of Sanger's Water System - Completed in 2020, increasing capacity to 750,000
- Provide Compound Security for Police and Fire Departments – Completed in 2022

MITIGATION ACTIONS

The planning team for the City of Sanger identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included. Actions with an “*” are those that mitigate losses to future development.

In addition to implementing the mitigation actions below the City of Sanger will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy.

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.

1. ESTABLISH POST-DISASTER ACTION PLAN FOR CITY CONTINUITY OF OPERATIONS PLAN

Hazard(s) Addressed: Multi-Hazard: dam failure, drought, earthquake, flood, human health hazards, severe weather, volcano, wildfire

Issue/Background: Establish a post-disaster action plan to be part of the City’s Disaster Plan that will include the following elements:

- Procedures for public information
- Post-disaster damage assessment
- Grant writing
- Code enforcement
- Redundant operations
- The plan will also include annexes from local businesses and large employers to improve economic and employment recovery. The plan will also identify a mechanism for the City to help businesses not involved with post-disaster planning to be incorporated into the City’s plan.

Other Alternatives: No action

Responsible Office: City of Sanger Fire Department, Fire Chief

Priority (High, Medium, Low): High

Cost Estimate: \$125,000

Potential Funding: General Fund, Homeland Security Grant Program (HSGP)

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-planning. A City and local business post-disaster plan will reduce the impact of a disaster to the local economy and employment.

Schedule: 1-4 years, dependent on funding

Status: 2009 project, currently seeking grant funding opportunities with contracted grant writers.

2. PROVIDE BACKUP POWER TO CITY PUMPS/WELLS

Hazard(s) Addressed: Multi-Hazard: drought, flood, severe weather, earthquake

Issue/Background: The City needs to ensure that its water distribution system can meet minimum fire flow and quality standards during emergency conditions.

Protecting public health is the primary goal when considering the community's drinking water system. The water distribution system must be pressurized to 20 pounds per square inch at all times to minimize cross-connection contamination concerns. The City's total capacity of water storage is 140,000 gallons. In the event of a fire, this storage is quickly depleted as fire flows can reach 6,000 gallons a minute and more. This was the case in July of 2016 during a large commercial fire at the Initiative Foods baby food processing facility in the City of Sanger. Water storage was quickly depleted as fire engines from over 15 different agencies within Fresno County tapped into the water distribution system and deployed their lines pumping an estimated 12,000 gallons per minute. With storage gone, City pumps were pushed to their limits while providing water to combat the blaze. Citizens throughout the City found it difficult doing the dishes much less taking a shower. Additionally during this fire, the power to the well next to the Initiative Foods plant was disrupted during the fire, forcing fire crews to rely on a nearby canal for a water source.

Other Alternatives: Building multiple elevated potable water storage tanks

Responsible Office: City of Sanger Public Works Department

Priority (High, Medium, Low): High

Cost Estimate: \$200,000 per well, maximum \$1.2 million

Potential Funding: General Fund, HMGP, HMGP Post Fire

Benefits (Avoided Losses): Ensures water is available to protect public health and minimize damage to property due to fires; keeps water department business operations

Schedule: 1-4 years, dependent on funding

Status: 2009 project, implementation in process

3. REPLACE OLD STORM DRAINS IN DRAINAGE SYSTEM TO PREVENT FLOODING

Hazard(s) Addressed: Flood

Issue/Background: During heavy rains, water threatens the homes and the vulnerable facility of Golden Living Center at 9th Street and Rawson Avenue. The proposed project will replace an old drainage system called in and out or siphon drainage. Basically, water is routed under the road at the intersection through a small pipe and then exits from a grated opening and is channeled to a larger drain inlet. Leaves accumulate under the grate, plugging the opening and making it necessary to remove the grate; this creates an unsafe situation and localized flooding. The City places barricades over the openings. However, from time to time, the barricades are removed by unauthorized personnel.

Other Alternatives: No action

Responsible Office: City of Sanger Public Works

Priority (High, Medium, Low): Medium

Cost Estimate: \$220,000

Potential Funding: General fund or the County-wide Measure C Transportation Block Grant funding, HMGP, BRIC

Benefits (Avoided Losses): This project will keep homes from flooding. The new drain inlets are much safer for the public and pets.

Schedule: Funding dependent; 1-3 years

Status: 2009 project, implementation in progress

4. PROVIDE FIRE DEPARTMENT OFFICE SECURITY

Hazard(s) Addressed: Other

Other Alternatives: Each day, the Fire Department is visited by many people for various reasons: ambulance billing, code enforcement issues, report retrieval, fireworks applications, site plan review, etc. For the most part, no conflict takes place. However, from time to time, irate people show up who are upset about imposed fees, citations, or services rendered. Maintaining accurate, effective access control is critical to protecting Fire Department personnel and equipment. This renovation of the Fire Department front office will be folded into a complete fire station remodel project to increase the size for current and future staff members.

Responsible Office: City of Sanger, Fire Chief

Priority (High, Medium, Low): High

Cost Estimate: \$3,000,000

Potential Funding: Community Facilities District, General Fund

Benefits (Avoided Losses): The proposed project will provide the Fire department office security, protecting personnel and equipment from potentially dangerous visitors.

Schedule: April 2025

Status: Currently under construction. This is part of a complete fire station remodel and renovation project approved by City Council and funding is through the City's General Fund.

5. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

Hazard(s) Addressed: Drought

Issue/Background: The Kings subbasin underlays the City of Sanger and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater

subbasins defined by the California Department of Water Resources (DWR). The City of Sanger has become a joint power authority of the South Kings Groundwater Sustainability Agency, other members of the Agency include the City of Kingsburg, City of Parlier and City of Fowler. As a member of the South Kings GSA, the City of Sanger is required to participate in the development and implementation, no later than January 31, 2020, of a Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the South Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Sanger.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: City of Sanger City Engineer and South Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with California Department of Water Resources Grants and Loans

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: In progress

6. ADD POTABLE WATER STORAGE CAPACITY (750,000 GAL) ABOVE GROUND TANK TO CITY'S WATER SYSTEM

Hazard(s) Addressed: Drought

Issue Background: Sharing radio air-time with seven (7) agencies, no input in dispatch personnel selection.

Other Alternatives: Continue with current contract with Fresno County Sheriff's Department

Responsible Office: City of Sanger Public Works

Priority (High, Medium, Low): High

Cost Estimate: \$5,000,000 – awarded via grant fall 2024

Potential Funding: General Fund, USDA Individual Water and Wastewater Grants

Benefits: Over \$500,000 in annual service fees paid, which rise as the population grows

Schedule: Timeframe for completion Fall 2025 – Spring 2026

Status: New Action

7. REESTABLISH EMERGENCY POLICE COMMUNICATIONS AND DISPATCH CENTER IN SANGER.

Hazard(s) Addressed: All hazards

Responsible Office: City of Sanger Police Department

Priority (High, Medium, Low): High

Potential Funding: HSGP

Schedule: Feasibility study beginning summer 2024, lasting 1-3 years

Status: New Action

8. ADD TWO NEW WATER WELLS TO THE CITY'S WATER SYSTEM TO ENSURE ADEQUATE FIRE FLOW WHEN NEEDED

Hazard(s) Addressed: Drought

Responsible Office: City of Sanger Public Works

Priority (High, Medium, Low): High

Potential Funding: State Capital Improvement Plan, HMGP

Schedule: Funding-Dependent, but currently seeking grant funding; estimated implementation 5 years. Placing on capital improvement project list for future projects.

Status: New Action

Annex L: City of Selma





PARTICIPATION

To update the City of Selma's jurisdictional annex, the City had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the City of Selma's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The City of Selma did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee (identified in Appendix B) or conduct additional public engagement.

COMMUNITY PROFILE

Figure 1. City of Selma Boundaries displays the extent and location of the City of Selma.

Figure 1. City of Selma Boundaries



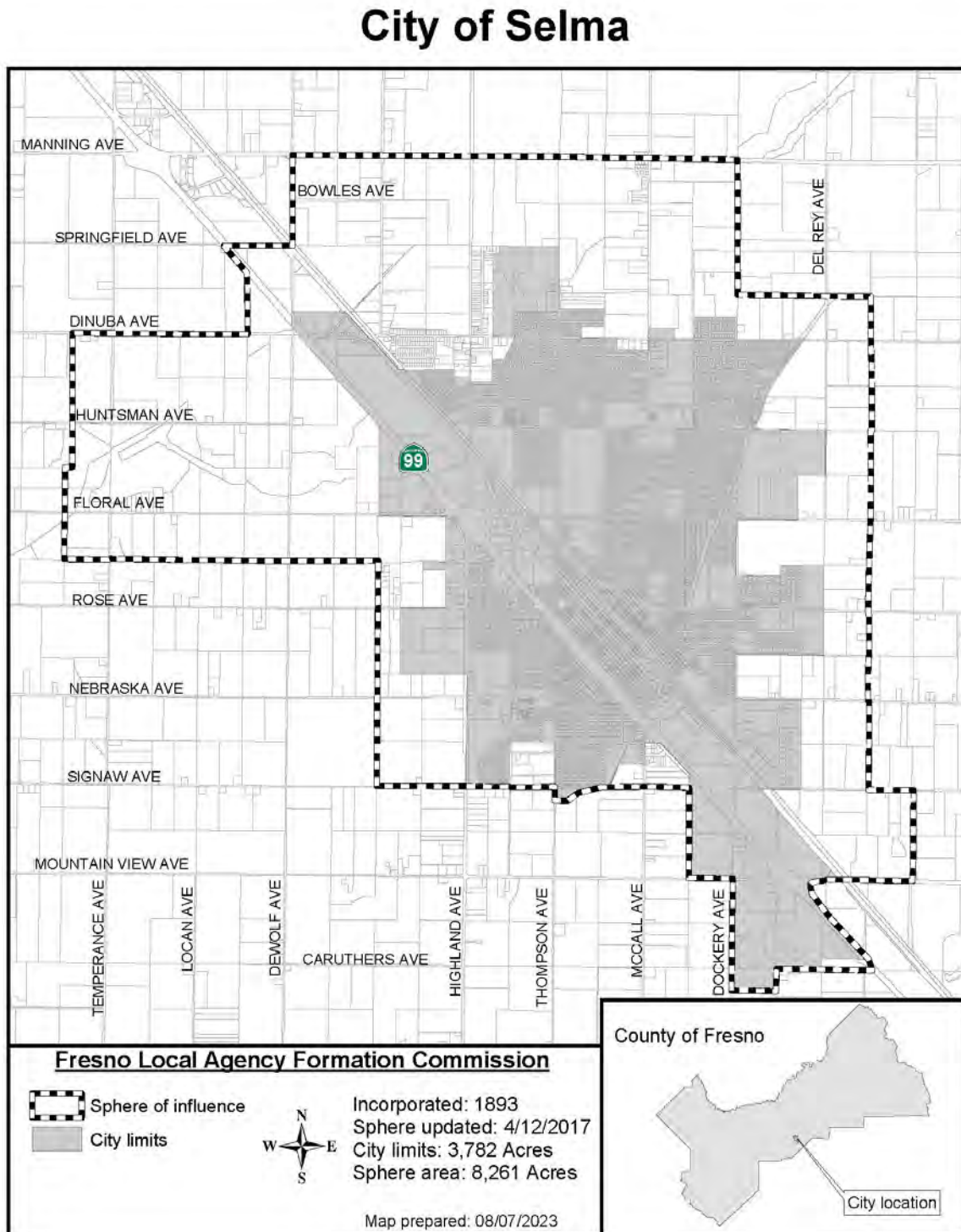
Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; U.S. Census TIGER/Line Shapefiles, Fresno County, CA Roads, 2023.



GEOGRAPHY AND CLIMATE

The City of Selma is located in the central San Joaquin Valley in Fresno County and is about 20 miles west of the Sierra Nevada Mountains. Selma is 19 miles south of the City of Fresno at the crossroads of State Highways 99 and 43. A major, busy railroad line runs diagonally through the City and parallel to State Highway 99. Neighboring communities include Kingsburg (5 miles south), Fowler (8 miles northwest), and Reedley (12 miles northeast). The city limits include 3,782 acres and the Sphere of Influence (SOI) encompasses 8,261 acres, shown in **Figure 2. City of Selma Limits and Sphere of Influence**. Over the past decade the City's boundaries have changed minimally, with only a small annexation of land in the southwestern portion of the City's Sphere of Influence. The landscape is generally flat.

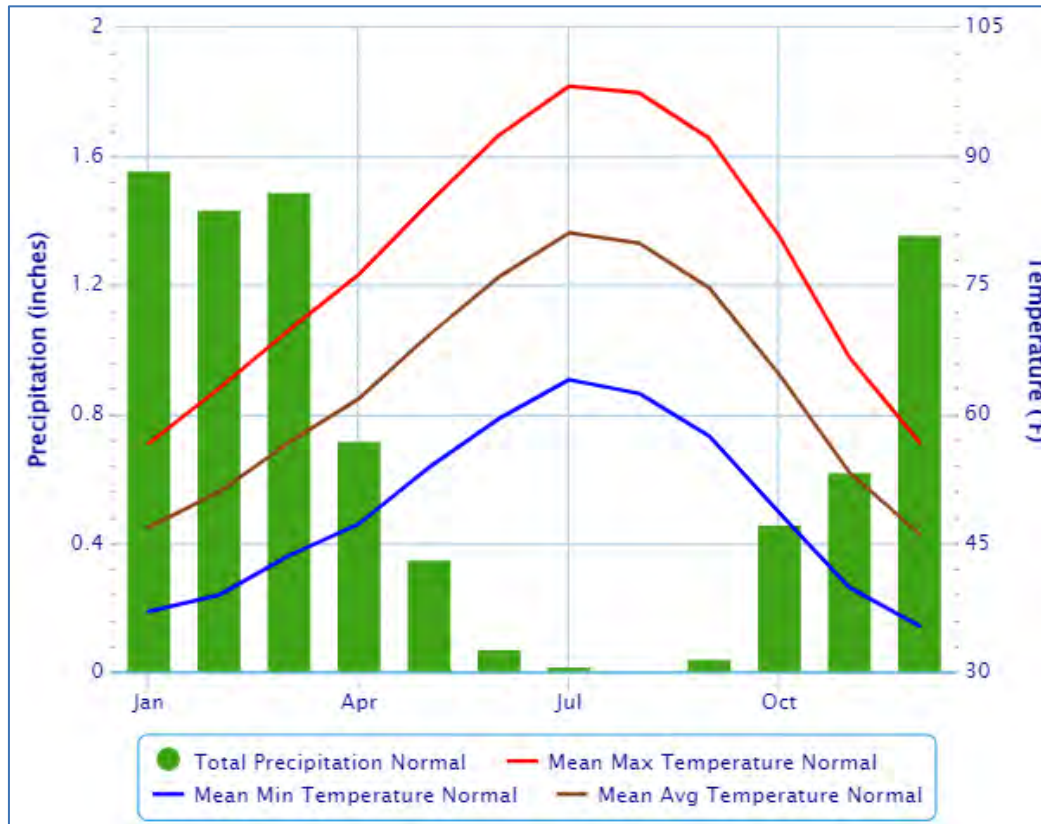
Figure 2. City of Selma Limits and Sphere of Influence



Source: Fresno Local Agency Formation Commission,
https://www.fresnolafco.org/files/4cff8fb5d/Selma_Portrait_08072023.pdf

The nearest National Weather Service weather station is located in Hanford, about 18 miles south of the City of Selma. The climate is mild year-round with average summer daytime highs in the 90s and winter daytime lows in the 40s. The summer months are very dry, while the winter months get the most rainfall and moisture. Selma's average yearly rainfall is approximately 8 inches. **Figure 3. Hanford Municipal Airport Monthly Normals for Precipitation and Temperature (1991-2020)** shows the monthly normal temperature and precipitation for the Hanford Municipal Airport.

Figure 3. Hanford Municipal Airport Monthly Normals for Precipitation and Temperature (1991-2020)



Source: National Weather Service (NWS)

HISTORY

Selma was founded in 1893 as an incorporated, agricultural-based city because of the area's mild and temperate climate and the presence of a Southern Pacific Railroad line.

ECONOMY

Much of the area's economy is agriculturally based. The City of Selma is known as the Raisin Capital of the World because the area has numerous vineyards that produce raisins and supporting packing companies. Other local produce includes tree fruits such as peaches. The retail industry in the City of Selma is growing. The leaders in retail sales include large car dealerships, building material and farming implement establishments, and other general retailers. The retail sales increase is due to population growth, Selma's incorporation into the Fresno metropolitan area, and the volume of people

that pass through the City on its major highways. Select estimates of economic characteristics for the City of Selma are shown in **Table 1. City of Selma's Economic Characteristics**.

Table 1. City of Selma's Economic Characteristics

Characteristic	City of Selma
Families below poverty level	16.8%
All people below poverty level	21.2%
Median family income	\$58,562
Median household income	\$53,874
Per capita income	\$21,714
Population in labor force	11,659
Population employed	10,350
Unemployment	10.3%
Number of Companies	N/A

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 2. City of Selma's Employment by Occupation and **Table 3. City of Selma's Employment by Industry** show how the City of Selma's labor force breaks down by occupation and industry based on estimates from the 2018-2022 American Community Survey.

Table 2. City of Selma's Employment by Occupation

Occupation	# Employed	% Employed
Natural Resources, Construction, and Maintenance Occupations	1,796	17.35%
Sales and Office Occupations	2,121	20.48%
Service Occupations	2,135	20.62%
Production, Transportation, and Material Moving Occupations	2,073	20.02%
Management, Business, Science, and Arts Occupations	2,225	21.53%
Total	10,350	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

Table 3. City of Selma's Employment by Industry

Industry	# Employed	% Employed
Educational Services, and Health Care and Social Assistance	2,234	21.58%
Agriculture, Forestry, Fishing and Hunting, and Mining	1,423	13.75%
Retail Trade	1,083	10.46%
Manufacturing	1,338	12.93%



Industry	# Employed	% Employed
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	624	6.03%
Public Administration	489	4.72%
Construction	523	5.05%
Wholesale Trade	326	3.15%
Professional, Scientific, and Mgmt., and Administrative and Waste Mgmt. Services	890	8.60%
Transportation and Warehousing, and Utilities	669	6.46%
Finance and Insurance, and Real Estate and Rental and Leasing	219	2.12%
Other Services, Except Public Administration	465	4.49%
Information	67	0.65%
Total	10,350	100.00%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

According to the U.S. Census Bureau 2022 Population Estimate, the city's population was estimated at 24,430. Select demographic and social characteristics for the City of Selma from the 2022 American Community Survey are shown in **Table 4. City of Selma's Demographic and Social Characteristics.**



Table 4. City of Selma's Demographic and Social Characteristics

Characteristic	City of Selma
Gender/Age	
Male	51.5%
Female	48.5%
Median age	31.3
Under 5 years	6.8%
Under 18 years	26.8%
65 years and over	11.6%
Race/Ethnicity	
White	58.8%
Asian	3.3%
Black or African American	1.0%
American Indian/Alaska Native	1.1%
Hispanic or Latino (of any race)	84.0%
Education	
High school graduate or higher	72.3%
Disability Status	
Population 5 years and over	13.2%

Source: U.S. Census Bureau American Community Survey 2018-2022 5-Year Estimates, www.census.gov/

HAZARD IDENTIFICATION AND SUMMARY

Selma's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Selma (see **Table 6. City of Selma - Hazard Summaries**). **Table 5. Risk Methodology** shows methodology to how the hazards were ranked. In the context of the plan's planning area, there are no hazards that are unique to Selma.

Table 5. Risk Methodology

$RF \text{ Value} = ((\text{Probability} \times .30) + (\text{Impact} \times .30) + (\text{Spatial Extent} \times .20) + (\text{Warning Time} \times .10) + (\text{Duration} \times .10))$				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 6. City of Selma - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Likely	Limited	Small	12 to 24 hours*	Less than 24 hours*	Medium
Avalanche	Unlikely	Minor	Negligible	N/A	N/A	Low
Dam Failure	Possible	Critical	Negligible	More than 24 hours	Less than 24 hours	Medium
Drought	Possible	Critical	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Limited	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Possible	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Likely	Critical	Large	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	High
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Limited	Large	More than 24 hours	Less than 24 hours	High
Tornado	Possible	Minor	Small	Less than 6 hours	Less than 6 hours	Low
Winter Storm	Likely	Limited	Large	More than 24 hours	Less than 1 week	Medium
Soil Hazards						
Erosion	Likely	Minor	Negligible	N/A	N/A	Low
Expansive Soils	Possible	Minor	Negligible	N/A	N/A	Low
Land Subsidence	Possible	N/A	Small	N/A	N/A	Low
Landslide	Unlikely	Minor	Negligible	12 to 24 hours*	Less than 6 hours*	Low
Volcano	Possible	Minor	Negligible	Less than 6 hours	More than 1 week	Low
Wildfire	Possible	Minor	Negligible	12 to 24 hours*	More than 1 week*	Low

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: *N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.*



VULNERABILITY ASSESSMENT

The intent of this section is to assess Selma's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (see **Table 6. City of Selma - Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the City of Selma's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table 6 reflect the hazards that could potentially affect the City. The discussion of vulnerability for each of the following hazards is in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

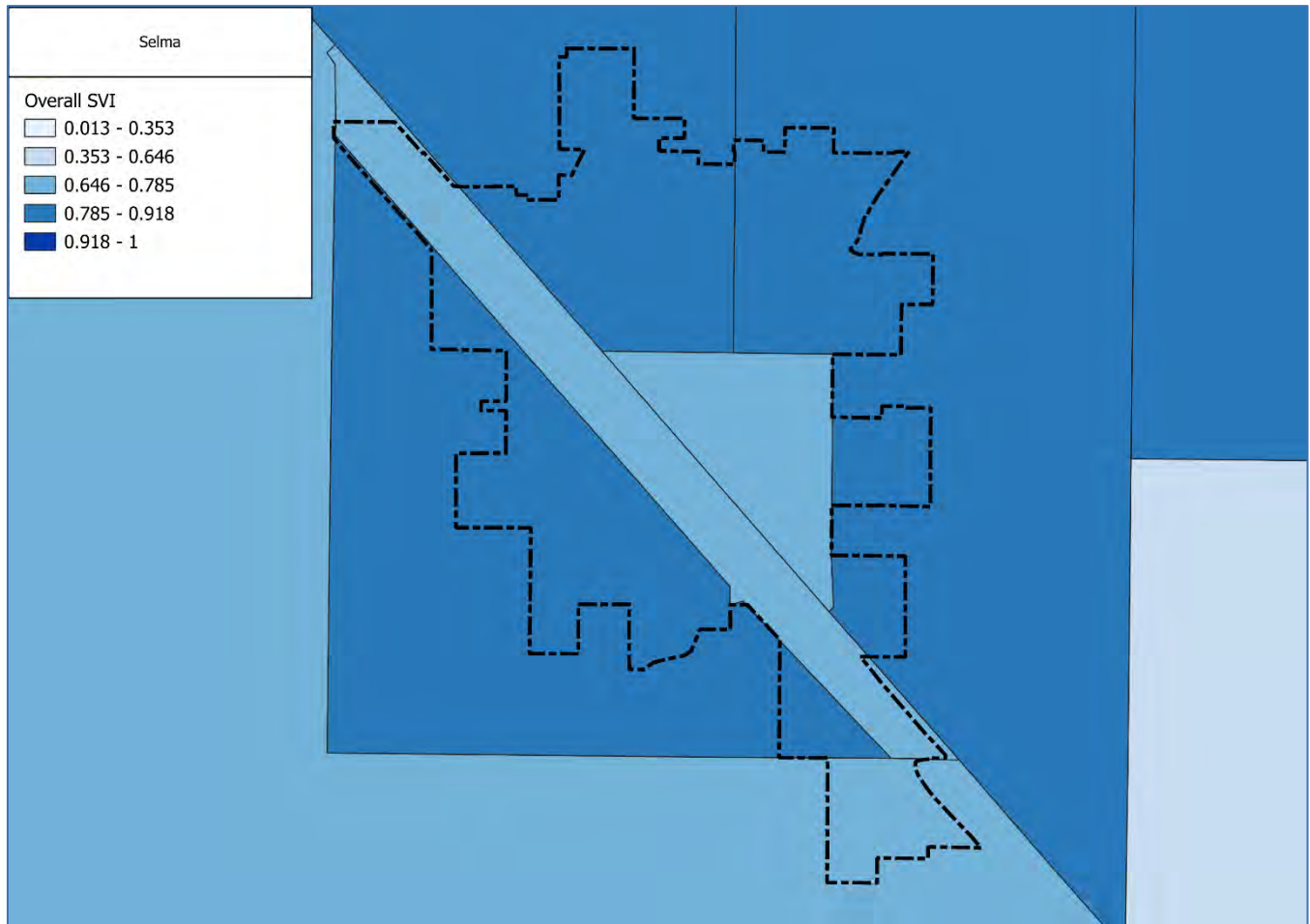
POPULATION AT RISK

The CDC's Social Vulnerability Index (SVI) is a tool that supports in identifying communities that are vulnerable to hazards and other stressors. Emergencies and disasters often highlight and intensify existing societal inequities, affecting groups based on socioeconomic status, race, age, disability, and other social factors. These events disproportionately impact certain populations, creating additional challenges in preparation, response, and recovery phases. More information on the SVI can be found in Chapter 4 of the base plan under the Social Vulnerability section.

In the City of Selma, census tracts with a higher SVI are clustered near the outer portions of the City, as shown in **Figure 4. City of Selma Social Vulnerability Index**. These census tracts may be at more risk of disaster and hazard impacts based on existing social inequities. To equitably reduce impacts to these communities, future planning, preparedness, and mitigation activities should work to address the social inequities that may increase their risk to disaster impacts. The CDC's Interactive SVI Map is a useful tool in understanding which social factors contribute to a census tracts higher overall SVI (e.g., socioeconomic status, race, age, disability, etc.). ¹

¹ CDC/ATSDR Social Vulnerability Index (SVI) | Place and Health | ATSDR
https://www.atsdr.cdc.gov/placeandhealth/svi/interactive_map.html

Figure 4. City of Selma Social Vulnerability Index



Source: CDC 2022 Social Vulnerability Index, City of Selma City Boundary

ASSETS AT RISK

This section considers Selma's assets at risk, including values at risk; critical facilities and infrastructure; historic, cultural, and natural resources; and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

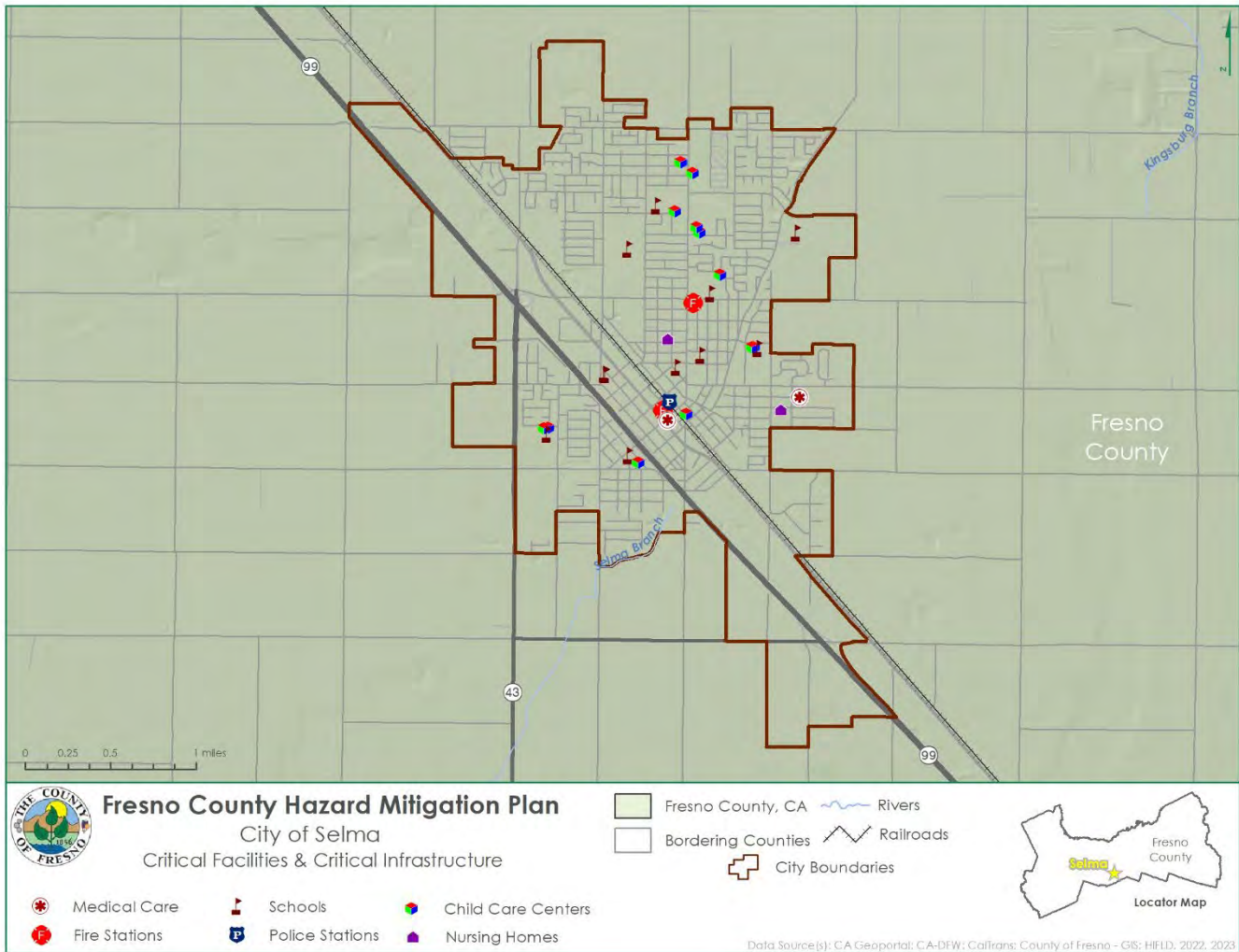
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Selma from Fresno County GIS is provided in **Table 7. City of Selma's Critical Facilities** and mapped in **Figure 5. City of Selma Critical Facilities**. This is the information that was used for mapping and analysis purposes.

Table 7. City of Selma's Critical Facilities

Critical Facilities Type	Number
CalARP	2
Colleges & Universities	1
Fire Station	3
Hospital	1
Police	1
School	12
Total	20

Source: Fresno County

Figure 5. City of Selma Critical Facilities



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; HIFLD, 2022, 2023



Table 8. Specific Critical Facilities and Other Community Assets Identified by City of Selma Planning Team lists particular critical facilities and other community assets identified by Selma's planning team as important to protect in the event of a disaster.

Table 8. Specific Critical Facilities and Other Community Assets Identified by City of Selma Planning Team

Name of Asset	Replacement Value (\$)	Occupancy/Capacity	Hazard Specific Info
Police Department	15,000,000	51	Located next to a railroad track, which is parallel to a gas line also
Fire Station 2	8,400,000	6 on duty 21 total	
Fire Station 1	10,400,000	4 on duty	Located within half a block of a railroad track and a gas line
Selma Community Hospital	45,000,000	500	Hazardous materials located within
City Hall	15,500,000	74 seated/ 159 standing	Located within a block of a railroad track and a gas line
Fire Administration Bldg.	584,246	50	
Senior Center	1,200,000	232	
Public Works Yard	4,500,000	16	Hazardous materials located within

Source: Fresno County

The City has four major medical facilities: Selma Community Hospital has 60 beds (including a 15-bed emergency wing), Kaiser Permanente Medical Clinical has an outpatient treatment facility, Bethel Lutheran Home has 87 beds, and Selma Convalescent Home has 34 beds.

HISTORIC, CULTURAL, AND NATURAL RESOURCES

There are no registered state or federal historical sites in the City, although Pioneer Village is a historically based village where many community events are held. The City of Selma has some environmentally sensitive areas, which include Rockwell Pond and the Young Pondering area.

GROWTH AND DEVELOPMENT TRENDS

Selma is growing at a rapid pace and is likely to continue this trend for many years. **Table 9. City of Selma's Change in Population and Housing Units** illustrates how the City has grown in terms of population and number of housing units between 2017 and 2022. **Figure 6. City of Selma Land Use** illustrates how the city is planning to focus its land use, expanding its housing to accommodate increase in population.

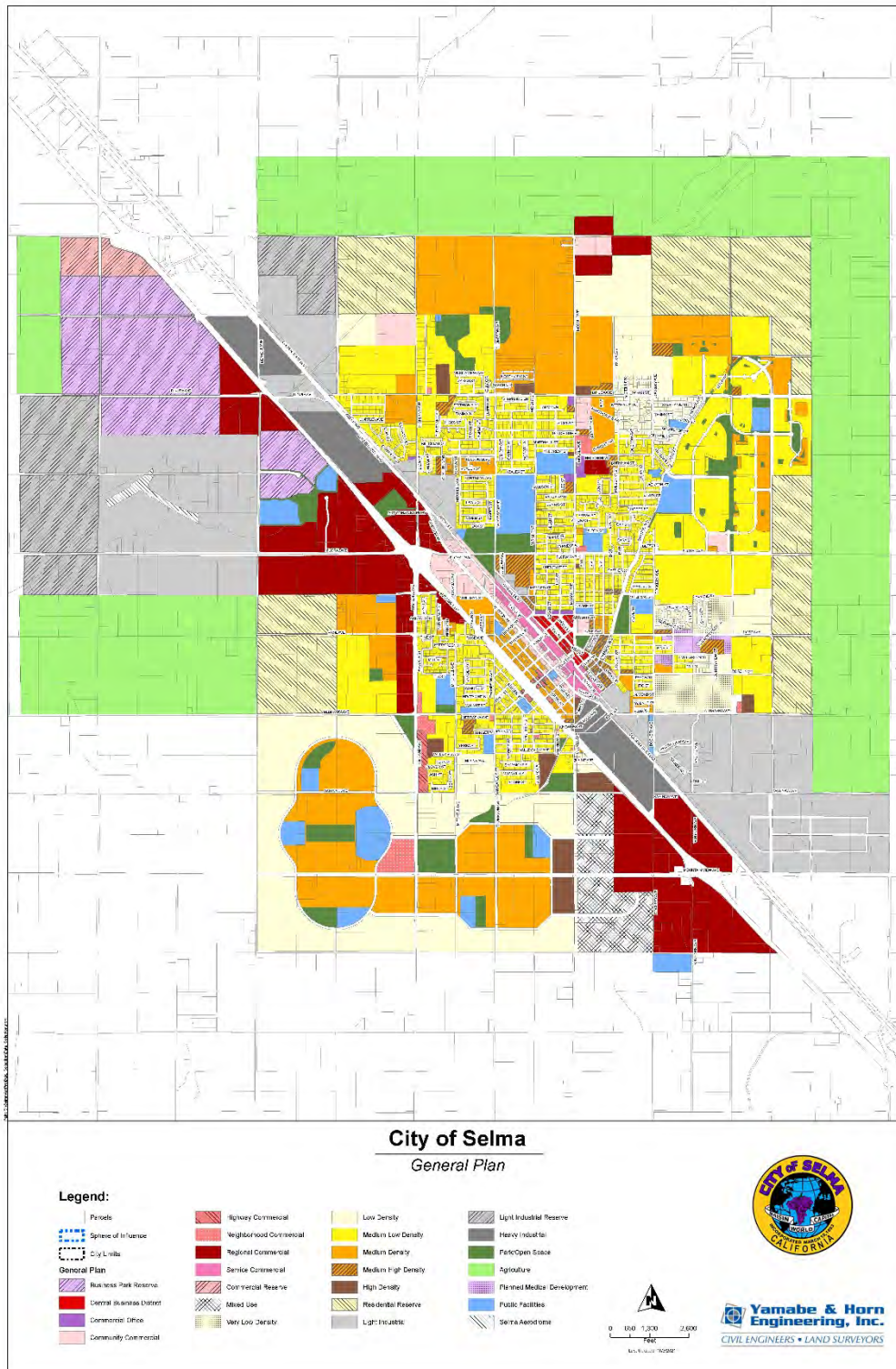


Table 9. City of Selma's Change in Population and Housing Units

2017 Population	2022 Population Estimate	Estimated Percent Change 2017- 2022	2017 # of Housing Units	2022 Estimated #of Housing Units	Estimated Percent Change 2017- 2022
24,537	24,576	+0.16%	7,137	7,650	+7.19%

Source: U.S. Census Bureau

Figure 6. City of Selma Land Use





Currently, there are no manufactured housing developments in Selma and there are no planned housing developments that would be located in specified flood hazard areas or in areas with unstable soil. One possible development of concern may be the Tutelian Commercial Project that is located adjacent to the Rockwell Pond, which accepts stormwater runoff from the City. However, the grading and drainage plan will mitigate any localized flooding issues or other issues associated with Rockwell Pond.

More general information on growth and development in Fresno County as a whole can be found in “Growth and Development Trends” in the Fresno County Vulnerability and Assets at Risk section of the main plan.

ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

The table above shows Selma’s exposure to hazards in terms of number and value of structures. Fresno County’s assessor’s data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern-day building codes. Impacts of past events and vulnerability to specific hazards are further discussed below (see the Hazard Identification section for more detailed information about these hazards and their impacts on Fresno County).

AGRICULTURAL HAZARDS (MEDIUM)

Although there is not much agriculture in the City limits, the surrounding areas are mostly agricultural land. The City of Selma is greatly affected by any agricultural hazard, because the economy is largely based on this industry. Besides the obvious extreme weather hazards, such as drought, flood and heavy rains, and extreme heat, other agricultural hazards could be a major impact on Selma. Hazards such as pests on certain crops could be a major issue for the economy. Past pests on crops have cost millions of dollars in damage and have included the glassy-winged sharpshooter, olive fruit fly, and red imported fire ant. Other hazards from agriculture itself include air pollution, water shortages, and hazardous materials spills.

Fresno County is one of the top counties in the nation in terms of poor air quality. Often, citizens of the County have a higher chance of having respiratory problems, including asthma in children, than others in the United States. Each year, air quality is also responsible for crop losses. Water shortages are becoming a problem in the area, and crop irrigation, which is necessary to support industry and thus the economy, adds to the problem. Agricultural sites that store hazardous materials that are close to the City could affect the City directly in the event of a spill or explosion.

DAM FAILURE (MEDIUM)

According to the City’s 1991 Safety Element, information from the U.S. Army Corps of Engineers, California Office of Emergency Services, and Fresno County indicated that Selma would be in extreme danger in the event of a complete dam failure at Pine Flat Dam at a time that the facility is at full capacity. This would be a worst-case scenario and Selma would be located in the center of a floodway approximately 17 miles wide and 8 to 10 feet deep within three hours of the failure. No projections of a



lesser extent have been made for this hazard and there has not been a reported past event of dam failure at Pine Flat Dam.

DROUGHT (HIGH)

Drought would mostly affect the economy of Selma by limiting water resources available for the agricultural sector and human consumption. The agricultural sector would need more irrigated water than normal. During drought periods, surface water allocations are reduced which leads to higher groundwater pumping from an already limited aquifer and thereby lowers the water table. Low water levels and water conservation for the area are already an issue, so a drought could impact Selma and its economy greatly.

Previous droughts happened between 1987 and 1992, which was statewide, and 1998-2004 (more of a dry spell than an actual drought). In 2007, there was an attempt to have a local state of emergency declared because of water supply shortages, especially for local farmers. There was also concern for an increase in West Nile virus because the breeding grounds were moving to urban areas with water due to the dry conditions in the rural areas.

The period between late 2011 and 2014 was the driest in California history since record-keeping began. The drought led to Governor Jerry Brown's instituting mandatory 25 percent water restrictions in June 2015. Subsequently, the winter of 2016–17 turned out to be the wettest on record in Northern California, surpassing the previous record set in 1982–83. The most recent drought from 2020 to 2023, significantly impacted farm in the San Joaquin Valley.

EARTHQUAKE (MEDIUM)

The City of Selma is located in Seismic Zone 3. The planning team identified 15 to 25 unreinforced masonry buildings in town, primarily retail buildings downtown. Specifically, the team identified City Hall and the Police Department as critical facilities that may be vulnerable to seismic events. Although from a historical perspective, the potential for secondary hazards caused by earthquakes have been considered minimal and rare in the Selma area, the potential for liquefaction and ground settlement instabilities are not well known.

There has been some minimal structural damage in the past from earthquakes, in particular the 1983 Coalinga earthquake, which was felt in Selma. The damage done to an unreinforced masonry building was absorbed by the building's owner.

Socioeconomically disadvantaged communities would experience the most damage due to the event perpetuating a cycle of poverty, displacement, and overall inequities. These communities may not be able to afford earthquake mitigation projects to their property, may not have authority to make such changes due to renting, or may be unhoused. Older adults, individuals with disabilities, and individuals with limited English proficiency are likely are more vulnerable to earthquakes due to lack of access to emergency communications and difficulty in evacuating unsafe structures for example.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The City of Selma's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (HIGH)

Selma has not historically been subject to significant flooding. The mapped flood hazard area for a 100-year event includes one small area in the northwestern part of the City. The special flood hazard area contains 18 homes. Previous flooding occurrences in the City of Selma have occurred in 2019, however no injuries, deaths, or damages were reported from the incident.

There is often localized flooding during heavy rain events due to the sheer amount of precipitation and the limited capacity of storm drainage system facilities, capacity issues, or failed operation of storm drain pumps. The City of Selma received American Recovery and Reinvestment Act (ARRA) funding to take a majority of the pumps offline and divert runoff from the Consolidated Irrigation District's (CID) canal system to Rockwell pond. The City is also currently working to divert the remaining pump stations to master planned retention basins. The City has prepared emergency response action plans for the remaining pump stations still active. Areas of localized flooding are illustrated in **Figure 8. City of Selma Hazard Mitigation Flooding Intersections.**

According to FEMA's 2016 Flood Insurance Study (FIS), the flood history of Selma is not well documented, but flooding reportedly occurred in the area in 1950, 1958, 1967, 1969, and 1978. In March 1958, nearly two inches of rain in less than a day clogged storm sewers and caused flooding in the central part of the City. In other floods, water has entered basements, sewer lines have backed up, and water has ponded in commercial and residential areas. Streets, lawns, and basements have been damaged; traffic has been disrupted; businesses have closed temporarily; and flood fighting has been necessary. Flooding has generally been short in duration (ponded areas being exceptions) and most damage has been considered minor.

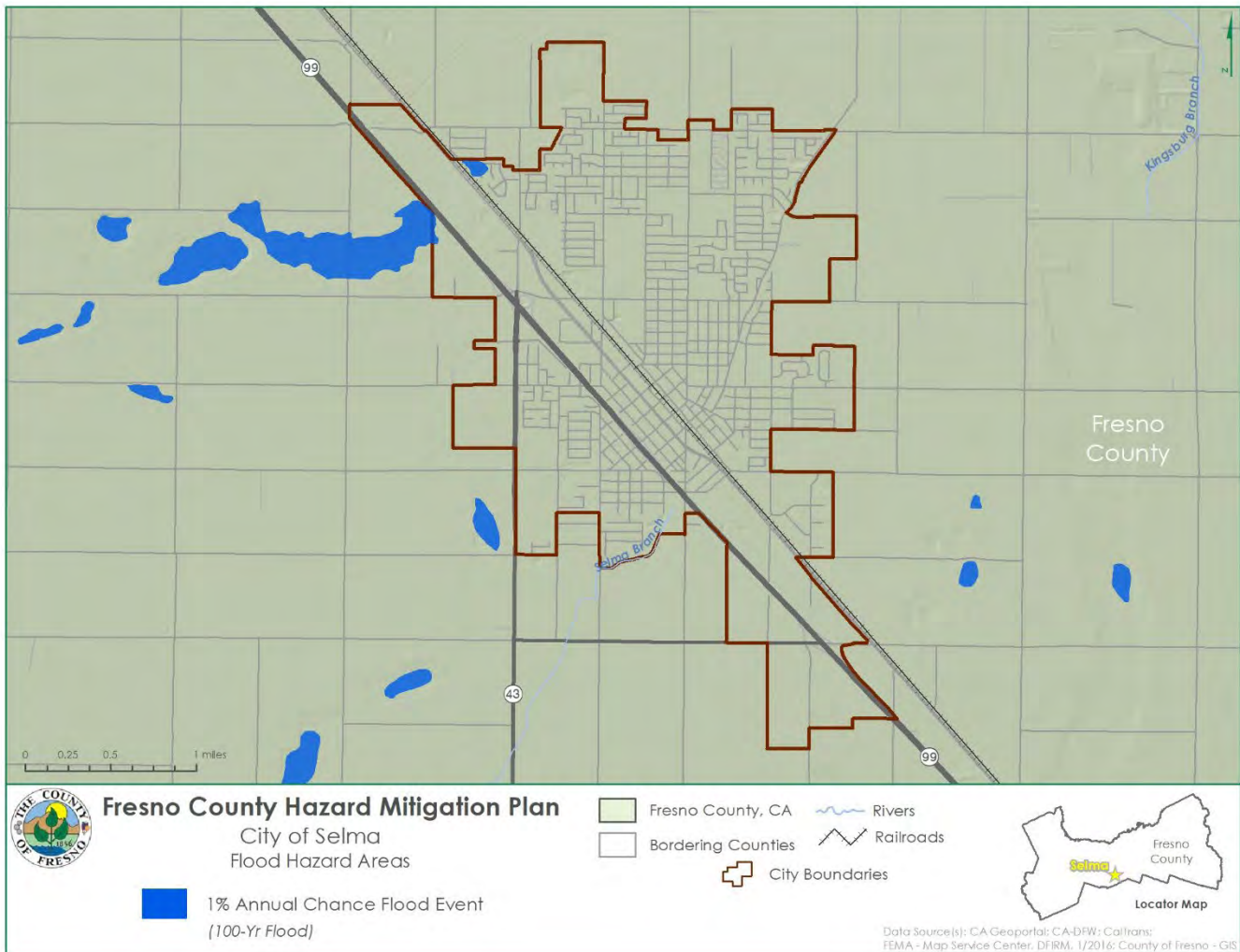
More recently there has been major damage and some localized flooding from storms:

- **May 2005:** Drainage ditch almost overflowed; localized street flooding occurred.
- **January 2006:** Heavy rain caused much damage to homes and businesses in Selma.

VALUES AT RISK

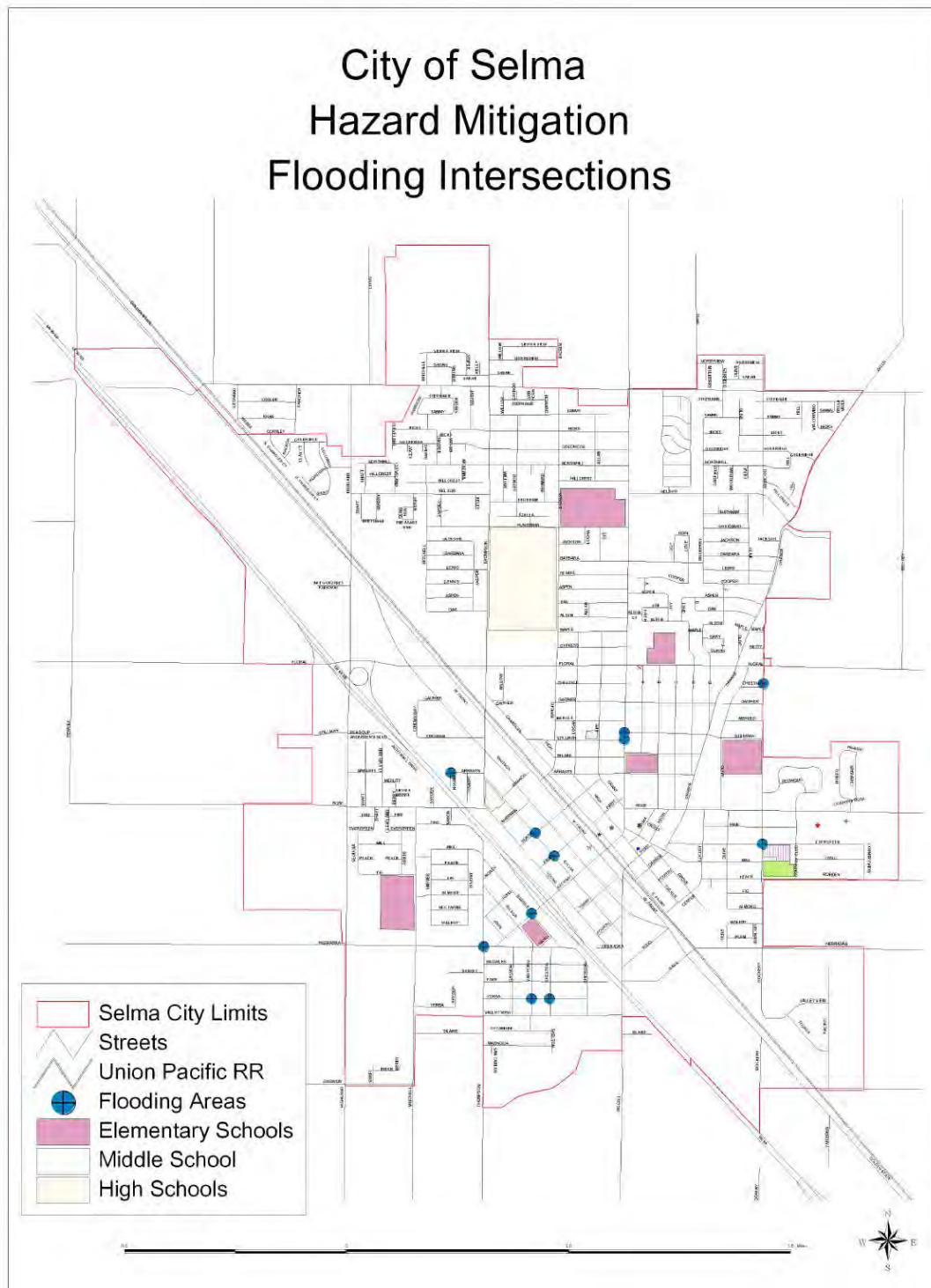
Following the methodology described in the Vulnerability of Fresno County to Specific Hazards section, a flood map for the City of Selma was created (see **Figure 7. Fresno County Flood Hazards Areas**).

Figure 7. Fresno County Flood Hazards Areas



Source: CA Geoportal; CA-DFW; Caltrans; FEMA – Map Service Center, DFIRM, 1/2016; County of Fresno - GIS

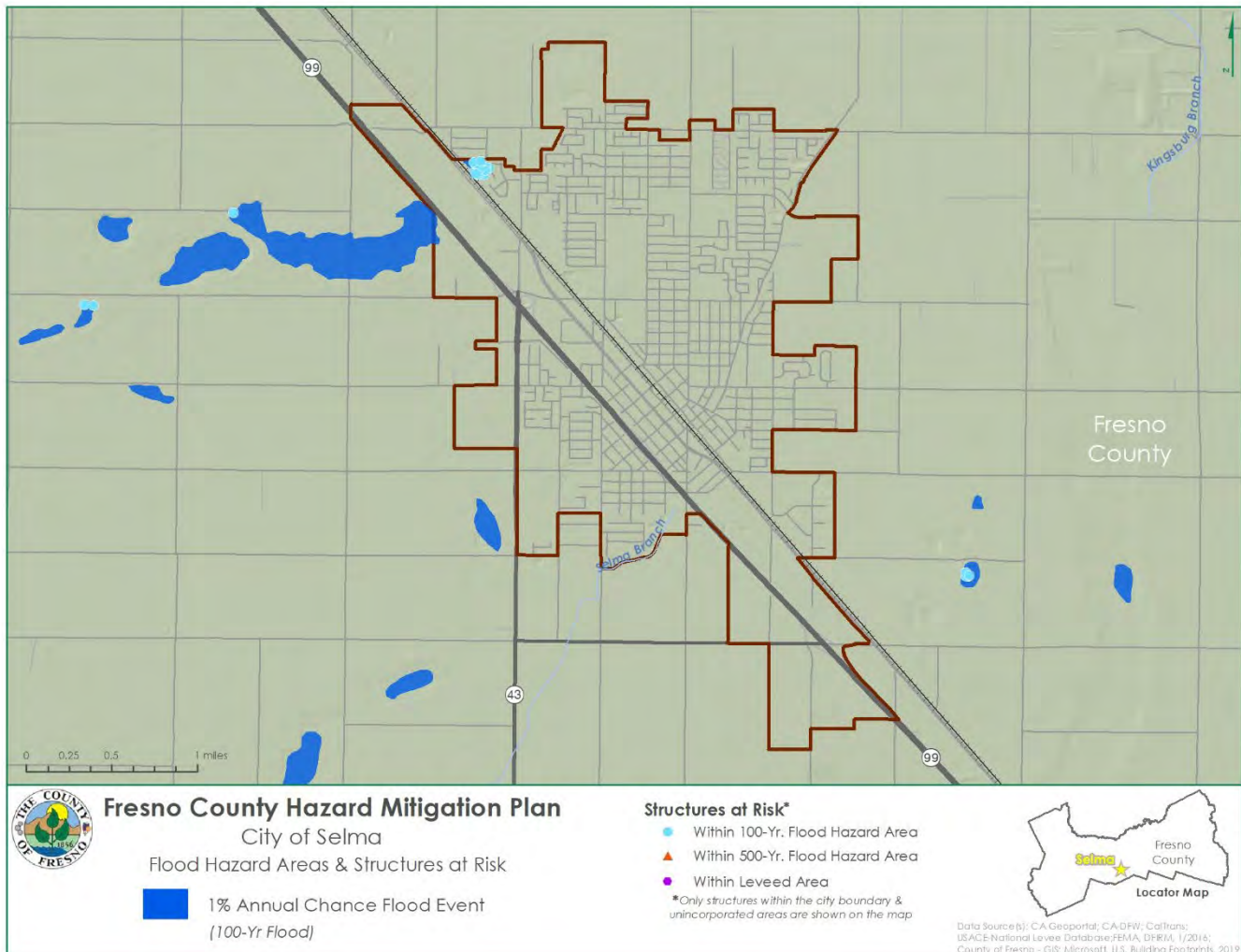
Figure 8. City of Selma Hazard Mitigation Flooding Intersections



The City of Selma does have assets at risk to the 100-year flood. There are 27 improved parcels located in the 100-year flood hazard area with an unknown value. There are no additional parcels in the 500-year floodplain.

A map of the vulnerable buildings in the 100-year floodplain is provided in **Figure 9. City of Selma At-Risk Buildings in Flood Hazard Areas**.

Figure 9. City of Selma At-Risk Buildings in Flood Hazard Areas



Source: CA Geoportal; CA-DFW; CalTrans; USACE-National Levee Database ; FEMA – Map Service Center, DFIRM, 1/2016 ; County of Fresno – GIS

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.



INSURANCE COVERAGE, CLAIMS PAID, AND REPETITIVE LOSSES

The City of Selma has a flood insurance rate map but is not currently participating in the National Flood Insurance Program. NFIP Insurance data indicates that as of March 19, 2024, there were 6 flood insurance policies in force in the City with \$2,524 in total premium or total paid. According to the FEMA Community Information System accessed March 19, 2024, there are no Repetitive Loss or Severe Repetitive Loss properties, and zero claims located in the jurisdiction.

POPULATION AT RISK

Using parcel data from the County and the digital flood insurance rate map, population at risk was calculated for the 100-year and 500-year floods based on the number of residential properties at risk and the average number of persons per household (3.17). The following are at risk to flooding in the City of Selma:

- 100-year flood—6,262 people
- 500-year flood—17,152 people
- Total flood—23,414 people

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.

CRITICAL FACILITIES AT RISK

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. According to data from Fresno County GIS and the digital flood insurance rate map, there are no critical facilities in Selma's flood hazard area.

HAZARDOUS MATERIALS INCIDENT (HIGH)

Two major transportation arteries of statewide significance traverse Selma—a main line of the Southern Pacific Railroad and State Highway 99. These routes are both heavily used and are frequently used to transport hazardous materials that could represent a risk to the community if involved in a transportation accident. Land uses along the transportation routes are diverse. One of the two fire stations is located one street away. Other areas of concern related to train derailment include the buried pipes and utilities that run along the tracks, poor crossings, and grade separation. Another transportation hazard is a small, two runway, privately owned airport located two miles northwest of Selma that provides service to private planes.

The planning team identified two plane crashes and two major transportation-related hazardous materials spills in the past:



- **January 1991:** Three big trucks, one loaded with toxic chemicals, collided on Highway 99 in Selma. This collision caused an explosion that closed down the highway and killed two people and injured a third. A nearby elementary school was closed the day after the accident.
- **October 1996:** A freight train carrying household paint, batteries, compressed gas cylinders, and pesticides derailed north of Selma spilling 100 gallons of diesel fuel. There were no injuries; five area residents were evacuated.
- **November 2000:** A plane crash at the Selma Airport resulted in one death and critically injured one person.
- **January 2008:** A single plane crash on the edge of the City limits resulted in one death.

There have been 3 hazardous materials incidents from 2017-2022 that have occurred in the City of Selma. Of the 3 incidents, there have been 1 fixed, 1 railroad, and 1 railroad non-release. There were no injuries or property damages during the time period, however there was one fatality from the railroad non-release incident that occurred in 2022. ² There are two CalARP hazardous materials facilities located in the City of Selma.

SEVERE WEATHER: EXTREME COLD/FREEZE (HIGH)

The City of Selma experiences freeze that mostly affect the agricultural economy of Selma. Extreme cold also increases the energy demand, poses a threat to human health, and can cause damage to underground water piping throughout the City. Past freezes occurred in, 1990, 1991, 1998, and 2007. Warming centers were opened up for many of these freezes to help the public.

- **1991 and 1990:** These freezes caused catastrophic damage to the crops in the San Joaquin Valley and received presidential disaster declarations.
- **December 1998:** A freeze, accompanied by black ice and snow, caused numerous vehicle accidents in the area and required response from Selma's public safety services. The freeze was also devastating to the valley's agricultural sector and resulted in a presidential disaster declaration.
- **January 11-17, 2007:** This freeze, which received a presidential disaster declaration, had a huge economic impact on the City of Selma and many human service resources were used throughout the rest of the year. Impacts included crop damage and unemployment.
- **December 2016:** California growers spent over \$25 million in December to protect their crops from a post-rain cold snap. Though it was cold in the San Joaquin Valley – down to 23 degrees in parts of the of the Valley, according to the National Weather Service – it wasn't the ice-box along the eastern foothills from Fresno County to Kern County.

SEVERE WEATHER: EXTREME HEAT (HIGH)

Extreme heat events are primarily an issue of human health in Selma, particularly for the homeless, senior citizens, agricultural workers, people with decreased health status, and lower income citizens.

² 2024 Fresno County Hazard Mitigation Plan
May 2024
California Office of Emergency Services (CalOES) Spill Release Reporting, 2017-2022, <https://www.caloes.ca.gov/office-of-the-director/operations/response-operations/fire-rescue/hazardous-materials/spill-release-reporting/>



Along with the extreme heat comes worsened air quality for the Central Valley region, which increases the chances of respiratory emergencies. Other major impacts of extreme heat events are agricultural losses, which affect the local economy in Selma, and increased water and energy demand, which results in increased operating costs.

The City operates cooling centers and uses the Connect CTY, a computerized telephone and e-mail notification system, to notify people of the issue and locations of the centers. The City also provides a transit system that can take citizens to the cooling centers. Summer temperatures in Selma can exceed 105°F and usually occur for a few days in a row, which is when cooling centers are opened. The Senior Center keeps a list of older adults to check up on, which is very helpful during this type of emergency as well as others.

Cooling centers were opened for extreme heat in Selma in 2007 and 2005. Other extreme heat years include 2016, 2015, 2014, 2003, 2002, and 1999. In mid-July 2006, a stretch of days with 100°F plus temperatures damaged crops, especially tomatoes, tree fruit, and grapes. It also led to a sharp increase in the number of mosquitoes infected with West Nile virus in the valley. The time period of January 2016 through December 2016 was the 3rd warmest year on record for California, according to NOAA's National Centers for Environmental Information (NCEI). California saw 2014 as the warmest year on record. Recently, in 2023, the extreme heat killed a farmworker harvesting tomatillos near Selma due to heat related illness. All heat-related illnesses are preventable with the right protections in place for farmworkers to stay cool and healthy during these types of extreme weather events.³

SEVERE WEATHER: FOG (MEDIUM)

Fog is a yearly occurrence around Selma and is a hazard that the City of Selma has learned to respond to. The City itself has fog that reduces visibility and can cause vehicle accidents. In addition, Selma's public safety personnel often have to respond to major accidents on the highways around Selma. This drains the local resources away from the City.

To try to combat this issue, the Selma Unified School system is on a "foggy day" schedule, which entails starting school later in the morning after a fog has lifted. Also, the California Highway Patrol and California Department of Transportation work together on public education, press releases, pace cars, and signs for safer highway driving.

Some major accidents in the area attributed to fog include the following:

- **November 26, 1989:** 21 vehicle pileup on Highway 99 near Selma, 14 people injured
- **January 23, 1990:** 60+ vehicle pileup on Highway 99 north of Selma, five deaths
- **February 7, 1991:** Multiple vehicle pileup on Highway 99 between Selma and Fresno, three deaths, 30 people injured
- **January 1994:** 56 vehicle pileup on Highway 99 near Selma, two deaths, 42 people injured
- **November 1998:** 74 vehicle pileup on Highway 99, two deaths, 51 people injured
- **November 2000:** Small private plane crash, 1 death, 1 critically injured person

³ 2024 Fresno County Hazard Mitigation Plan
May 2024
Fresno CA farmworker dies in triple-digit heat, advocates say | Fresno Bee
<https://www.fresnobee.com/news/local/article278374474.html>



- **February 2002:** 87 vehicle pileup on Highway 99 near Selma, three deaths, 51 people injured
- **November 2007:** 102 vehicle pileup on Northbound Highway 99, two deaths, over 30 people injured
- **January 2017:** At least 40 vehicles were involved in multiple crashes in dense fog on Highway 198 in Kings County
- **January 14, 2022:** The fog event occurred between Selma and Fresno/Highway 99 and caused \$630,000 in damages and led to one death.

SEVERE WEATHER: HEAVY RAIN/THUNDERSTORM/HAIL/LIGHTNING (HIGH)

There has been major damage and some localized flooding from storms during February 1992, February 1998, April 1999, May 2005, January and March of 2006, and January and February of 2017 (see also Flood section above).

- **February 1992:** The City of Selma's ambulance resources were used to respond to four accidents in a chain-reaction on Highway 99 due to heavy rain and hail. There were 12 vehicles involved in these near Fowler with only minor injuries to 12 people and no deaths.
- **February 1998:** A storm downed trees and power lines, damaged cars and homes, and caused power outages.
- **April 1999:** A week of cold, wet, and windy weather with hail caused some crop damage in the area.
- **May 2005:** A ditch almost overflowed, localized street flooding was reported, and houses were struck by lightning.
- **January 2006:** Heavy rains caused much of the damage to homes and businesses.
- **March 2006:** Extreme winds caused much of the damage, especially to a mobile home park.
- **January 2017:** In Fresno County, west of Selma, the intersection of Clovis Avenue and Conejo intersection flooded with several inches of water all across the road.
- **February 2017:** Heavy, persistent rainfall across northern and central California created substantial property and infrastructure damage from flooding, landslides and erosion

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Witt O'Brien's consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Selma's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 10. City of Selma Mitigation Capability Summary**.

Table 10. City of Selma Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability		X	
Fiscal Capability	X		
Available Staff	X		
Political Support/Interest	X		
Community Support		X	

REGULATORY MITIGATION CAPABILITIES

Table 11. City of Selma's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Selma.

Table 11. City of Selma's Regulatory Mitigation Capabilities

Regulatory Tool	Adopted/Updated Yes/No	Under Development Yes/No	Comments
Building Codes (please indicate UCC or IBC and Year)	Yes	No	2022 adopted/updated
Community Emergency Response Team (CERT)	No	No	



Regulatory Tool	Adopted/Updated Yes/No	Under Development Yes/No	Comments
Community Rating System (CRS Program of the NFIP)	No	No	
Emergency Management Accreditation Program	No	No	
Fire Code	Yes		2022 updated/adopted
Firewise Community	No	No	
Floodplain Management Flood Damage Prevention Ordinance	No	No	
Land Use/Development Planning	Yes	Yes	
National Flood Insurance Program (NFIP)	No	No	
Post Disaster Redevelopment/Reconstruction Plan/Ordinance	No	No	
Storm Ready	No	No	
Stormwater Management Plan/Ordinance	Yes	No	
Subdivision Regulations/Ordinance	Yes	No	
Two Weeks Ready	No	No	
Unified Development Ordinance	Yes	No	
Zoning Ordinance	Yes	Yes	

PLANNING MITIGATION CAPABILITIES

Table 12. City of Selma Planning Capabilities identifies the plans related to mitigation and loss prevention in Selma.

Table 12. City of Selma Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes	Yes	2022 adopted/updated Expected completion Feb 2024
Climate Resiliency or Adaptation Plan	Yes	No	
Community Wildfire Protection Plan (CWPP)	No	No	
Comprehensive Emergency Management Plan	Yes	Yes	Expected completion 2024
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	Yes	Yes	Expected completion 2025



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Continuity of Operations Plan (COOP)			
Disaster Recovery Plan	No	No	
Economic Development Plan	No	Yes	Expected completion 2025
Emergency Operations Plan (EOP)	Yes	Yes	Expected completion 2024
Evacuation Plan	No	No	
Flood Response Plan	No	No	
Floodplain Management Plan/Flood Mitigation Plan	No	No	
Hazard Mitigation Plan	Yes	Yes	
Historic Preservation Plan	No	No	
Natural Resources Protection Plan (NRPP)	No	No	
Open Space Management Plan (Parks and Rec/Greenway Plan)	Yes	Yes	
Threat Hazard Identification and Risk Assessment	No	No	

CITY OF SELMA GENERAL PLAN

The Selma General Plan provides comprehensive planning for the future. It encompasses what the City is now, what it intends to be, and provides the overall framework of how to achieve this future condition. Estimates are made about future population, household types, and employment, so that plans for land use, circulation and public facilities can be made to meet future needs. The General Plan represents an agreement on the fundamental values and a vision that is shared by the residents and the business community of Selma and the surrounding area of interest. Its purpose is to provide decision makers and City staff with direction for confronting present issues, as an aid in coordinating planning issues with other governmental agencies, and for navigating the future. State law specifies that each General Plan address seven issues area (“elements”): land use, circulation, open space, conservation, housing, safety, noise, and environmental justice. The current plan does not include the newest element, environmental justice since their last plan update. These mitigation-related goals and policies are included below.

SAFETY ELEMENT

The Safety Element was adopted to provide for the protection of residents of the Selma community from natural and manmade hazards. It identifies a range of hazards to life and property to which the City and its residents are subject. The goals for protection of life and property are common to each hazard and are, therefore, presented as the overall goals of the Safety Element.

Goals



- To prevent loss of life and serious injury, resulting from natural or manmade hazards to the residents of the City of Selma.
- To prevent serious structural damage to critical facilities and structures where large numbers of people are expected to congregate at one time.
- To ensure the continuity of vital services to the Selma area in case of disaster.
- To provide a leadership role in education on public safety.

Hazard Specific Objectives and Policies

Seismic Safety Objectives

- Identify risks to the City of Selma from seismic hazards.
- Establish and maintain a plan to minimize identified risks from seismic hazards.
- Establish and maintain a plan for responding to seismic disaster and for the provision of emergency services.
- To adopt a Seismic Impact Transportation Plan reflecting primary and secondary disaster access routes and designating appropriate evacuation routes.

Seismic Safety Policies

- The Safety Element shall be reviewed and updated periodically. Upon adoption of the Interim Safety Element, the City should review and update the plan within one year and every five years thereafter.
- The City shall develop and adopt an Emergency Operations Plan which shall include action plans in the event of an earthquake disaster. Emergency evacuation routes should be included in the plan.
- The City shall maintain and continue to update, with the County of Fresno and other agencies, an Emergency Services Plan. Included in the plan should be:
 - Provision for control and direction of emergency operations.
 - Provision for continuity of governmental services.
 - Program to coordinate the repair and restoration of essential systems and services.
 - Coordination of emergency operations with other jurisdictions,
- The City should establish an inspection program to identify and inventory all existing unreinforced masonry structures in the City.
- The City should implement a program to abate all identified dangerous buildings.
- Emergency communication centers, fire stations, and other emergency service or critical facilities should be examined to determine earthquake resistance. A program to mitigate deficient facilities should be established.
- Emergency procedures should be identified for public and private utility districts.
- Primary and secondary hazards from seismic activity should be evaluated in all environmental assessment and reporting processes.
- The list of critical facilities for the City of Selma in Appendix D of the Summary and Policy Recommendations of the Five County Seismic Report, shall be reviewed and updated.



- Critical facilities shall be designed to the standards established by the Uniform Building Code for such facilities. Critical facilities means essential facilities as provided in the Uniform Building Code.
- The City shall continue to adopt current issues of the Uniform Building Code and implement the seismic design standards provided by the Code.
- Seismic safety information should be made available to the general public. School districts and agencies related to aged, handicapped, and seismically susceptible industries should be encouraged to develop education programs for seismic awareness.
- The Technical Report of the Five County Seismic Study should be made available to planning projects in the City of Selma.
- The Seismic Impact Transportation Plan designates the following disaster transportation routes.

Geological Safety Objectives

- To provide a safe environment for building construction through knowledge and understanding of soil and land resources.

Geological Safety Policies

- Detailed mapping and analysis of identified areas of geologic hazard shall be provided. Areas identified with a “severe” rating for allowable soil pressures or high corrosivity soil characteristics should be mapped for City staff use in new development project consideration.
- Continue to enforce the Uniform Building Code in all matters related to soil preparation and foundation requirements.

Flood Safety Objectives

- Minimize the hazards of localized sheet flooding resulting from prolonged rainfall and stormwater runoff.
- Promote and become instrumental in coordinating the inclusion of a dam failure component to a regional disaster plan.

Flood Safety Policies

- The City of Selma shall evaluate territories within its sphere of influence to identify areas of potential localized flood hazards.
- In areas identified as being potentially subject to flooding, where the exact area and depth of flooding is uncertain, the applicant or developer of an annexation or development proposal shall be responsible for the preparation of a civil engineering report evaluating the flooding potential.
- The City of Selma shall continue to implement and administer the Master Plan for Storm Drainage as a means of offsetting increased storm water runoff from urbanization.
- The City of Selma shall seek and petition the County of Fresno, Council of Fresno County Governments, and other agencies and cities impacted by potential dam failure to participate in the completion of a disaster plan dealing with dam failure.



- The City shall prepare a local emergency evacuation plan responding to the complete failure of Pine Flat Dam at peak capacity. The evacuation plan shall be coordinated with other responsible and impacted jurisdictions.

Transportation Safety Objectives

- To maintain a responsive City staff trained in hazardous materials incidents.
- To maintain a safe relationship between major transportation routes and urban land uses.
- To provide for land use safety in areas influenced by airports.

Transportation Safety Policies

- The City shall consider the impacts of potential transportation hazards upon adjacent land uses when considering proposals for new or changed urban uses.
- New public use buildings, such as, schools and hospitals, should be located a minimum of 1,000 feet from mainline rail or freeway routes.
- The City shall continue to staff, train, and equip an emergency response team to respond and coordinate public safety activities. The Selma Fire Department is designated as the City's emergency response team for hazardous materials incidents.
- The City shall continue to implement the airport land use plan for the Selma Aerodrome.
- New public use buildings should not be located within the flight path or approach zone of airports.
- Adopted new speed survey

Hazardous Materials Safety Objectives

- To reduce and control the effects of hazardous wastes so as to promote the public health and welfare of the Selma community.

Hazardous Materials Safety Policies

- To coordinate and cooperate with other local, state, and federal agencies with expertise and responsibility for all aspects of hazardous wastes.
- To educate the public on the subject of hazardous wastes.
- To ensure that disaster planning for the City of Selma includes policies appropriate to problems associated with hazardous wastes.

CONSERVATION AND OPEN SPACE ELEMENT

This element provides guidance through policies, plans, and programs on the location and design of open space in the community and in the conservation and usage of natural resources.

Goals



- Protect the environment.
- Provide for the usage of natural resources without causing their premature depletion.
- Preserve prime agricultural land.
- Preserve groundwater quality and reduce overdraft conditions.
- Eliminate potential for soil erosion or degradation of its agricultural productivity.
- Limit potential threats to human health and property, which may result from natural environmental hazards.

Policies

- Areas with high erosion potential or soil instability which cannot be mitigated shall be designated for open space land uses.
- Channel and slope modification shall be discouraged where they increase the rate of surface runoff and increase the potential for erosion.
- The City shall endeavor to mitigate, to the fullest extent possible, activities which will exacerbate groundwater overdraft.
- To the fullest degree possible, prime agricultural land shall be preserved for agricultural uses only.
- Maintain Rockwell Pond as both a resource management area (water recharge) and community open space.
- Require correction of local stormwater ponding conditions prior to development in such areas, either through off-site improvements provided by land developers, or through community storm drain facility capital improvement projects.
- Require soil studies in localized areas known to have expansive or unstable soils.

SAFETY, PUBLIC SERVICES, AND FACILITIES ELEMENT

Goals

- Reduce the threat to persons and property resulting from natural and manmade hazards including fire, crime, and flooding.
- Provide a safe and sanitary physical environment.
- Undertake required improvements of the sewer and storm drainage systems.

Policies

- Capital improvements shall be undertaken to eliminate existing flooding problems.
- The adopted Urbanizing Area Master Plan for Storm Drainage shall be utilized to determine adequate facilities for new development.
- All new developments shall be required to have community sewer, water, and stormwater systems.



WATER CONSERVATION ORDINANCE

The purpose of the Water Conservation Ordinance of the City of Selma is to minimize outdoor water use, control unnecessary water consumption, and to conserve water in landscaping to preserve the available potable water supply of the City. It prohibits waste of water as defined in the ordinance, sets water conservation stages for outdoor water use, and establishes design criteria for water conservation in landscaping.

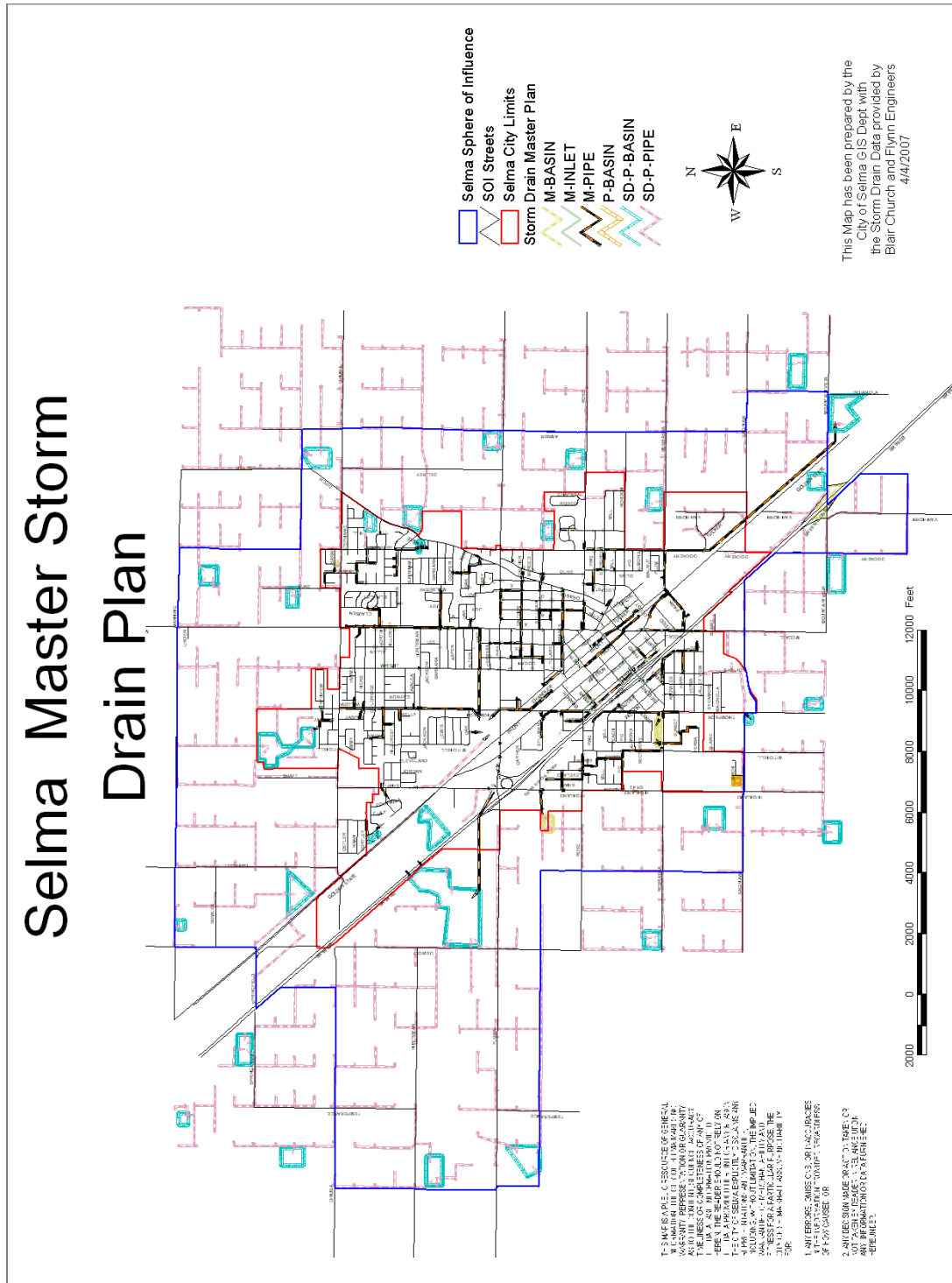
CITY OF SELMA EMERGENCY OPERATIONS PLAN, 1989

The City of Selma Emergency Operations Plan Emergency provides guidance for City response to extraordinary emergency situations associated with natural disasters, technological incidents, and nuclear defense operations. The Basic Plan provides an overview of operational concepts, identifies components of the City Emergency Management Organization, and describes the overall responsibilities of federal, state, County, and City entities. Response and recovery functions, as well as specific guidelines for accomplishing these functions, are contained in the Functional Annexes.

CITY OF SELMA STORM DRAIN MASTER PLAN

The City of Selma has as storm drain master plan to address localized flooding issues. The plan is illustrated in **Figure 10. Selma Master Storm Drain Plan.**

Figure 10. Selma Master Storm Drain Plan



ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 13. City of Selma's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in Selma.

Table 13. City of Selma's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Emergency Manager	Yes	Single Staff	City Manager
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	Yes	Contracted	
Fiscal Management or Procurement Specialists	Yes	Department	Finance
Floodplain Manager	No		
Land Surveyors	No		City Engineer
Land Use/Management/Development Planning	Yes	Department	
Planners or engineers with an understanding of natural and/or human caused hazards	No		
Resource Development Staff or Grant-writing	Yes	Contracted	
Scientists familiar with the hazards of the community	No		
Staff experienced with Geographic Information Systems (GIS) or HAZUS	Yes	Department	DCM/CE
Staff with education or expertise to assess the community's vulnerability to hazards	No		

In Selma, the public is served by a seven department City government, which includes full-time Fire and Police departments. The City is also served by supporting groups of reserve firefighters and “volunteers in policing” that can be used in emergencies or major events. The Selma Fire Department provides ambulance services for the City and outside the City limits, encompassing a total of 150 square miles.

The City of Selma has a mapped Special Flood Hazard Area but does not participate in the NFIP and has been sanctioned since 1975. After weighing the limited number of homes subject to the 1- percent-annual-chance flood hazard against the high cost of being a member of the National Flood Insurance Program (NFIP), City Council determined that it is not in the City's best interest to participate in the NFIP.



FISCAL MITIGATION CAPABILITIES

Table 14. City of Selma's Fiscal Mitigation Capabilities identifies financial tools or resources that the City could potentially use to help fund mitigation activities. There are currently no specific funding sources for hazard mitigation.

Table 14. City of Selma's Fiscal Mitigation Capabilities

Financial Resources	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)			X	
Special Purpose Tax (or taxing districts)			X	
Gas/Electric Utility Fees				Follow up
Water/Sewer				
Stormwater Utility Fees			X	
Development Impact Fees			X	
General Obligation, Revenue, and/or Special Tax Bonds			X	
Partnering Agreements or Intergovernmental Agreements			X	
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)			X	
Homeland Security Grants (HSGP)			X	
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants			X	Application
Infrastructure Investment and Jobs Act (IIJA)	X			

MITIGATION OUTREACH AND PARTNERSHIPS

The Selma Fire Department provides fire safety education and overall fire prevention. The City of Selma is also developing a public disaster preparedness program that should be functional within the next three to four years.

Existing strengths in the City of Selma are that community and local businesses are very generous in meeting the needs and/or volunteering themselves for community outreach programs and events.

OTHER MITIGATION EFFORTS

The City of Selma is involved in some targeted mitigation efforts, these include the following:



- The City is currently working on its Disaster Management Plan, education and implementation of the plan throughout City government, and an educational outreach program for the citizens of Selma. This is estimated to take three to four years.
- The City is working on procuring a new Fire Station/Headquarters building, which will move the Fire leadership team away from the railroad tracks, which will hopefully mitigate the impacts that some of the manmade hazards could have on Fire response resources. Construction is expected to begin within the next two to five years.
- The City has placed secondary points of connection and pads for emergency generators at strategic locations to pump stormwater during a citywide power failure.
- The City is requiring new housing developments to put in better stormwater systems than what was previously required to minimize localized street flooding in those areas.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the City of Selma has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the community. The opportunities for enhancement of the City's existing mitigation program are listed below.

- Develop a Drought Contingency Plan that will help to create a framework for drought response and mitigation in the City of Selma.

MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The City of Selma adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The City of Selma has not identified any specific planning mechanisms into which information from the 2018 plan was incorporated. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. All divisions within the Community Development Department, (Building, Planning and Housing) may utilize the hazard information when reviewing site plans or building permit applications. The Parks Division may utilize the hazard information to better understand the City's vulnerability to drought and how to better maintain the City's parks and landscaped medians in a way that will not exacerbate the effects of drought on the community. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Selma will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

COMPLETED 2009 MITIGATION ACTIONS

The City of Selma has not completed any mitigation actions identified in the 2009 plan. However, the City will carry forward, with some revisions, several actions that were deferred due to funding constraints and incorporate them into the mitigation strategy of this plan.

There is one action from the City of Selma's 2009 mitigation strategy that the City has decided not to carry forward and recommend for implementation in this plan. This deleted action and the reason for its deletion is as follows:

- Construct a Railroad Crossing Underpass – project no longer planned by City

COMPLETED 2018 MITIGATION ACTIONS

The new Police Department headquarters has been completed.



MITIGATION ACTIONS

The planning team for the City of Selma identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are included.

In addition to implementing the mitigation actions below the City of Selma will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy.

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.

1. INSTITUTE A DISASTER PREPAREDNESS EDUCATION PROGRAM FOR THE PUBLIC

Hazard(s) Addressed: Multi-Hazard: dam failure, drought, earthquake, extreme temperatures, human health hazards, flood, severe weather, wildfire, hazardous materials

Issue/Background: The public of Selma does not have any City-issued disaster preparedness education. Any knowledge they possess is from other sources, such as federal and state government agencies. Special populations targeted for this education are non-English speaking residents, senior citizens, and citizens living at or below the poverty level.

Other Alternatives: Adding a smaller disaster preparedness education program onto the already strong fire prevention program; participation in the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program

Responsible Office: City of Selma Fire and Police departments

Priority (High, Medium, Low): High

Cost Estimate: \$6,500 per year

Potential Funding: The program will be kicked off by an AmeriCorps volunteer (which will not cost the City, monetarily), and the actual program will be funded by donations and some budgeted money from the City of Selma.

Benefits (Avoided Losses): By educating the public in disaster preparedness, the citizens will be better prepared during an actual disaster. This individual preparedness will help save lives and property. This also removes some of the constraints on the City's emergency services, enabling them to do more for residents in the event of a disaster.

Schedule: In progress

Status: Continuous/routine activity, Disaster Preparedness communications are occurring through notifications on social media, electronic mail and various regional media platforms.



2. INSTALL BACK-UP POWER FOR STORM DRAIN PUMPS

Hazard(s) Addressed: Multi-Hazard: drought, flood, severe weather, earthquake

Issue/Background: Most of the City of Selma's storm drain pumps do not have back-up power sources. This causes localized flooding when there is heavy rain and power outages, which tend to go hand and hand during major storms. To alleviate this problem, the City can make use of portable generators for the pumping stations.

Other Alternatives: No action

Responsible Office: City of Selma Public Works Department

Priority (High, Medium, Low): High

Cost Estimate: \$27,540 per generator; the cost of three generators would be \$82,620 (not including fees and taxes)

Potential Funding: General Fund, FEMA Preparedness grants

Benefits (Avoided Losses): By having back-up power sources, the storm drain pumps will be able to operate, to avoid localized flooding, in the event of a power failure. This could prevent property damage, including damage to cars parked on the streets. Damage costs could range greatly, but an estimate is \$2,000-\$3,000 per storm without power.

Schedule: Within 3-4 years

Status: 2009 project, progress dependent on funding availability

3. SHERIDAN STREET PUMP STATION BYPASS AND RETENTION BASIN

Hazard(s) Addressed: Flood

Issue/Background: There is often localized flooding throughout the City of Selma during large storms. The area that is particularly affected is downtown from Young St. to Highway 99, which starts at Rose Ave. and continues to Second St. (please refer to the localized flooding map in **Figure 6. Fresno County Flood Hazards Areas**). There are major intersections and areas that flood during storms with intense rains. This occurs during rain events when storm water in this area flows into an underground storm drain system that ends up at a pumping station on Sheridan Street. The tributary area also contains a large section of State Highway 99 runoff. This drainage system does not currently have sufficient capacity to handle maximum storm flows. By not having enough capacity, this creates clogging and backflow in the area which causes major localized flooding, including surrounding citizens' properties. This project will bypass the existing pump station and gravity feed runoff into a new master planned retention basin south of Valley View Avenue.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which project will be implemented: The City of Selma Stormwater Master Plan

Responsible Office: City of Selma Public Works & Caltrans

Priority (High, Medium, Low): High



Cost Estimate: \$4,200,000 total possible, which is comprised of land acquisition, excavation of the retention basin and piping.

Potential funding: General Fund, Storm drain impact fees, Caltrans

Benefits (avoided Losses): The city can decrease damage caused by localized flooding during every single heavy rain storm. The average potential monetary loss could reach \$9,000 per heavy rain storm which could equal out to more than \$45,000 per year in damages. If an extremely heavy rain were to occur more than the average amount of rain, the extent and cost of damages would be much greater and could reach an upwards to \$700,000 because 35 buildings (mostly homes) have flooding potential damage (up to \$20,000 per building) and another possible \$75,000 in other property damages. Examples of possible yearly damages include citizens' vehicles parked in the streets and on properties, vehicles trying to get through the flooded areas, and other private property. These estimates also do not take into account the large amount of resources used in attempting to stop this localized flooding that could be used in other problems during these storms.

Schedule: Within 3-5 years

Status: 2009 project, in progress, progress depends on funding availability

4. CONSTRUCT NEW FIRE DEPARTMENT HEADQUARTERS

Hazard(s) Addressed: Hazardous Materials

Issue/Background: Besides needing to update space and facilities for both departments, the police station is located directly next to the railroad line that runs through the City (it is actually the old train depot). There is also a pressurized natural gas line that runs along the tracks by the police station that is considered a hazard.

Other Alternatives: No action

Responsible Office: City of Selma Fire department

Priority (High, Medium, Low): High

Cost Estimate: \$8 million

Potential Funding: 50% funded via State Funding Allocation and 50% funded via voter approved G.O. Bond

Benefits (Avoided Losses): Moving the fire station away from the railroad line will reduce the impacts of a disaster, which could partially or completely destroy 50 percent of the City's emergency services response capabilities. It would also reduce the threat posed to the City's dispatch communications, which dispatches both police and fire services.

Schedule: Within the next 3 years

Status: 2009 project, partially completed. Police department headquarters completed, the fire department headquarters is ongoing

5. SUSTAINABLE GROUNDWATER MANAGEMENT ACT COMPLIANCE INCLUDING GROUNDWATER SUSTAINABILITY PLANNING AND IMPLEMENTATION

**Hazard(s) Addressed:** Drought, Agricultural hazards

Issue/Background: The Kings subbasin underlays the City of Selma and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Selma is within the boundaries of the Central Kings Groundwater Sustainability Agency (GSA). The Central Kings GSA is comprised of local agencies including County of Kings, County of Fresno and County of Tulare, as well as a memorandum of understanding (MOU) with Consolidate Irrigation District. As a community that is within the boundaries of the Central Kings GSA, the City of Selma will participate as a stakeholder in the planning process by attending meetings during the development of the Central Kings Groundwater Sustainability Plan (GSP) which must be completed no later than January 31, 2020, to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Active participation in the development and implementation of the Central Kings GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Selma.

Other Alternatives: None. Not participating in the development and implementation of the GSP that is within the boundaries of the City will put the community at risk of not having sustainable groundwater supplies during periods of long-term drought.

Responsible Office: City Engineer and Central Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: None

Potential Funding: This project is funded through the Central Kings GSA.

Benefits (Avoided Losses): Active participation in the implementation of the GSP by the Central Kings GSA will result in the management of groundwater in a manner that is sustainable and avoids undesirable results, as defined by the California State Department of Water Resources, for the City of Selma.

Schedule: GSAs must complete and submit the required GSP to DWR, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: The updated GSP was submitted in late 2019, implementation ongoing.

Annex M: Fresno County Metropolitan Flood Control District





PARTICIPATION

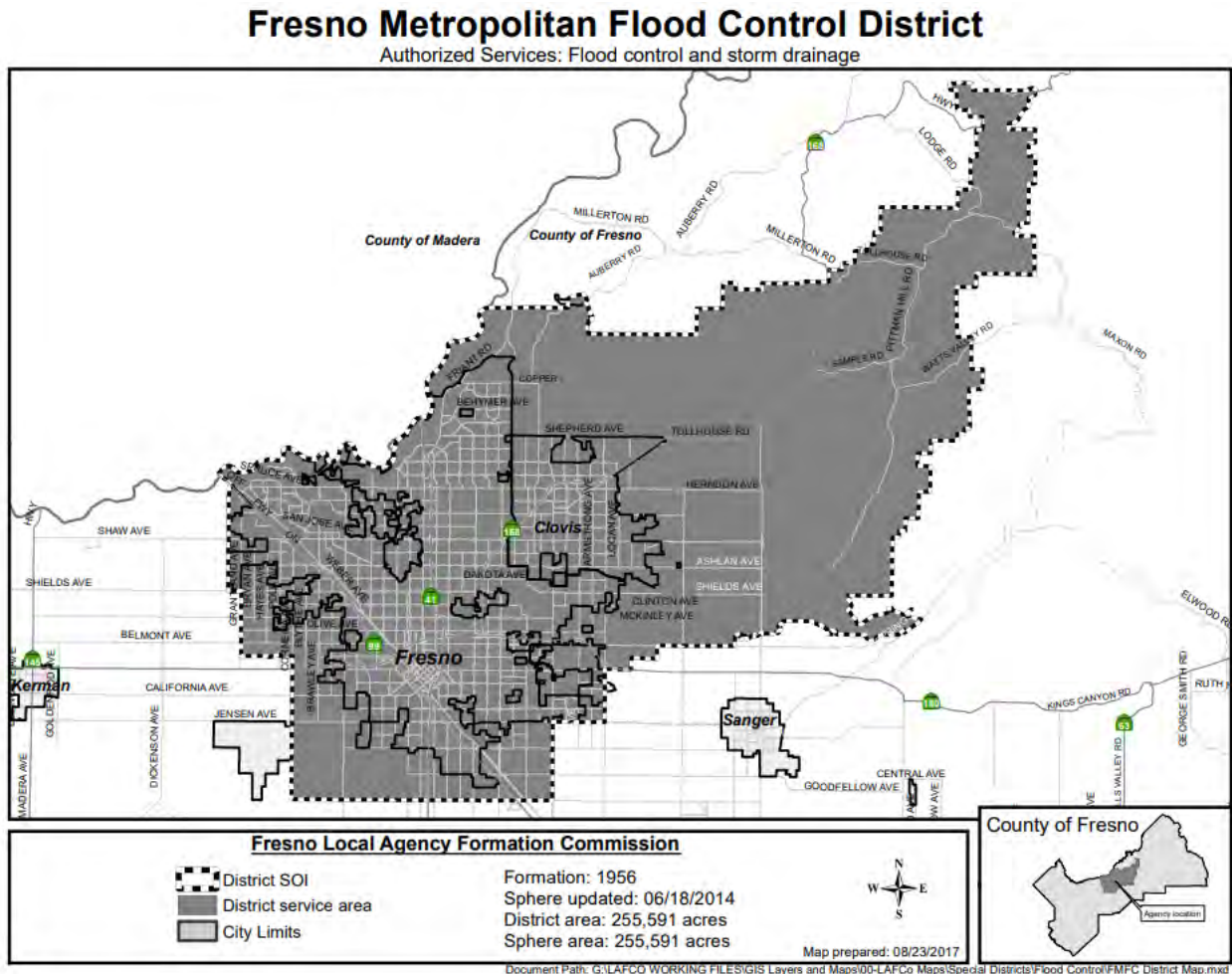
To update the Fresno County Metropolitan Flood Control District's jurisdictional annex, the District had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the District's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The District did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee (documented in Appendix B) or conduct additional public outreach activities.



DISTRICT PROFILE

The Fresno Metropolitan Flood Control District service area is illustrated in **Figure 1. Fresno County Metropolitan Flood Control District's Service Area**.

Figure 1. Fresno County Metropolitan Flood Control District's Service Area



Source: Fresno Local Agency Formation Commission,
<https://www.fresnolafco.org/files/130864d3b/FMFC+District+Map.pdf>



BACKGROUND

Until June 5, 1956, the responsibility for stormwater management and related functions was vested individually in the Cities of Fresno and Clovis and the County of Fresno. Fresno Metropolitan Flood Control District (District) is a “special act” district, created by the electorate to provide fully coordinated and comprehensive stormwater management and related services on a regional basis through a quasi-joint powers relationship among the Cities of Fresno and Clovis and the County of Fresno.

The District is located in the fertile San Joaquin Valley in the central part of California, about halfway between San Francisco and Los Angeles. The terrain in the Fresno area is relatively flat, with a sharp rise to the foothills of the Sierra Nevada Mountains about 15 miles eastward.

The climate in the Fresno area is sunny and dry in the summer and cool and wet in the winter months. Midsummer temperatures can occasionally top 100°F, but low humidity and gentle breezes helps to ease high temperatures from feeling hotter. The mean July temperature is 83.5°F (mean high about 98°F). Although temperatures drop below 32°F at times, the mean low temperature in the winter is about 40°F degrees. Precipitation usually begins in October and ends in April, averaging 10 to 11 inches.

The District is authorized to control stormwater within an urban and rural foothill watershed of approximately 400 square miles known as the Fresno County Stream Group. The watershed extends eastward into the Sierra Nevada to an elevation of approximately 4,500 feet above sea level. The District service area includes most of the Fresno-Clovis metropolitan area (excluding the community of Easton) and unincorporated lands to the east and northeast. **Figure 2. Fresno Metropolitan Flood Control District’s Master Plan Map** displays the District’s Master Plan Map.

[illegible]

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May 2024



HISTORY

Before 1956, stormwater management generally consisted of independent, site-specific actions intended only to alleviate individual problem locations, failing to create comprehensive solutions. In response to the rapidly increasing number of stormwater management problems and the inability of the three independent jurisdictions to provide an effective, coordinated solution, a citizens' committee formed to explore alternatives.

The result of the citizens' efforts was draft legislation creating a "special act" district designed to mandate a quasi-joint powers relationship among the Cities and County, which would provide the desired stormwater management service. The act is known as the Fresno Metropolitan Flood Control District Act of 1955 and was signed into law on May 13, 1955. The District Act became law on September 17, 1955, subject to voter approval. On June 5, 1956, the District Act was ratified by a five-to-one majority vote (32,030 voting in favor, 5,974 voting in opposition) and was established as Chapter 73 of the California Water Code appendix.

The mission of the District is to provide the approximately 700,000 citizens living within its boundaries the ability to control and manage the water resources of the area; to prevent damage, injury, and inconvenience; to conserve such waters for local, domestic, and agricultural use; and to maximize the public use and benefit of the District's programs and infrastructure.

The District works to address stormwater and related water resource problems and needs, while seeking to prevent the creation of new problems. The District strives to achieve these goals within the reasonable time and economic parameters established through collective community discussion and decision making as entrusted to the District's seven-member Board of Directors. As a service agency, it is the District's responsibility to respond to the community's needs for technical information, resource conservation, and facility construction, operation, and maintenance.



HAZARD IDENTIFICATION AND SUMMARY

The District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the District (see **Table 2. Fresno County Metropolitan Flood Control District Hazard Summaries**). **Table 1. Risk Methodology** shows methodology to how the hazards were ranked.

Table 1. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 2. Fresno County Metropolitan Flood Control District Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Possible	Limited	Small	12 to 24 hours*	Less than 24 hours*	Low*
Avalanche	Unlikely	Minor	Small	N/A	N/A	N/A
Dam Failure	Unlikely	Critical	Extensive	Less than 6 hours	Less than 24 hours	High
Drought	Possible	Critical	Large	More than 24 hours	More than 1 week	Medium*
Earthquake	Possible	Limited	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Possible	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Likely	Critical	Large	Less than 6 hours	Less than 1 week	Medium*
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	Low*
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Fog	Highly Likely	Negligible	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Minor	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Small	Less than 6 hours	Less than 6 hours	Low
Winter Storm	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Soil Hazards						
Erosion	Likely	Minor	Moderate	N/A	N/A	Low
Expansive Soils	Likely	Minor	Moderate	N/A	N/A	Low
Land Subsidence	Possible	N/A	Limited	N/A	N/A	Low
Landslide	Possible	Limited	Small	12 to 24 hours*	Less than 6 hours*	Low
Volcano	Unlikely	Limited	Large	Less than 6 hours*	More than 1 week*	Low*
Wildfire	Possible	Limited	Small	12 to 24 hours*	More than 1 week*	Low*

*Rated on an average basis. For example, warning time for agricultural hazards by vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: N/A was identified for the “Overall Risk” when hazards were not applicable to the District. N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/District.



VULNERABILITY ASSESSMENT

The intent of this section is to assess District's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See **Table 2. Fresno County Metropolitan Flood Control District Hazard Summaries**). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the District's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table 2 reflect the hazards that could potentially affect the District. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

ASSETS AT RISK

This section considers the District's assets at risk, specifically critical facilities and infrastructure, natural resources, and growth and development trends.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. **Table 3. Specific Critical Facilities and Other Community Assets Identified by the Fresno Metropolitan Flood Control District's Planning Team** lists particular critical facilities and other community assets identified by the District's planning team as important to protect in the event of a disaster. The District's physical assets consist of the flood control and local drainage structures and real property, the operations center, and equipment.



Table 3. Specific Critical Facilities and Other Community Assets Identified by the Fresno Metropolitan Flood Control District's Planning Team

Name of Asset	Replacement Value (\$)	Occupancy/Capacity #	Comments
Redbank Fancher Creek Flood Control Project	\$125,000,000	N/A	Provides protection from 200 year, 30 day rainfall event
Local stormwater drainage system (153 basins in various stages of completion, 84 pump stations, 670 miles of pipeline)	\$320,000,000	N/A	2 year pipeline collection system and 6-inch, 10 day basin capacity
Fresno Metropolitan Flood Control District Operations Center	\$12,000,000	84 employees	

Source : Fresno County



The Fresno Metropolitan Flood Control District has undertaken several mitigation actions to reduce vulnerability within the District. Fancher Creek Detention Basin (FCB) is an important component of the District's Flood Control Master Plan. Not only does FCB provide flood control on a large channel, it also removed several floodplains from a flood insurance requirement for many Fresno residents. The major structures in FCB were constructed in 2006. However, the need for additional excavation of the basin and future improvements remains.

The District recently acquired a Proposition 1 Grant that will fund the construction of a pipeline from the Gould Canal to FCB as well as a large capacity pump station in FCB. The pipeline will allow uncontrolled flows from Mud Creek and the Vernon Drain to be diverted from the Gould Canal to FCB. The pump station will provide rapid dewatering of FCB. These projects are scheduled to be constructed in 2018-2019.

NATURAL RESOURCES

Several state or federally listed species may be found within the District boundary. These are identified, along with other species of concern found in the District, in **Table 4. Species of Concern in the Fresno Metropolitan Flood Control District.**

Table 4. Species of Concern in the Fresno Metropolitan Flood Control District

Common Name	Scientific Name	Federal Status	State Status
American Badger	<i>Taxidea taxus</i>		
American (=pine) marten	<i>Martes Americana</i>		
Bald eagle	<i>Haliaeetus leucocephalus</i>		Endangered
Beaked clarkia	<i>Clarkia rostrata</i>		
Black-crowned heron	<i>Nycticorax nycticorax</i>		
Boggs Lake hedge-hyssop	<i>Gratiola heterosepala</i>		Endangered
Burrowing owl	<i>Athene cunicularia</i>		
California horned lark	<i>Eremophila alpestris actia</i>		
California linderiella	<i>Linderiella occidentalis</i>		
California tiger salamander	<i>Ambystoma californiense</i>	Threatened	Threatened
Colusa grass	<i>Neostapfia colusana</i>	Threatened	Endangered
Dry Creek cliff strider bug	<i>Orabilia pege</i>		
Elongate copper-moss	<i>Mielichhoferia elongate</i>		
Foothill yellow- legged frog	<i>Rana boylei</i>		Candidate -threatened
Fresno kangaroo rat	<i>Dipodomys nitratoide exilis</i>	Endangered	Endangered
Golden eagle	<i>Aquila chrysaetos</i>		
Great gray owl	<i>Strix nebulosa</i>		Endangered
Greene's tuctoria	<i>Tuctoria greenei</i>	Endangered	Rare
Hairy orcutt grass	<i>Orcuttia pilosa</i>	Endangered	Endangered
Hardhead	<i>Mylopharodon conocephalus</i>		



Hartweg's golden sunburst	<i>Pseudobahia behiifolia</i>	Endangered	Endangered
Hoary bat	<i>Lasiurus cinereus</i>		
Hoover's calycaderia	<i>Calycadenia hoover</i>		
Keck's checkerbloom	<i>Sidalcea keckii</i>	Endangered	
Kings River buckwheat	<i>Eriogonum nudum</i> var. <i>regirivum</i>		
Madera linanthus	<i>Linanthus serrulatus</i>		
Mariposa cryptantha	<i>Crypantha mariposae</i>		
Mariposa pussypaws	<i>Calyptidium pulchellum</i>	Threatened	
Midvalley fairy shrimp	<i>Branchinecta mesoallensis</i>		
Molestan blister beetle	<i>Lytta molesta</i>		
Orange lupine	<i>Lupinus citrinus</i> var. <i>citrinus</i>		
Osprey	<i>Pandion haliaetus</i>		
Oval-leaved viburnum	<i>Viburnum ellipticum</i>		
Pallid bat	<i>Antrozous pallidus</i>		
Prairie falcon	<i>Falco mexicanus</i>		
San Joaquin adobe sunburst	<i>Pseudobahia peirsonii</i>	Threatened	Endangered
San Joaquin kit fox	<i>Vulpes macrotis mutica</i>	Endangered	Threatened
San Joaquin pocket mouse	<i>Perognathus inornatus inornatus</i>		
San Joaquin Valley orcutt grass	<i>Orcuttia enaequalis</i>	Threatened	Endangered
Sanford's arrowhead	<i>Sagittaria sandordii</i>		
Sierra Nevada red fox	<i>Vulpes vulpes necator</i>	Candidate	Threatened
Spiny-sepaed button-celery	<i>Eryugium spinosepalum</i>		
Spotted bat	<i>Euderma maculatum</i>		
Succulent owl's-clover	<i>Castilleja campestris</i> ssp <i>Succulenta</i>	Threatened	Endangered
Swainson's Hawk	<i>Buteo swainson</i>		Threatened
Tree-anemone	<i>Carpenteria californica</i>		Threatened
Tricolored blackbird	<i>Agelaius tricolor</i>		Candidate-Endangered
Valley elderberry longhorned beetle	<i>Desmocerus californicus dimorphus</i>	Threatened	
Vernal pool fairy shrimp	<i>Branchinecta lynchi</i>	Threatened	
Vernal pool tadpole shrimp	<i>Lepidurus packardii</i>	Endangered	
Western mastiff bat	<i>Eumops perotis californicus</i>		
Western pond turtle	<i>Emys</i> (=Clemmys) <i>marmorata</i>		
Western spadefoot	<i>Spea</i> (=Scaphiopus) <i>hammondii</i>		
Western yellow-billed cuckoo	<i>Coccyzus americanus occidentalis</i>	Threatened	Endangered
White-tailed Kite	<i>Elanus leucurus</i>		



Willow flycatcher	<i>Empidonax traillii</i>		Endangered
Yosemite leisia	<i>Lewisia disepala</i>		

Source: Fresno Metropolitan Flood Control District Services Plan, 2004

Sensitive habitats in the District include the following:

- Central Valley drainage hardhead/squawfish stream
- Great Valley mixed riparian forest
- Northern basalt flow vernal pool
- Northern claypan vernal pool
- Northern hardpan vernal pool
- Sycamore alluvial woodland

GROWTH AND DEVELOPMENT TRENDS

The Fresno Metropolitan Flood Control District completes technical studies and updates its master plan in conjunction with the growth patterns within its 400-square-mile service area. The District meets with the local Building Industry Association and planning departments to ensure knowledge of growth and development trends.

Development requires the urban storm drain system to be expanded. As the urban sphere expands, the District's storm drainage master plan expands as well. The District utilizes canals that are operated and maintained by the Fresno Irrigation District (FID) to pump stormwater when urban basins require additional stormwater management capacity. These canals have a fixed capacity. An expanded urban area also increases the total amount of runoff generated within the District boundaries; this runoff may also need to be managed by pumping to the FID system.

ESTIMATING POTENTIAL LOSSES

This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Specific losses for the Cities of Fresno and Clovis and the portion of the County of Fresno within the District's boundaries are discussed elsewhere in this hazard mitigation plan.

Hazardous Materials Incidents are considered Medium priority hazards by the District but are addressed by the City of Fresno and the City of Clovis. See Chapter 4 Risk Assessment, Annex B, and Annex C for details on vulnerability to this hazard.

DAM FAILURE (HIGH)

The Fresno Metropolitan Flood Control District has three earthen dams (**Big Dry Creek, Fancher Creek, and Redbank Creek**) that are identified in the Fresno County Operational Area Dam Failure Evacuation Plan. The dams are maintained regularly for rodent and vegetation control and inspected



regularly for operational integrity and security. They are also inspected annually by the U.S. Army Corp of Engineers and the California Department of Water Resources Division of Safety of Dams.

DROUGHT (MEDIUM)

The Fresno Metropolitan Flood Control District has nearly 420 acres of irrigated and landscaped basins that could be impacted in a prolonged drought, such as the drought period that extended from 2020 to 2023.

EARTHQUAKE (MEDIUM)

The seismic hazard within the Fresno Metropolitan Flood Control District's service area is relatively low compared to many other parts of California. However, the area is considered to have a moderate risk of earthquake damage due to the presence of major fault systems to the west, south, and east and due to the large population and number of buildings, critical facilities, and infrastructure and other development that could be vulnerable to more severe ground shaking.

FLOOD/LEVEE FAILURE (MEDIUM)

The Fresno Metropolitan Flood Control District's operation center is located outside of the 100- year floodplain and therefore should not be susceptible to damage in a large flood event. The Redbank-Fancher Creeks Flood Control Project and local stormwater drainage system could sustain damage during a large flood event due to debris accumulation and high stormwater flows.

Since it is a special district, participation in the National Flood Insurance Program (NFIP) does not apply to the Fresno Metropolitan Flood Control District, thus NFIP Repetitive Loss and Severe Repetitive Loss properties are not tracked for the jurisdiction; therefore, the District does not have this data available. Refer to those annexes for additional information. There is one Repetitive Loss property in the unincorporated County. There is one Severe Repetitive Loss properties in the County as detailed in Chapter 4 of the base plan.

SEVERE WEATHER: HEAVY RAIN/THUNDERSTORM/HAIL/LIGHTNING (MEDIUM)

Heavy rain, thunderstorm activity, and hail are usually of such duration that they have no adverse impact on the District's Redbank-Fancher Creeks Flood Control Project. However, the local stormwater drainage system, which is designed to accept the peak flow rate of runoff from a two- year intensity storm event (a storm which has a 50 percent probability of occurring in any given year) could be impacted. When storm events occur that exceed the two-year intensity, ponding occurs in the streets until the pipeline system can remove the water. If the storm is sufficiently intense to generate more water than the street can store, the water will continue to rise until it reaches a topographic outlet where it can escape down gradient. This escape route is a feature of the major storm routing system. There are multiple areas within the District's service area that were developed before the District was formed and therefore lack the major storm routing system. These areas could be susceptible to damage from heavy rain, thunderstorms, and hail.

Populations most at-risk to severe weather events include but not limited to children, individuals with access and functional needs, outdoor workers, and people with disabilities. Populations living in mobile



homes are additionally most at-risk, especially during high wind events during a severe weather event as they are not as structurally sturdy.



CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into four sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, and mitigation outreach and partnerships.

To develop this capability assessment, the District's planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the District's planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The Fresno Metropolitan Flood Control District's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 5. Fresno County Metropolitan Flood Control District Mitigation Capability Summary**.

Table 5. Fresno County Metropolitan Flood Control District Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Fiscal Capability	X		
Available Staff		X	
Political Support/Interest	X		
Community Support	X		

REGULATORY MITIGATION CAPABILITIES

Figure 6. Fresno Metropolitan Flood Control District's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.



Table 6. Fresno Metropolitan Flood Control District's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X				X	
Community Emergency Response Team (CERT)	X				X	
Community Rating System (CRS Program of the NFIP)	X				X	
Emergency Management Accreditation Program (EMAP)		X			X	
Fire Code	X				X	
Firewise Community		X			X	
Floodplain Management/Flood Damage Prevention Ordinance	X		2005		X	
Land Use/Development Planning	X				X	
National Flood Insurance Program (NFIP)	X				X	
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X			X	
Storm Ready		X			X	
Stormwater Management Plan/Ordinance	X				X	
Subdivision Regulations/Ordinance		X			X	
Two Weeks Ready		X			X	
Unified Development Ordinance		X			X	
Zoning Ordinance	X				X	

PLANNING MITIGATION CAPABILITIES

Table 7. Fresno County Metropolitan Flood Control District Planning Capabilities identifies the plans related to mitigation and loss prevention in the District.

Table 7. Fresno County Metropolitan Flood Control District Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	Yes		Yearly, 5 year plan
Climate Resiliency or Adaptation Plan	No	No	
Community Wildfire Protection Plan (CWPP)	No	No	



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Comprehensive Emergency Management Plan	No	Yes	July 2024 completion
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No	No	
Continuity of Operations Plan (COOP)	No	Yes	July 2024 completion
Disaster Recovery Plan	No	No	
Economic Development Plan	No	No	
Emergency Operations Plan (EOP)	Yes	Yes	Dam failure element coming 2024, expected to be completed 2024
Evacuation Plan	No	No	
Flood Response Plan	No	Yes	July 2024 completion
Floodplain Management Plan/Flood Mitigation Plan	Yes	No	Floodplain policy, updated 2005
Hazard Mitigation Plan	No	No	
Historic Preservation Plan	No	No	
Natural Resources Protection Plan (NRPP)	No	No	
Open Space Management Plan (Parks and Rec/Greenway Plan)	No	No	
Threat Hazard Identification and Risk Assessment	No	No	

DISTRICT SERVICES PLAN, 2016

The District Services Plan presents District goals, program objectives, current program descriptions, and implementation strategies. Comprehensive program descriptions provide reference and orientation information for District staff, Board members, and the public. The mission of the District is to provide to the citizens living within its boundaries the ability to control and manage the flood, storm, and surface and ground water resources of the area, so as to prevent damage, injury, and inconvenience; to conserve such waters for local, domestic and agricultural use; and to maximize the public use and benefit of the District's programs and infrastructure.

FRESNO COUNTY FLOOD CONTROL DISTRICT STRATEGIC PLAN

The Fresno County Flood Control District Strategic Plan is a brief document that includes the District's mission and vision statements and other guiding principles. The following goals are outlined in the plan:

- Timely provision of needed services through fair and equitable financing
- Prevention of future drainage/flooding problems
- Operations and maintenance programs that ensure public safety and community aesthetics



- Conservation of storm and other surface water to preserve groundwater and environmental resources
- Augmentation of public open space and recreation resources through joint use of District facilities
- Support of economic development within the Fresno/Clovis area
- Achievement of program goals through close coordination with the County and the Cities of Fresno and Clovis

FRESNO AREA REGIONAL GROUNDWATER MANAGEMENT PLAN

The mission of the District is to provide to the citizens living within its boundaries the ability to control and manage the flood, storm, and surface and ground water resources of the area, so as to prevent damage, injury, and inconvenience; to conserve such waters for local, domestic and agricultural use; and to maximize the public use and benefit of the District's programs and infrastructure. The purpose of this Plan is to implement effective groundwater management that works toward maintaining a high quality and dependable water resource for the water users and landowners within the Plan Area, while minimizing negative impacts to other affected parties. The Plan documents the existing groundwater management efforts in the Plan Area that have been successful. The Plan also develops a coordinated and comprehensive approach to the future evaluation and management of groundwater resources within the Plan Area, in concert with other groundwater management activities within the groundwater basin.

DISTRICT PROGRAMS

FLOOD CONTROL PROGRAM

The flood control program relates to the control, containment, and safe disposal of stormwater that flows onto the valley floor from the eastern streams. It consists of a system of facilities and operations that is currently composed of eight major flood control facilities and many related streams and channels. The District is the local sponsor of the U.S. Army Corps of Engineers' Redbank-Fancher Creeks Flood Control Project, which consists of five of the flood control system's major facilities. The District is responsible for construction cost sharing, land acquisition, operation, and maintenance related to the project. It is also responsible for construction, operation, and maintenance of additional, nonfederal flood control facilities required to control the stream group, and for floodplain management. The eight major structural elements of the flood control system are Big Dry Creek Dam and Reservoir, Fancher Creek Dam and Reservoir, Redbank Creek Dam and Reservoir, Pup Creek Detention Basin, Alluvial Drain Detention Basin, Redbank Creek Detention Basin, Fancher Creek Detention Basin, and Big Dry Creek Detention Basin.

RURAL STREAMS PROGRAM

The District has implemented a rural streams program to preserve, restore, and maintain rural stream channels and to complete any additional facilities necessary to safely convey storm flows through the rural area and the downstream urban area. It includes activities to secure and maintain drainage amenities necessary for rural lands within the watershed.



LOCAL STORMWATER DRAINAGE PROGRAM

The District's local drainage program relates to the collection and safe disposal of stormwater runoff generated within the urban and rural watersheds or "drainage areas." The District's local stormwater drainage system consists of storm drains, detention and retention basins, and pump stations. The system is designed to retain and infiltrate as much stormwater and urban runoff as possible.

OTHER PROGRAMS

Other District programs include a stormwater quality program, water conservation program, recreation program, and wildlife management program.

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 8. Fresno Metropolitan Flood Control District's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in the District.

Table 8. Fresno Metropolitan Flood Control District's Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		Department	
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Department	Limited to storm drain system only
Fiscal Management or Procurement Specialists		X		
Floodplain Manager		X		
Land Surveyors		X		
Land Use/Management/Development Planning	X		Department	
Planners or engineers with an understanding of natural and/or human-caused hazards	X		Department	
Resource Development Staff or Grant-writing		X		
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)	X		Single Staff	
Staff with education or expertise to assess the		X		



community's vulnerability to hazards				
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In addition to the above capabilities, the Fresno Metropolitan Flood Control District also has several programs and projects designed to reduce vulnerability. The District runs ongoing public outreach via a clean stormwater education program. The District also has several structural flood control projects ongoing, including significant completion of Fancher Creek Detention Basin (FCB), construction of flood control facilities at Pup Creek-Enterprise Basin (PEB), construction of the Big Dry Creek Detention Basin Pump Station (BDB), construction of the Dry Creek Extension Basin Pump Station (DCE), and ongoing excavation of FCB, BDB, PEB, and DCE. The District is also planning for upcoming construction of pump stations at urban stormwater basins in various locations.

BOARD OF DIRECTORS

A seven-member Board of Directors governs the District. The Fresno City Council appoints four members, the Fresno County Board of Supervisors appoints two members, and the Clovis City Council appoints one member. Each director serves a four-year term and may be reappointed for consecutive terms. The Board must approve the District budget, fees, and assessments; direct matters of policy and enact ordinances; and perform other responsibilities authorized and required by the Fresno Metropolitan Flood Control District Act of 1955.

FISCAL MITIGATION CAPABILITIES

Table 9. Fresno Metropolitan Flood Control District's Fiscal Mitigation Capabilities identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table 9. Fresno Metropolitan Flood Control District's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming			X	
Community Development Block Grants (CDBG)	X			
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fee	X			
Water/Sewer Fees	X			
Stormwater Utility Fees			X	
Development Impact Fees			X	



Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
General Obligation, revenue, and/or Special Tax Bonds		X		
Partnering Agreements or Intergovernmental Agreements	X			
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)		X		
Homeland Security Grants (HSGP)	X			
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants		X		
Infrastructure Investment and Jobs Act (IIJA)	X			

The financing program of the District includes five major categories of revenues. These include general property tax, assessments, bonds, fees and service charges, and grants and contributions. In addition to these, the District receives minor miscellaneous revenues such as rents and leases, interest, and gifts. The general authority to receive or collect such revenues is set forth in the District's enabling legislation, other state legislation under which the District is an eligible participant, and through joint powers relationships in which the District participates.

ECONOMIC DEVELOPMENT RESERVE

In October of 1999, the Board of Directors established an annual economic development reserve for the purpose of accelerating funding of storm drainage infrastructure to support job-creating developments in the community. This policy allows up to 50 percent of the District's annual budget reserve to be allocated as an economic development reserve.

These funds may be used at the direction of the Board to support construction of master plan storm drainage facilities to service high priority economic development projects. Projects are considered on a first come, first served basis, and each project must:

- Create additional leverage toward construction of master plan facilities by drawing additional public or private monies,
- Effect construction of critical elements of the drainage system, and



- Serve an economically targeted industry or area.

MITIGATION OUTREACH AND PARTNERSHIPS

As part of the rural streams program, the District has developed and distributed public information materials to increase public awareness and understanding of various issues related to clean stormwater, including stream and habitat values, flood water conveyance, water quality, and the adverse effects of human activities.

The District partners with the Fresno Irrigation District and the Cities of Fresno and Clovis, which provide for dry season delivery of imported surface water into many of the District's local stormwater drainage retention basins.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the Fresno Metropolitan Flood Control District has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the communities the District serves. Some of the opportunities for enhancement of the District's existing mitigation program are listed below.

- Enhance existing public outreach strategy. As mentioned above the District has an outreach strategy that includes disseminating information to the public through their clean stormwater education program. The District may work to enhance their public outreach strategy to include information on flood/levee failure and dam failure and through existing partnerships with the County, City of Fresno, and City of Clovis.
- Future improvements may include participation in training for staff related to hazard mitigation grant funding in partnership with the County and Cal OES.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The Fresno Metropolitan Flood Control District adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of plans, programs and policies for the jurisdictions within the District. Hazard information will be incorporated in future updates to the District's Service Plan and Strategic Plan. The information within this LHMP as well as the annexes of the jurisdictions the District serves, will help the District to better understand the vulnerabilities of each jurisdictions and better tailor projects within the District's existing programs.

FMFCD is continually seeking solutions to flood control issues that arise. FMFCD continues to study the flood hazard concerns listed in the previous 2018 plan and has actively sought to incorporate solutions into FMFCD's storm drainage master plan. FMFCD has also been intentional in allocating funds to projects that alleviate these flood hazards in FMFCD's Five Year Financial Budget for Capital Projects.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from the Fresno Metropolitan Flood Control District will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

COMPLETED 2009 MITIGATION ACTIONS

The District has not completed any mitigation actions identified in the 2009 plan. However, implementation has been started for several of these actions and will be continued as part of the mitigation strategy for this plan update.

There are two actions from the 2009 plan that the District is not carrying forward, because they have been replaced with new projects detailed in actions 1 and 2, below. The deleted actions are:

- Construct Control Structures and Flood Channel for Mud Creek Flows between Gould and Fresno Canals
- Construct Improvements to the Vernon Drain between the Gould and Fresno Canals

COMPLETED 2018 MITIGATION ACTIONS

1. CONSTRUCT THE GOULD CANAL TO FANCHER CREEK DETENTION BASIN PIPELINE

Hazard(s) Addressed: Flood

Issue/Background: The Gould Canal is an FID facility that conveys rural stormwater and irrigation water through the Fresno/Clovis area. There are multiple uncontrolled rural streams that discharge into



the Gould Canal upstream of this project component's location. Along with the uncontrolled rural stream discharges, FMFCD has multiple urban basins, located downstream of Fancher Creek Detention Basin, that rely on discharging to the Gould Canal to prevent localized flooding. During major storm events, the uncontrolled flows in the Gould Canal can limit the ability to pump urban basins to the Gould Canal. FMFCD and FID monitor the Gould Canal closely to ensure the canal does not overtop. At times, the inability to discharge stormwater out of the urban basins creates a localized flooding issue. The stormwater that is conveyed in the canal, whether it is from the rural streams or urban basins, is routed out of the local region. The Gould Canal to Fancher Creek Detention Basin Pipeline will construct the facilities necessary to establish a connection between the Gould Canal and Fancher Creek Detention Basin, including roughly 2,900 lineal feet of 72" pipeline. The connection will allow FMFCD to divert the uncontrolled rural stream flows out of the Gould Canal and into Fancher Creek Detention Basin. These proposed improvements will reduce the risk of flooding along the canal downstream and will maintain capacity within the canal for urban basin discharges. This project component will also allow FMFCD to capture, retain and recharge stormwater in Fancher Creek Detention Basin that would typically be routed out of the local region.

Other Alternatives: No action

Responsible Office: Fresno Metropolitan Flood Control District

Priority (High, Medium, Low): High

Cost Estimate: \$1,562,000

Potential Funding: This project is being funded by a 2017 Proposition 1 Grant.

Benefits (Avoided Losses): The project would provide reduction of flooding that currently occurs in the rural and urban areas.

Schedule: Three years

Status: Removed

Comments: Project completed in 2020

2. CONSTRUCT THE FANCHER CREEK DETENTION BASIN PUMP STATION AND TELEMETRY SYSTEM

Hazard(s) Addressed: Flood

Issue/Background: Fancher Creek Detention Basin's primary use is for flood control. This site is also used for groundwater recharge. However, recharge operations are very conservative (i.e.

smaller volumes for a limited time span) as the basin's gravity relief system does not provide rapid dewatering of the basin. A necessity to better utilizing the basin for groundwater recharge is the ability to dewater the basin quickly, should a major storm event be forecasted. This project will include constructing a high discharge pump station and telemetry system, enabling expanded recharge operations. Once the pump station is constructed, FMFCD and FID will be able to divert and retain stormwater that would otherwise be routed out of the local region into the basin to retain for groundwater recharge purposes. Not only will local water conservation and water supply self-reliance be increased, but the ability to divert stormwater into this basin more frequently will decrease flood risk along the adjacent canals downstream.

Other Alternatives: No action



Responsible Office: Fresno Metropolitan Flood Control District

Priority (High, Medium, Low): High

Cost Estimate: \$1,094,000

Potential Funding: This project is being funded by a 2017 Proposition 1 Grant

Benefits (Avoided Losses): The project would provide reduction of flooding that currently occurs in the rural and urban areas.

Schedule: Three years

Status: Removed

Comments: project completed in 2023

MITIGATION ACTIONS

The planning team for the Fresno Metropolitan Flood Control District identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, potential funding, estimated cost, and timeline are also included.

In addition to implementing the mitigation actions listed below, the Fresno Metropolitan Flood Control District will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The District agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

1. PROVIDE FOR LOCAL STORMWATER DRAINAGE SYSTEM INFRASTRUCTURE

Hazard(s) Addressed: Flood, heavy rain/thunderstorm/hail/lightning

Issue/Background: Drainage service for new development is funded through development fees paid upon approval of the development. Ideally, drainage services are provided concurrent with construction of the development project. However, system construction may occasionally be delayed due to insufficient fee revenue to fund all facilities required by a development project. The provision of service can also be delayed by the lack of street improvements necessary to convey runoff from the development to the collection points. Unless the developer or the District can advance funds to cover the necessary facilities or street improvements, the developer must provide temporary on-site storage of the project's runoff until permanent service is available.

There are also areas within the District that were developed before the District was established in 1956. Some of these areas are still without permanent drainage service due to the lack of development fee revenue.

Other Alternatives: No action

Responsible Office: Fresno Metropolitan Flood Control District General Manager

Priority (High, Medium, Low): High

Cost Estimate: \$100,000-\$2,000,000 per project



Potential Funding: Pre-Paid Drainage Assessment Funds and Fresno Metropolitan Flood Control District General Fund

Benefits (Avoided Losses): Ensures roads are passable for emergency vehicles and prevents repetitive structural damage.

Schedule: Development is continuously occurring that requires new local storm drainage infrastructure. For some developments, the necessary downstream infrastructure may not exist and there's no timeline as to when it will be constructed. In these scenarios, the flood hazard is mitigated by requiring the development to construct temporary on-site drainage basins.

Status: In progress

2. RETAIN 200-YEAR FLOOD CONTROL PROTECTION*

Hazard(s) Addressed: Flood, Levee Failure

Issue/Background: There are currently 200-year flood control facilities (dams, detention basins, and bypass structures) east of the metropolitan area. As development occurs upstream of those facilities, the level of protection will diminish. The study and subsequent construction of additional flood control facilities (detention basins and bypass structures) upstream of new development will continue the 200-year protection level.

Other Alternatives: Compromise 200-year protection level

Responsible Office: Fresno Metropolitan Flood Control District General Manager

Priority (High, Medium, Low): Medium

Cost Estimate: \$50,000,000

Potential Funding: Fresno Metropolitan Flood Control District Assessment Tax Fund, HMGP, HMGP Post Fire

Benefits (Avoided Losses): Retain current 200-year flood protection level

Schedule: 5-10 years to mitigate increased runoff if and when a proposed and constructed development jeopardizes the District's ability to the 200-year flood protection.

Status: In progress

3. RETROFIT AREAS WITH SURFACE OUTLETS TO PROTECT EXISTING STRUCTURES

Hazard(s) Addressed: Flood, heavy rain/thunderstorm/hail/lightning

Issue/Background: The District was not formed until 1956, and portions of the community were not annexed to the District immediately. There are a number of areas that were developed in low lying areas that are prone to flooding when large storms occur. Current standards establish the finished floors of structures be elevated above the surface outlet of an area. This project would retrofit areas with surface outlets to protect existing structures.

Other Alternatives: Purchase repetitively flooded structures

Responsible Office: City of Fresno and Fresno Metropolitan Flood Control District General Manager



Priority (High, Medium, Low): Medium

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

Potential Funding: City of Fresno, Fresno Metropolitan Flood Control District General Fund, HMGP, HMGP Post Fire, BRIC

Benefits (Avoided Losses): Ensures roads are passable for emergency vehicles and prevents repetitive structural damage

Schedule: 5 years

Status: In progress

4. INSTALL BACK-UP GENERATORS FOR PUMP ONLY FACILITIES

Hazard(s) Addressed: Flood, drought, earthquake, levee failure, heavy rain/thunderstorm/hail/lightning

Issue/Background: The Fresno Metropolitan Flood Control District was not formed until 1956, and portions of the community relied on pump only stations for protection from floods. If there was a power outage in these areas during a storm event, the streets would become impassable and potential structure damage would occur.

Other Alternatives: Purchase repetitively flooded structures

Responsible Office: City of Fresno and Fresno Metropolitan Flood Control District General Manager

Priority (High, Medium, Low): Low

Cost Estimate: \$50,000-\$100,000 per site; there are four such sites (WW, VV, MM, and AB2)

Potential Funding: Fresno Metropolitan Flood Control District General Fund, HMGP, HMGP Post Fire

Benefits (Avoided Losses): Ensures roads are passable for emergency vehicles and prevents repetitive structural damage

Schedule: 5-10 years

Status: In initial stages; the generators have not been purchased

5. BIG DRY CREEK DIVERSION ADDITIONAL DROP STRUCTURE

Hazard(s) Addressed: Flood, heavy rain/thunderstorm/hail/lightning, levee failure

Issue/Background: Big Dry Creek Diversion routes flows out of the base of Big Dry Creek Reservoir, the District's largest flood control structure. The Diversion Channel helps de-water stormwater captured in Big Dry Creek Reservoir and is operated within the framework of the U.S. Army Corps Water Control Manual for the Redbank and Fancher Creek Project. The construction of an additional drop structure within the channel will decrease velocity in the Diversion Channel, reducing erosion and improving the safety of the Project.

Other Alternatives: None.

Responsible Office: Fresno Metropolitan Flood Control District General Manager

Priority (High, Medium, Low): Medium



Cost Estimate: \$700,000

Potential Funding: Fresno Metropolitan Flood Control District General Fund, USACE

Benefits (Avoided Losses): Reduces channel erosion, improves operational safety and reduces maintenance.

Schedule: 5-10 years

Status: In initial stages; the drop structure has not been designed or funded at this time. In the channel's current condition, there's no threat to flooding structures.

Annex N: Lower San Joaquin Levee District





PARTICIPATION

To update the Lower San Joaquin Levee District's jurisdictional annex, the District had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the District's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. To update the annex, the District engaged with one local stakeholder: Jacobs Engineering. The District did not conduct additional public outreach activities beyond that of the Hazard Mitigation Planning Committee.



DISTRICT PROFILE

BACKGROUND

The Lower San Joaquin Levee District (the District) was created by the state legislature in 1955. The purpose of the District is to operate and maintain levees, bypasses, channels, control structures, and other facilities in connection with the Lower San Joaquin River Flood Control Project and provide protection to the people and the property of the District. A brief history of the San Joaquin River helps clarify the District's purpose: The San Joaquin River and its tributaries have historically caused flood problems that have been a threat to life and property. Flooding problems have been lessened, but not eliminated, through activities of federal, state, and local governments and the sacrifices and efforts of affected landowners.

HISTORY

Completion and operation of the Friant Dam in 1947 reduced flow volumes but contributed to a major sedimentation problem in the river. Sedimentation has reduced the river's flow capacity and increased the potential for flooding and erosion problems as well as vegetation encroachment, which further accelerates channel constriction. Years of planning, engineering, and public hearings resulted in the approval of the Lower San Joaquin River Flood Control Project plan.

The project was designed and constructed by the California Department of Water Resources between 1959 and 1967. The project's purpose is to provide flood protection along the San Joaquin River and tributaries in Merced, Madera, and Fresno counties. The plan covers 108 river miles, contains 191.4 miles of levees, and protects over 300,000 acres. The project is a series of bypasses built to collect San Joaquin flood flows, as well as floodwater from the Kings River System. The bypasses divert flows around stretches of the San Joaquin where constrictions impair its capacity. The district, in accordance with its agreement with the State Reclamation Board, is obligated to maintain not only the bypasses, but the channel of the San Joaquin River within the project, in a condition where the channel will carry flood flows in accordance with the maximum benefits for flood protection.

The district boundaries were based on historical data as to areas subject to actual flooding and/or receiving benefit from the project related to the designed capacity of the bypass system. The boundaries were established along existing section lines, roads, canals, drains or other permanent lines that were reasonably close to the probable floodplain.

Until June 5, 1956, the responsibility for stormwater management and related functions was vested individually in the Cities of Fresno and Clovis and the County of Fresno. Fresno Metropolitan Flood Control District (District) is a "special act" district, created by the electorate to provide fully coordinated and comprehensive stormwater management and related services on a regional basis through a quasi-joint power's relationship among the Cities of Fresno and Clovis and the County of Fresno.

GEOGRAPHY AND CLIMATE

The district is located in the fertile San Joaquin Valley in the central part of California, about halfway between San Francisco and Los Angeles. The terrain in the Fresno area is relatively flat, with a sharp rise to the foothills of the Sierra Nevada Mountains about 15 miles eastward.



The climate in the Fresno area is sunny and dry in the summer and cool and wet in the winter months. Midsummer temperatures can occasionally top 100°F, but low humidity and gentle breezes help to make the high temperature more bearable. The mean July temperature is 82°F (mean high 99°F). Although temperatures drop below 32°F at times, the mean low temperature in the winter is 37°F degrees. Precipitation usually begins in October and ends in April, averaging 10.6 inches.

The District is authorized to control stormwater within an urban and rural foothill watershed of approximately 400 square miles known as the Fresno County Stream Group. The watershed extends eastward into the Sierra Nevada to an elevation of approximately 4,500 feet above sea level. The District service area includes most of the Fresno-Clovis metropolitan area (excluding the community of Easton) and unincorporated lands to the east and northeast. **Figure 1. Lower San Joaquin Levee District Boundaries** and **Figure 2. Fresno Metropolitan Flood Control District's Master Plan Map** displays the District's Master Plan Map.

Figure 1. Lower San Joaquin Levee District Boundaries

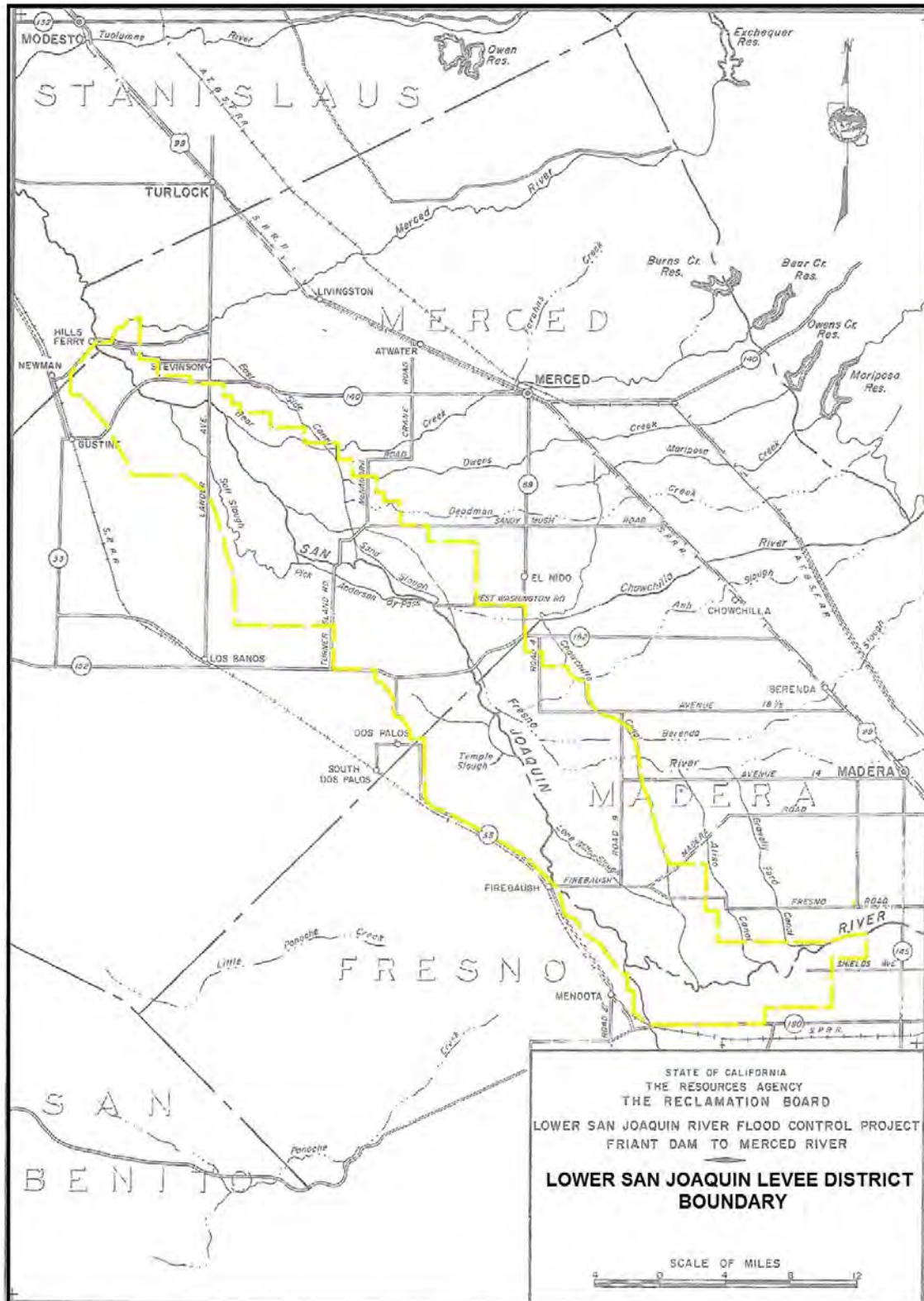
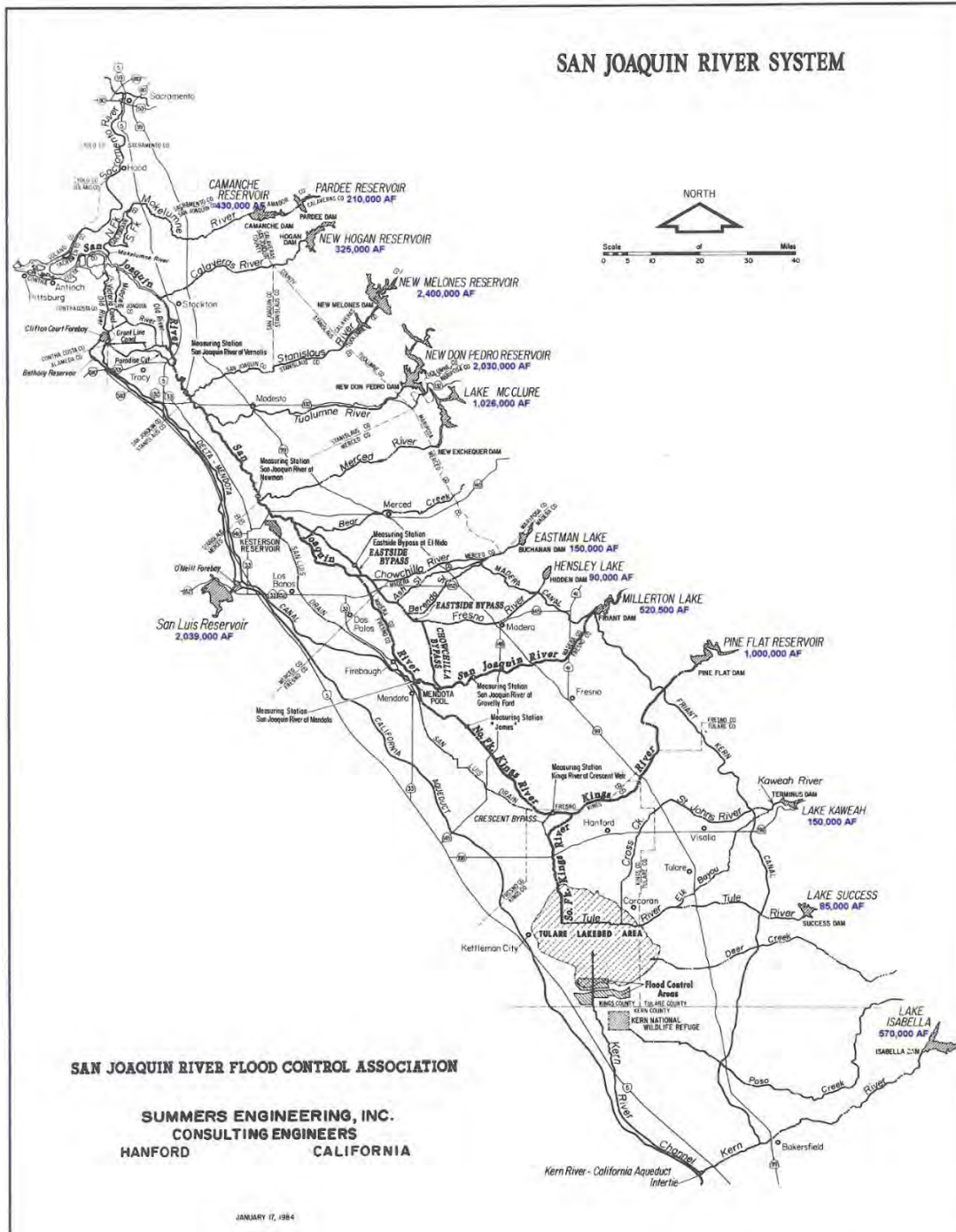




Figure 2. Fresno Metropolitan Flood Control District's Master Plan Map





HAZARD IDENTIFICATION AND SUMMARY

The District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the District (see **Table 2. Lower San Joaquin Levee District – Hazard Summary**). **Table 1. Risk Methodology** shows methodology to how the hazards were ranked.

Table 1. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 2. Lower San Joaquin Levee District – Hazard Summary

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	N/A	N/A	N/A	N/A	N/A	N/A
Avalanche	N/A	N/A	N/A	N/A	N/A	N/A
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours	High
Drought	Likely	Critical	Small	More than 24 hours	More than 1 week	High
Earthquake	Possible	Catastrophic	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Likely	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Likely	Limited	Large	Less than 6 hours	Less than 1 week	Low*
Human Health Hazards						
Epidemic/Pandemic	N/A	N/A	N/A	N/A	N/A	N/A
West Nile Virus	N/A	N/A	N/A	N/A	N/A	N/A
Severe Weather						
Extreme Cold/Freeze/Heat	N/A	N/A	N/A	N/A	N/A	Medium
Fog	Likely	Limited	Moderate	N/A	N/A	Medium
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Limited	Large	N/A	N/A	High
Tornado	Likely	Limited	Moderate	N/A	N/A	Medium
Winter Storm	Possible	Minor	Large	More than 24 hours	Less than 1 week	Medium
Soil Hazards						
Erosion	Likely	Limited	N/A	N/A	N/A	High
Expansive Soils	Possible	N/A	N/A	N/A	N/A	Low
Land Subsidence	Possible	N/A	Small	N/A	N/A	Medium
Landslide	Possible	Minor	Small	12 to 24 hours*	Less than 6 hours*	Low
Volcano	N/A	N/A	N/A	N/A	N/A	N/A
Wildfire	N/A	N/A	N/A	N/A	N/A	N/A

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.

Note: N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/jurisdiction.



VULNERABILITY ASSESSMENT

The intent of this section is to assess District's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the District's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries reflect the hazards that could potentially affect the District. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

ASSETS AT RISK

This section considers the District's assets at risk, which include real property; levees, structures, and appurtenances that make up the flood project; and other equipment and automobiles used in District operations (see **Table 3. Specific Critical Facilities and Other Community Assets Identified by the Lower San Joaquin Levee District's Planning Team**). It should be noted that the real property and flood project are owned entirely by the State of California. The District has ownership of a 3.5-acre parcel and various equipment and automobiles that are used for operation and maintenance of the flood project.

Table 3. Specific Critical Facilities and Other Community Assets Identified by the Lower San Joaquin Levee District's Planning Team

Name of Asset	Replacement Value (\$)	Hazard Specific Info
Property Flood Project	3,721,080	Flood, Erosion, Drought
Equipment	492,345	Flood
Automobiles	342,800	Flood

Source: Fresno County



ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County. **Table 3. Specific Critical Facilities and Other Community Assets Identified by the Lower San Joaquin Levee District's Planning Team** above shows the San Joaquin Levee District's critical facilities and assets that could be exposed to hazards. Specific losses for the District and the portion of the County of Fresno within the District's boundaries are discussed elsewhere in this hazard mitigation plan.

Note: severe weather: heavy rain/ thunderstorm/hail/lightning is considered a Medium priority hazard by the District but is not unique to the District in the context of the full planning area. See Chapter 4 Risk Assessment for details on vulnerability to this hazard.

DAM FAILURE (HIGH)

Dam failure is a significant hazard in the District, as it may result in increased strain on remaining flood control facilities, including the levee system.

DROUGHT (HIGH)

Drought conditions can also cause problems in the District, as dry, cracking soil can compromise the integrity of the levee system. The cracking of the levee material (clay soil) is regularly observed during dry times when no water is present in the channels. Water in the channels allows the clay in the levee soil material to absorb the water and close the cracking.

FLOOD/LEVEE FAILURE (HIGH)

Floods are clearly the hazard of greatest concern to the District. The California Department of Water Resources defines the flood season as November 15 to June 15. In the early part of the season, the San Joaquin Valley is in danger of flood from rain-flood runoff. In the latter part of the season, there is danger of flooding from snowmelt runoff. Heavy rains and thunderstorms occur annually and increase the risk of damaging floods occurring within District boundaries.

Every three to four years, on average, flood flows in the District (along San Joaquin, Kings, Fresno, Chowchilla rivers and numerous streams) exceed the design level of protection of the levees. These events result in infrastructure damage (e.g., to the levees themselves); property damage throughout the district in agricultural, rural, and urban areas; and crop damage. For more information about flooding in the District, see the District Profile.

While there is no history of past occurrences, a failure of one or more upstream dams could cause significant flooding and be catastrophic in nature to the District and surrounding areas.

Since it is a special district, participation in the National Flood Insurance Program (NFIP) does not apply to the Lower San Joaquin Levee District, thus NFIP Repetitive Loss and Severe Repetitive Loss properties are not tracked for in the jurisdiction; therefore, the District does not have this data available. There are two Repetitive Loss properties in the unincorporated County, but further details to determine if these are within the District's boundary are not available. There are no Severe Repetitive Loss properties in the County as detailed in Chapter 4 of the base plan.



Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.

SEVERE WEATHER: HEAVY RAIN/THUNDERSTORM/HAIL/LIGHTNING/WIND (HIGH)

The San Joaquin Valley is susceptible to heavy rains, thunderstorms, lightning and high winds. More information on how these weather events impact the San Joaquin Valley can be found in Chapter 4 of the base plan for Fresno County.

SOIL HAZARDS: EROSION (HIGH)

Related to flooding, erosion along the banks of the channels is also a concern of the District. Ongoing maintenance is required to mitigate the effects of erosion caused by high waters.



CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the District's planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the District's planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The San Joaquin Levee District's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 4. Lower San Joaquin District Mitigation Capability Summary**.

Table 4. Lower San Joaquin District Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability	X		
Administrative and Technical Capability	X		
Fiscal Capability	X		
Available Staff	X		
Political Support/Interest	X		
Community Support		X	

REGULATORY MITIGATION CAPABILITIES

Table 5. Lower San Joaquin Levee District Regulatory Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table 5. Lower San Joaquin Levee District Regulatory Capabilities

Regulatory Tool	Adopted/Updated Yes/No	Under Development Yes/No	Comments
Building Codes (please indicate UCC or IBC and Year)	No		
Community Emergency Response Team (CERT)	No		



Regulatory Tool	Adopted/Updated Yes/No	Under Development Yes/No	Comments
Community Rating System (CRS Program of the NFIP)	No		
Emergency Management Accreditation Program	No		
Fire Code	No		
Firewise Community	No		
Floodplain Management Flood Damage Prevention Ordinance	No		
Land Use/Development Planning	No		
National Flood Insurance Program (NFIP)	No		
Post Disaster Redevelopment/Reconstruction Plan/Ordinance	No		
Storm Ready	No		
Stormwater Management Plan/Ordinance	No		
Subdivision Regulations/Ordinance	No		
Two Weeks Ready	No		
Unified Development Ordinance	No		
Zoning Ordinance	No		

The District's primary capability is the Lower San Joaquin River Flood Control Project, which is described in more detail in the District Profile. The District's operations and maintenance rules are as follows:

- No encroachment or trespass, which will adversely affect the efficient operation or maintenance of the project works, shall be permitted upon the rights of way for the protective facilities.
- No improvement, excavation or construction shall be permitted within the limits of the project right of way, nor shall any change be made in any features of the works without prior determination by the State Reclamation Board that such improvement, excavation, construction, or alteration will not adversely affect the functioning of the protective facilities. Such improvements or alterations as may be found to be desirable and permissible under the above determination shall be constructed in accordance with standard engineering practice and to the design criteria of the project.
- The California Department of Water Resources (DWR) makes semiannual inspections of all features of the project and reports its findings to the District and the State Reclamation Board. The inspection objectives are to determine if proper maintenance items are being adhered to (i.e., that all brush, trees, and wild growth, other than sod, are removed from the levee crown and slopes; that all burrowing animals have been exterminated; that an active channel maintenance program is being carried out; that all bridges and control structures of the project are in good conditions and working order). Following the inspection findings a joint field inspection is made with the District and the DWR to review and discuss the report.



- The channel as defined for this project is that area lying along the waterway between the waterward toe of one levee and the waterward toe of the opposite levee. In cross sections this includes the drainage channel and banks, and the area from the top of the bank to the toe of the levee which is called the berm or floodway.
- The channels consist of natural drainage channels and bypass channels constructed as part of this project. These channels extend along and adjacent to the San Joaquin River from the Merced River to Mendota Dam, and from the junction of the Chowchilla Canal Bypass to Gravelly Ford. The river reach from Mendota Dam to the Chowchilla Canal Bypass is not part of the project facilities.
- Inspections by the District shall be made to be certain that the channel floodway is clear of debris, weeds, and wild growth; the capacity of the channel or floodway is not being reduced by the formation of shoals.
- The channels of the project shall be maintained and kept clear of regrowth of vegetation. This is necessary as regrowth of vegetation will change the flood flow characteristics of the project channels. The purpose of channel maintenance is to ensure that the channel is kept in as good a condition as when the project was constructed. A regular program of channel maintenance shall be instituted by the District. Tree and brush growth in the channel shall be cleared and removed along with any debris that may be present. A strip of brush and small trees may be retained, through application to the State Reclamation Board, on the floodplain within 10 feet of the levee on the waterward side where necessary to prevent erosion and wavewash. Suitable riprap material shall be placed to repair existing slope protection or in other locations found to be critical trouble points to stabilize the channel alignment and preserve the general uniformity of the bank lines.

Additionally, federal and state regulations require that all flood projects undergo an inspection of facilities every 90 days. Two of these inspections are done by the DWR (in the fall and spring), and two are done by the District (in the winter and summer). All inspections are done to specific standards developed by the U.S. Army Corps of Engineers and the DWR. Inspections result in ratings of either “compliant” or “noncompliant.” Records by DWR that show the District has maintained their flood facility to “compliant” standards. DWR publishes an annual report on such inspections.



PLANNING MITIGATION CAPABILITIES

Table 6. Lower San Joaquin Levee District Planning Capabilities identifies the plans related to mitigation and loss prevention in the District.

Table 6. Lower San Joaquin Levee District Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)			
Climate Resiliency or Adaptation Plan	Yes		
Community Wildfire Protection Plan (CWPP)	Yes		
Comprehensive Emergency Management Plan	No		
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No		
Continuity of Operations Plan (COOP)	No		
Disaster Recovery Plan	No		
Economic Development Plan	No		
Emergency Operations Plan (EOP)	Yes		1955 adopted/updated
Evacuation Plan	No		
Flood Response Plan	Yes		1955 adopted/updated
Floodplain Management Plan/Flood Mitigation Plan	No		
Hazard Mitigation Plan	Yes		
Historic Preservation Plan	No		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	No		
Threat Hazard Identification and Risk Assessment	No		

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 7. Lower San Joaquin Levee District's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in the District.



Table 7. Lower San Joaquin Levee District's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Emergency Manager	Yes	Shane Swartz	
Engineers or professional trained in construction practices related to building and/or infrastructure	Yes	District	
Fiscal Management or Procurement Specialists	No		
Floodplain Manager	No		
Land Surveyors	No		
Land Use/Management/Development Planning	No		
Planner or engineers with an understanding of natural and/or human caused hazards	No		
Resource Development Staff or Grant Writing	No		
Scientists familiar with the hazard of the community	No		
Staff experienced with Geographic Information Systems (GIS) or HAZUS	No		
Staff with education or expertise to assess to community's vulnerability to hazards	No		

The District is governed by a seven-member Board of Directors and appointments are by the Board of Supervisors of the appropriate counties. The District operates with an unpaid Board, minimal staff, no investment in real property, and only the absolute necessities in equipment. The philosophy of the District Board is to provide the best flood protection with minimal funds. District personnel are given flood-fight methods training, per the DWR/U.S. Army Corps of Engineers standards, every three years (length of time is determined by employee turnover).

FISCAL MITIGATION CAPABILITIES

Table 8. Lower San Joaquin Levee District's Fiscal Mitigation Capabilities identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table 8. Lower San Joaquin Levee District's Fiscal Mitigation Capabilities

Financial Resources	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming	X			
Community Development Block Grants (CDBG)	X			



Financial Resources	Never Used	Previously Used	Currently Used	Comments
Special Purpose Tax (or taxing districts)		X		
Gas/Electric Utility Fees	X			
Water/Sewer	X			
Stormwater Utility Fees	X			
Development Impact Fees	X			
General Obligation, Revenue, and/or Special Tax Bonds	X			
Partnering Agreements or Intergovernmental Agreements	X			
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)		X		
Homeland Security Grants (HSGP)	X			
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			

From 1963 to 1978, all lands within the District were assessed a tax for maintenance. This was through the assessor offices of the three counties. The tax was a flat rate based on assessed valuation, land only. After the voter approval of Proposition 13 in 1978, all tax assessments were eliminated. This resulted in substantial decreases in District income to funds amounting to half the District's average annual budget for routine maintenance. To continue financing the maintenance and operation costs of this service, a benefit assessment was implemented. The assessment is in proportion to the benefit received as it relates to each parcel's ability to be put into use and its size. (Use refers to the use of the land, e.g., swamp and overflow, pasture, row crops and permanent crops, residential, commercial, or industrial. Each land use is given a weighted factor for determining the assessment charged to that parcel.)

MITIGATION OUTREACH AND PARTNERSHIPS

Cooperation from local agencies (districts, counties), landowners, the DWR, and the U.S. Army Corps of Engineers is essential in the flood-fight activities needed to operate and maintain the flood facilities during an event. Needed manpower for patrolling and/or flood fighting is a cooperative effort from stakeholders (those who have a vested interest in maintaining levee stability for flood protection).

OTHER MITIGATION EFFORTS

Annual maintenance activity includes vegetation control (herbicide, handwork), rodent control, fence/gate repairs, erosion repairs, levee roadway graveling, levee slope repairs, channel repairs,



livestock grazing monitoring, and structure inspections (operation-electronic). During high water periods, the District patrols the levees.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the Lower San Joaquin District has existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the communities the District serves. Some of the possible opportunities for enhancement of the District's existing mitigation program are listed below.

- Develop an Evacuation Plan in case of dam or levee failure in partnership with the County and jurisdictions within the District.
- Develop and implement warning systems. To further enhance mitigation efforts the District may partner with the jurisdictions in the District to develop and implement warning systems for existing levees and dams that may impact these communities in an event of a failure.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The Lower San Joaquin Levee District adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The Lower San Joaquin Levee District did not identify any specific planning mechanisms into which information from the 2018 plan was incorporated. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of plans, programs and policies for the jurisdictions within the District. The hazard information will be used to inform the District's Lower San Joaquin River Flood Control Project including reviewing and if necessary, revising the project's operations and maintenance rules. The information contained with this annex as well as the hazard information within the jurisdictional annexes that are served by the District, will help the District to better understand the vulnerabilities of the communities they serve and help to mitigate those risks where possible.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from the Lower San Joaquin Levee District will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

COMPLETED 2009 MITIGATION ACTIONS

The Lower San Joaquin Levee District has not completed any of the mitigation action identified in the 2009 plan. However, implementation of these actions is underway and will continue as part of the mitigation strategy of this plan update.

COMPLETED 2018 MITIGATION ACTIONS

There are no completed actions since the last plan update in 2018.



MITIGATION ACTIONS

The planning team for the Lower San Joaquin Levee District identified and prioritized the following mitigation actions based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are included.

In addition to implementing the mitigation actions below the Lower San Joaquin Levee District will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The District agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

1. INSTITUTE A DREDGING MANAGEMENT PROGRAM FOR THE PURPOSE OF FLOOD DAMAGE REDUCTION

Hazard(s) Addressed: Flood

Issue/Background: At any given point, channel flood stage is determined, in part, by the size and shape of the cross-sectional area of the floodway channel. Impediments that can affect the floodway cross-sectional area create undesirable conditions. Typically, in the San Joaquin River, in-channel shoaling results when the channel flow is unable to transport the amount of material being carried by the current (capacity), or the size of the transported material exceeds the ability of the current to move it (competency). When either of these conditions exists, transported sediment is deposited by the river and accumulation begins to occur. This will eventually build-up to the point that it diminishes the channel depth and restricts the passage and/or reduces flow capacity of the river. This accumulation slows flow velocity, contributing to longer durations of exposure of levees to erosion and saturation, affecting levee foundation issues. These in-channel sediment deposits can also cause overbank flooding to occur more frequently.

Dredging to remove sediment deposits can reduce the frequency of overbank topping and shorten flow durations, which will minimize levee foundation integrity issues. It should be noted that while dredging can temporarily restore channel capacity, it does not change the pre-existing conditions that caused the sediment to be deposited in the first place. In fact, dredging re-creates those original conditions, resulting in continued sediment deposition at that location. This will continue to occur as long as an upstream sediment source exists (particularly erosion-prone banks and lands). Consequently, dredging must be repeated regularly to maintain the effectiveness of reducing flood stages.

Regulatory agencies with responsibilities to maintain ecosystem values in river environments can prevent and/or hinder program attempts to manage this sediment accumulation. The environmental effects of removing this sediment may require more mitigation for habitat losses than the District can provide. There are land and water rights that will need to be addressed before a viable program can be implemented, which will take time. These time constraints result in increased risk of loss of life and property in a future disaster.

A comprehensive approach to all the issues pertaining to river sediment accumulation that incorporates habitat and flood values needs to be developed, with a focus on protecting life and property. This can be accomplished through committed efforts of responsible agencies along with adequate funding. This would have to be an ongoing process as the river system will continue to deposit sediment.



Other Alternatives: Constructing a new setback levee would allow the river sediment processes to remain in the main channel. This would address channel capacity requirements by increasing the cross-sectional area of the channel for flood flows. The associated costs (land acquisitions, water rights, levee construction, levee removal, etc.) would be higher than a suitable dredging management program.

Responsible Office: Lower San Joaquin Levee District General Manager

Priority (High, Medium, Low): High

Cost Estimate: \$2.5 million/mile (106 miles of river)

Potential Funding: CA DWR grants

Benefits (Avoided Losses): Flood damage in Mendota and Firebaugh will be avoided. Damage to viable agricultural crops that will affect economies in surrounding communities and statewide markets will also be avoided.

Schedule: Annually, when river channel is seasonally dry (June-October), depending on river reach

Status: In progress/routine activity

2. INSTITUTE AN INVASIVE VEGETATION MANAGEMENT PROGRAM FOR THE PURPOSE OF FLOOD DAMAGE REDUCTION

Hazard(s) Addressed: Flood

Issue/Background: At any given point, channel flood stage is determined, in part, by the size and shape of the cross-sectional area of the floodway channel. Impediments that can affect the floodway cross-sectional area create undesirable conditions. Unmanaged invasive vegetation is an impediment within the San Joaquin River that can reduce the ability of the channel to pass the designed flood flows, thus reducing flow velocity and increasing the water stage elevation. Proper management of vegetative growth is essential in lessening flood damage.

The impact of vegetation on the flow carrying capacity of the San Joaquin River depends on the location, density, height, and vegetation type as well as the depth, velocity, and timing of the flood flows. Unmanaged vegetation within the river's main channel causes drag, or a resistance to flow. Dense vegetation located throughout the river channel is likely to cause significant resistance and increase flow stage, whereas a narrow band of trees and shrubs parallel to the channel may have little impact on the channel's ability to carry flood flows. However, even acceptable woody trees and shrubs that have rigid stems will attempt to resist flows and may become uprooted and add to the debris carried by the flood flows.

Vegetation along levees needs to be removed or otherwise managed as part of routine flood management system maintenance. This practice can prevent trees from becoming established that may harm the integrity of the levee and facilitates visual inspection of the levee. Managing vegetation requires knowledge of the river system relative to acceptable retention of certain vegetation. A vegetated buffer zone between the main channel and the levee can benefit the reliability of the flood management system by protecting the levee without significantly impacting stage or flow capacity.

Unfortunately, regulatory agencies with responsibilities to maintain ecosystem values in river environments can prevent and/or hinder program attempts to manage this vegetation. Unmanaged vegetation can become habitat for species listed under the endangered species acts. The



environmental effects of removing this vegetation may require more mitigation than the District can provide. The result is increased risk of loss of life and property in a future disaster.

A comprehensive approach to all the issues pertaining to habitat and flood values needs to be developed, with a focus on protecting life and property. This can be accomplished through committed efforts of responsible agencies along with adequate funding. This would have to be an ongoing process, as the river system will continue to develop vegetative growth.

Other Alternatives: Constructing a new setback levee would allow vegetation to remain in the main channel by increasing the cross-sectional area of the channel for flood flows. The associated costs (land acquisitions, water rights, levee construction, levee removal, etc.) would be higher than a suitable vegetative management program.

Responsible Office: Lower San Joaquin Levee District General Manager

Priority (High, Medium, Low): High

Cost Estimate: \$500,000–10 million

Benefits (Avoided Losses): Flood damage in Mendota and Firebaugh will be avoided. Damage to viable agricultural crops that will affect economies in surrounding communities and statewide markets will also be avoided. It would also create a balanced aquatic habitat ecosystem that can support environmental values along with flood management.

Potential Funding: CA DWR grants

Schedule: Annually, November to April (conditions permitting)

Status: Routine activity

Annex O: Kings River Conservation District





PARTICIPATION

To update the Kings River Conservation District's jurisdictional annex, the District had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the District's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The District did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee (documented in Appendix B) or conduct additional public outreach activities.



DISTRICT PROFILE

In 1951, the Kings River Conservation District (KRCD) was formed through special legislation by the State of California in order to manage and protect the resources of the San Joaquin Valley. Today, KRCD is a leading resource management agency for the Kings River region serving agriculture, business, and residential communities within 1.2 million acres spanning portions of Fresno, Kings, and Tulare counties.

The mission of KRCD is to provide flood protection, cooperate with other agencies to achieve a balanced and high-quality water supply, provide on-farm support in efficient water conservation practices, and develop power resources for the public good. Additionally, KRCD has partnered with the Kings River Water Association and the California Department of Fish and Wildlife to implement the Kings River Fisheries Management Program. The Kings River Fisheries Management Program is dedicated to improving and enhancing the lower Kings River watershed and fishery habitat through habitat enhancements, scientific studies, monitoring, and public outreach and education.

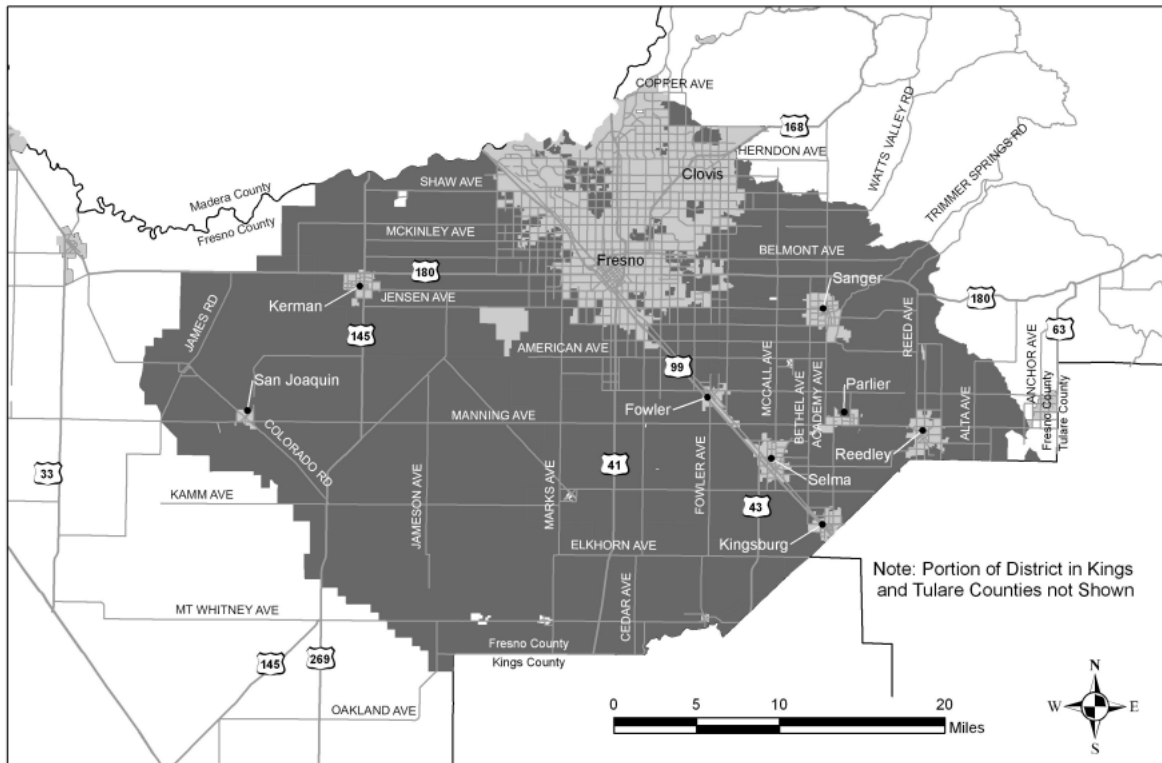
The KRCD consists of seven divisions, each represented by an elected director who together comprise the KRCD's governing body.

The KRCD's area and its seven divisions are shown in **Figure 1. Kings River Conservation District**. The District is a new jurisdiction that participated in the 2017-2018 Fresno County Multi-Hazard Mitigation Plan Update.

The Fresno County communities participating in this plan update that fall within the KRCD boundaries are the cities of Clovis, Fowler, Fresno, Kerman, Kingsburg, Reedley, San Joaquin, and Sanger.



Figure 1. Kings River Conservation District



Legend

- District Area and SOI
- City Areas

**Fresno Local Agency Formation Commission
Kings River Conservation District**

District Formed: 1951
SOI Adopted: 3/24/1976
SOI Updated: 8/22/2007

Map Date : September 2007
District Area: 1,311,163 Acres
Sphere Area: 1,311,163 Acres

Source: Fresno County Local Agency Formation Commission,
<https://www.fresnolafco.org/files/b2597d2ad/KRCD.pdf>



HAZARD IDENTIFICATION AND SUMMARY

The Kings River Conservation District's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the Fresno County area (see **Table 2. Kings River Conservation District Hazard Summaries**).

Table 1. Risk Methodology shows methodology to how the hazards were ranked.

Table 1. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 2. Kings River Conservation District Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Large	12 to 24 hours*	Less than 24 hours*	High
Avalanche	N/A	N/A	N/A	N/A	N/A	N/A
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours	High
Drought	Possible	Critical	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Critical	Large	Less than 6 hours	Less than 6 hours	Medium*
Flood/Levee Failure	Likely	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Likely	Critical	Moderate	Less than 6 hours	Less than 1 week	Medium*
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	Low*
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Possible	Critical	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Minor	Small	Less than 6 hours	Less than 6 hours	Low
Winter Storm	Highly Likely	Limited	Large	More than 24 hours	Less than 1 week	Medium
Soil Hazards						
Erosion	Likely	Critical	Moderate	N/A	N/A	High
Expansive Soils	Possible	Limited	Moderate	N/A	N/A	Medium*
Land Subsidence	Highly Likely	Limited	Large	N/A	N/A	High
Landslide	Possible	Limited	Small	N/A	N/A	Low
Volcano	Unlikely	Minor	Small	N/A	N/A	Low
Wildfire	Highly Likely	Critical	Extensive	12 to 24 hours*	More than 1 week*	Medium*

*Rated on an average basis. For example, warning time for agricultural hazards may vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.



Note: N/A was identified for the “Overall Risk” when hazards were not applicable to the District. N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/District.



VULNERABILITY ASSESSMENT

The intent of this section is to assess the District's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the District's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Figure 6 reflect the hazards that could potentially affect the District. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

Note: *Sediment Deposition should be considered as an additional hazard in the next plan update.*

ASSETS AT RISK

This section considers the District's assets at risk, which include critical facilities and infrastructure, natural resources, and potential future growth and development throughout the District's Boundary.

CRITICAL FACILITIES AND INFRASTRUCTURE

A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. **Table 3. Critical Facilities and Other Assets Identified by the District's Planning Team** lists particular critical facilities and other community assets identified by the District's planning team as important to protect in the event of a disaster.

Table 3. Critical Facilities and Other Assets Identified by the District's Planning Team

Name of Asset	Replacement Value (\$)	Hazard Specific Info
Jeff L. Taylor Pine Flat Power Plant	\$220,163,426	Dam Failure
Kings River Channel Improvement Levee	\$5,000,000	Flood, Dam Failure, Land Subsidence



Name of Asset	Replacement Value (\$)	Hazard Specific Info
Riverdale District Office	\$368,542	Flood, Erosion, Drought
Equipment	\$1,055,087	Flood, Earthquake
Automobiles	\$758,858	Flood, Earthquake

Source: Kings River Conservation District

NATURAL RESOURCES

In partnership with the Kings River Water Association (KRWA) and the California Department of Fish and Wildlife (CDFW), the KRCD runs the Kings River Fisheries Management Program, which is intended to protect and enhance fishery habitat within the lower Kings River.

GROWTH AND DEVELOPMENT TRENDS

KRCD does not monitor potential growth of urban and rural communities nor does KRCD participate in planned development of communities and infrastructure. Growth and development trends can be referred to in each city and county's General Plan.

ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Table 3. Critical Facilities and Other Assets Identified by the District's Planning Team shows the Kings River Conservation District's critical facilities and assets that could be exposed to hazards. Specific losses for the incorporated communities and the portion of the County of Fresno within the District's boundaries are discussed elsewhere in this hazard mitigation plan.

Note: both earthquake and hazardous materials incidents are considered Medium priority hazards by the District but are addressed by the affected cities and unincorporated Fresno County in the respective jurisdictional annexes and main plan risk assessment. See Chapter 4 Risk Assessment for details on vulnerability to this hazard.

AGRICULTURAL HAZARDS (HIGH)

The KRCD works with growers in the district to improve water management. Agricultural hazards that require an increase in irrigation could strain groundwater supplies in the region, which would be of concern to the District. Additionally, the KRCD is concerned with water quality. Any pests, crop diseases, or noxious weeds that could result in a widespread increased application of fertilizers, pesticides, or other chemicals could negatively impact water quality in the watershed.



DAM FAILURE (HIGH)

The KRCD operates the Pine Flat Power Plant, which generates electricity through irrigation and flood control releases from the Pine Flat Dam. Failure of the dam would halt power generation and put this asset at risk.

Additionally, failure of the dam would result in uncontrolled flows from the reservoir and would have a potential to overtop the levee and canal systems below the dam. At risk would be the inundation of agricultural lands and urban and rural communities located in close proximity to the Kings River.

DROUGHT (HIGH)

Drought vulnerability within the KRCD is related to land subsidence and the structural integrity of the District's flood control structures. The recent drought from 2012 to 2017 resulted in an increase in groundwater pumping, which accelerated land subsidence in several locations throughout the District. Subsidence, discussed below, threatens the structural integrity of the District's levees.

FLOOD/LEEVE FAILURE (HIGH)

Flood is the primary hazard of concern for KRCD. Before Pine Flat Dam was developed, Kings River flooding was always a threat. The Kings River is prone to two types of flooding, stormwater and snowmelt. Downpours of rain over the foothills and mountains can create extremely high peak flows, though generally of brief duration. The maximum natural flow ever measured or calculated on the Kings River occurred on January 3, 1997, and amounted to 112,000 cubic feet per second. Snowmelt runoff flows in the April through July period do not reach such extreme peaks but yield a much greater total volume of water over a longer period. Pine Flat Dam has largely controlled flood flows originating above the reservoir; however, during heavy storm events, uncontrolled flows from eastern small streams like Mill Creek and Hughes Creek (located between one to three miles below Pine Flat Dam) are capable of generating substantial peak flows which would then be pushed through the network of canals and levees in the Kings and Tulare Subbasins.

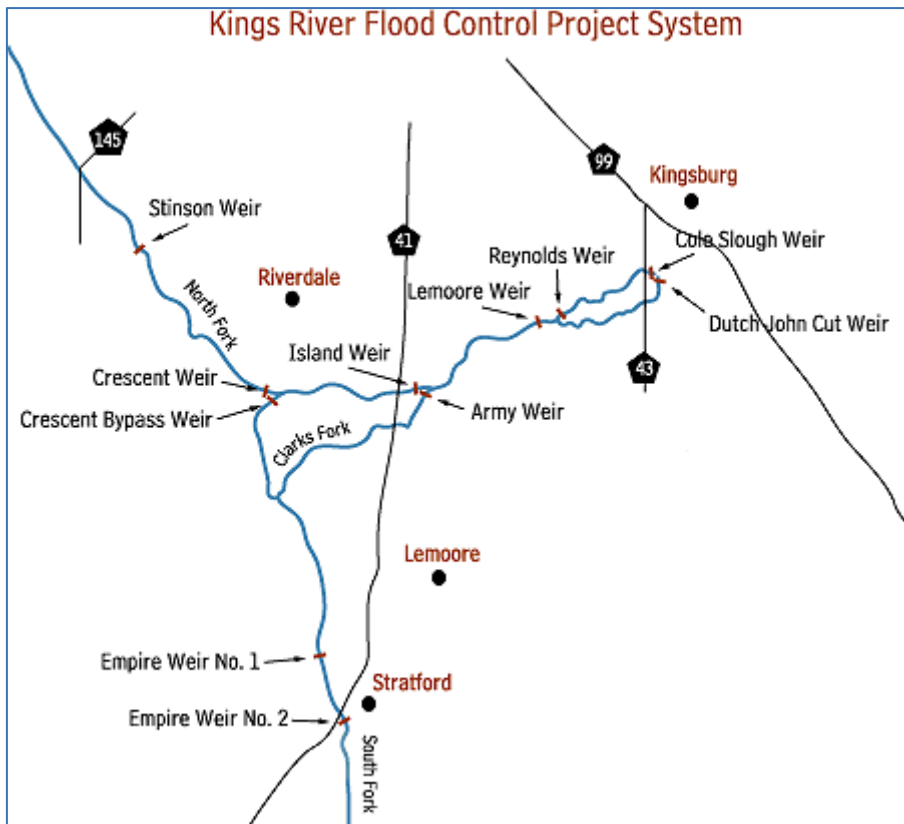
The 2017 deluge of floodwater releases from Pine Flat Dam caused flooding to communities and businesses along parts of the Kings River. On June 22, 2017, KRCD responded to a levee breach on the South Fork of the Kings River between Grangeville Blvd. and Highway 198. The breach was a 40-foot wide break that flooded 400 acres of alfalfa.

The KRCD works to protect the flood carrying capacity of Kings River channels and levees through maintenance of approximately 140 miles of levee systems along the river from below Kingsburg near 8½ Avenue in Kings County to Highway 41 near Stratford on the South Fork, and to McMullin Grade (Highway 145) on the North Fork. The KRCD's flood control systems are shown in **Figure 2. KRCD Flood Control System**.

KRCD staff conduct year-round maintenance to eliminate the danger of flood and erosion hazards, including controlling weeds and brush along the levee banks, and clearing downed trees from the channels. During flood releases, the flood control maintenance crew maintains 24-hour patrols monitoring the levee banks for sloughing, erosion and boils. Also, during high water, the staff assists other irrigation districts in removing debris from the various weirs and structures along the river.

Since it is a special district, participation in the National Flood Insurance Program (NFIP) does not apply to the Kings River Conservation District, thus NFIP Repetitive Loss and Severe Repetitive Loss properties are not tracked for the jurisdiction; therefore, the District does not have this data available. Refer to those annexes for additional information. There is one Repetitive Loss property in the unincorporated County. There are no Severe Repetitive Loss properties in the unincorporated County as detailed in Chapter 4 of the base plan.

Figure 2. KRCD Flood Control System



Source: KRCD

Generally, within the United States, communities disproportionately at risk of flooding impacts and damage are communities placed in low-lying areas due to social and economic inequities, especially in urban settings. For example, these communities may not have ease of access to shelters during a flood event which can further increase vulnerability based on factors such as age, disability, and access to transportation.

SOIL HAZARDS: EROSION (HIGH)

KRCD staff regularly conduct maintenance on the levee systems to minimize erosion. Erosion of levees and riverbanks can compromise the structural integrity of the flood control systems and clog the river channels, exacerbating flood impacts.



SOIL HAZARDS: LAND SUBSIDENCE (HIGH)

During the 2012 to 2017 drought, farmers relied heavily on groundwater pumping, which caused acceleration in land subsidence in several locations throughout the Kings River service area. Subsidence threatens the structural integrity of the KRCD Channel Improvement Levees. Recent droughts from 2020 to 2023 additionally strained the agricultural industry and water supplies. Sediment deposition is another soil hazard. During the last flood in 2023, an extensive amount of sediment deposition has decreased the capacity of the water system. In addition to land subsidence, this poses a large threat to the system's ability to convey water safely.

WILDFIRE (MEDIUM)

Wildfire is not of high significance to KRCD. On occasion, KRCD would prescribe controlled burns to the interior of the levees to rid the channel of dead and overgrown brush as a way to maintain a clear channel for effective conveyance of flood flows and to mitigate potential wildfires.

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the District's planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the District's planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The Kings River Conservation District's updated capabilities are summarized below. A summary of the mitigation capabilities is summarized in **Table 4. Kings River Conservation District's Mitigation Capability Summary**.

Table 4. Kings River Conservation District's Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability		X	
Administrative and Technical Capability			X
Fiscal Capability	X		
Available Staff		X	
Political Support/Interest		X	
Community Support		X	



REGULATORY MITIGATION CAPABILITIES

Table 5. Kings River Conservation District's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table 5. Kings River Conservation District's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)	X					
Community Emergency Response Team (CERT)		X				
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X				
Fire Code		X				
Firewise Community		X				
Floodplain Management/Flood Damage Prevention Ordinance		X				
Land Use/Development Planning		X				
National Flood Insurance Program (NFIP)		X				
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready		X				
Stormwater Management Plan/Ordinance		X				
Subdivision Regulations/Ordinance		X				
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance		X				



PLANNING MITIGATION CAPABILITIES

Table 6. Kings River Conservation District Planning Capabilities identifies the plans related to mitigation and loss prevention in the District.

Table 6. Kings River Conservation District Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	No		
Climate Resiliency or Adaptation Plan	No		
Community Wildfire Protection Plan (CWPP)	No		
Comprehensive Emergency Management Plan	Yes		
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No		
Continuity of Operations Plan (COOP)	No		
Disaster Recovery Plan	No		
Economic Development Plan	No		
Emergency Operations Plan (EOP)	Yes		
Evacuation Plan	No		
Flood Response Plan	Yes		
Floodplain Management Plan/Flood Mitigation Plan	Yes		
Hazard Mitigation Plan	Yes		Partner with county
Historic Preservation Plan	No		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	No		
Threat Hazard Identification and Risk Assessment	No		

ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 7. District's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in the District.



Table 7. District's Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager	X		Department	Flood Operations and Maintenance Department
Engineers or professionals trained in construction practices related to buildings and/or infrastructure	X		Two Staff Members	Chief Engineer, Manager of Flood Operations
Fiscal Management or Procurement Specialists	X		Department	
Floodplain Manager	X		Department	
Land Surveyors		X		
Land Use/Management/Development Planning		X		
Planners or engineers with an understanding of natural and/or human-caused hazards		X		
Resource Development Staff or Grant-writing	X		Staff Members	
Scientists familiar with the hazards of the community		X		
Staff experienced with Geographic Information Systems (GIS)	X		Staff Members	
Staff with education or expertise to assess the community's vulnerability to hazards	X			

FISCAL MITIGATION CAPABILITIES

Table 8. Kings River Conservation District's Fiscal Mitigation Capabilities identifies financial tools or resources that the District could potentially use to help fund mitigation activities.

Table 8. Kings River Conservation District's Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming	X			
Community Development Block Grants (CDBG)	X			



Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Special Purpose Taxes (or taxing districts)			X	
Gas/Electric Utility Fee	X			
Water/Sewer Fees	X			
Stormwater Utility Fees	X			
Development Impact Fees	X			
General Obligation, revenue, and/or Special Tax Bonds		X		
Partnering Agreements or Intergovernmental Agreements		X		
FEMA Hazard Mitigation Assistance Grants (HMGP, FMA, PDM)			X	
Homeland Security Grants (HSGP)	X			
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			

MITIGATION OUTREACH AND PARTNERSHIPS

KRCD has a partnership with the Kings River Water Association (KRWA) and the California Department of Fish and Wildlife (CDFW) to implement the Kings River Fisheries Management Program in order to protect and enhance fishery habitat.

The KRCD also works through the Southern San Joaquin Valley Water Quality Coalition with the Central Valley Regional Water Quality Control Board to address water quality issues in the Tulare Lake Basin watershed.

OTHER MITIGATION EFFORTS

KRCD has conducted studies and preliminary assessments for several water supply enhancement projects, including Rodgers Crossing, Mill Creek, groundwater banking, and Raised Pine Flat Dam.



OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the Kings River Conservation District has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the communities the District serves. Some of the opportunities for enhancement of the District's existing mitigation program are listed below.

- Develop and implement warning systems. To further enhance mitigation efforts the District may partner with the jurisdictions in the District to develop and implement warning systems for existing levees and dams that may impact these communities in an event of a failure.
- Partner with jurisdictions within the District including the County to develop a Drought Contingency plan that will help to create a framework for drought response and mitigation in the District.
- Provide training opportunities for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform staff members on how best to integrate hazard information and mitigation projects into their daily duties.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The Kings River Conservation District adopts the hazard mitigation goals and objectives developed by the Fresno County Hazard Mitigation Planning Committee. The District slightly modified the goals to fit their needs and are described in further detail below.

1. Provide protection for People's lives and property from hazards
2. Improve all communities' resilience and capabilities to mitigate hazards and reduce exposure to hazard related losses
3. Improve community and agency awareness about hazards and associated vulnerabilities that threaten Fresno County planning area communities
4. Provide protection for critical facilities, utilities, services, and agriculture from hazard impacts
5. Maintain coordination of disaster planning
6. Maintain and provide for FEMA and USACE eligibility and work to position jurisdictions for grant funding
7. System Wide Improvement Framework (used to be named "Analysis of Levee Integrity and Improvement Project")

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The Kings River Conservation District identified their Emergency Action Plan and Fisheries Management Program as planning mechanisms which were influenced by information pulled from the 2018 hazard mitigation plan. The information contained within this 2024 plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of plans, programs and policies for the jurisdictions within the District. The hazard information may be incorporated into updated to the District's Emergency Action Plan and well as inform existing projects such as the Kings River Fisheries Management Program. The information contained with this annex as well as the hazard information within the jurisdictional annexes that are served by the District, will help the District to better understand the vulnerabilities of the communities they serve and help to mitigate those risks where possible.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from the Kings River Conservation District will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

MITIGATION ACTIONS

The planning team for the Kings River Conservation District identified and prioritized the following mitigation action based on the risk assessment. Background information and information on how the action will be implemented and administered, including the responsible office, potential funding, estimated cost and schedule are included.



In addition to implementing the mitigation action below the Kings River Conservation District will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The District agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

1. MAINTAIN A WEBSITE OF FLOOD RELATED RESOURCES FOR COMMUNITY EDUCATION

Hazard(s) Addressed: Agricultural hazards, flooding

Issue/Background: KRCD levees are adjacent to private property and protects these properties, municipal, industrial, rural and agricultural from flooding. The KRCD website contains information on flooding. The KRCD website contains information on flooding.

Other Alternatives: No

Cost Estimate: Minimal – maintenance of the website is done by the KRCD staff

Benefits: Staying connected to the community and delivering reliable resources are important to KRCD staff.

Responsible Office: Kings River Conservation District Director of Water Resources/Chief Engineer

Priority (High, Medium, Low): High

Potential Funding: DWR Statewide Flood Emergency Response Program; KRCD local fund

Schedule: As reliable information becomes available

Status: In development

2. REMOVE INVASIVE SPECIES ALONG THE KINGS RIVER TO PROTECT LEVEE SYSTEM

Hazard(s) Addressed: Agricultural hazards, erosion, flooding

Issue Background: Invasive vegetation (Arundo) and wildfire (Nutria) species effect the integrity of the levees and the ability to identify levee issues.

Other Alternatives: KRCD will evaluate other alternatives for removal of invasive species as they become available.

Cost Estimate: \$3,300,000 (Proposition 68, invasive vegetation)

Benefits: Improve the integrity of the levee system to avoid flooding valuable property and agriculture.

Responsible Office: Kings River Conservation District Director of Water Resources/Chief Engineer

Priority (High, Medium, Low): High

Potential Funding: DWR Statewide Flood Emergency Response Program; KRCD local fund, Proposition 68

Schedule: Proposition 68 projects will be completed in 2026

Status: In progress



3. ANALYZE SUBSIDENCE ALONG THE LEVEE SYSTEM

Hazard(s) Addressed: Agricultural hazards, dam/levee failure, flooding

Issue/Background: Subsidence occurs in area where groundwater, oil, and gas are extracted during times when surface water is unavailable. Subsidence threatens the structural integrity of the KRCS levees. Coupled with excessive sediment deposition during large flood years, subsidence and sediment deposition squeezes the capacity of the channels. KRCD conducts a yearly surface elevation survey to understand the subsidence on the levees and throughout the KRCD boundary.

Other Alternatives: Satellite Imagery, LiDAR

Cost Estimate: \$30,000 annually

Benefits: This data helps to understand areas that could be vulnerable in a flood

Responsible Office: Kings River Conservation District Director of Water Resources/Chief Engineer

Priority (High, Medium, Low): High

Potential Funding: DWR Statewide Flood Emergency Response Program; KRCD local fund

Schedule: Annually, fall

Status: Continuous/routine activity

4. CHANNEL MAINTENANCE, SEDIMENT REMOVAL AND DEBRIS CLEARANCE

Hazard(s) Addressed: Flooding of municipal and agriculture, levee failure, sediment deposition

Issue/Background: KRCD conducts ongoing channel maintenance, sediment removal and debris clearance to allow efficient conveyance of flood flows. Due to the extreme swings in California climate, the Kings River has seen an excessive amount of debris and sediment deposited throughout the entire Kings River System.

Other Alternatives: No

Cost Estimate: \$50,000-\$100,000

Benefits: Efficient conveyance to avoid flooding of valuable property and agriculture

Responsible Office: Kings River Conservation District Director of Water Resources/Chief Engineer

Priority (High, Medium, Low): High

Potential Funding: KRCD local fund

Schedule: Annually as conditions allow

Status: Continuous/routine activity

Annex P: Sierra Resource Conservation District





PARTICIPATION

To update the Sierra Resource Conservation District's jurisdictional annex, the District had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the District's input. Opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. The Sierra Resource Conservation District did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee. These stakeholders are identified in Appendix B.



DISTRICT PROFILE

The Sierra Resource Conservation District (SRCD or the District) has partnered under separate Memorandums of Understanding (MOUs) with the Highway 168 Fire Safe Council and the Oak to Timberline Fire Safe Council in the further development and update of this annex. For more information about the Councils, please see Section Mitigation Outreach and Partnerships.

According to the Sierra Resource Conservation District Long Range Plan 2015-2020, the primary purposes of the SRCD (as legislated by the state) are to secure the adoption of conservation practices including but not limited to farm, range, open space, urban development, wildlife, recreation, watershed, water quality, and woodland and to save the basic resources, soil, water, and air of the state from unreasonable and economically preventable waste and destruction. Its mission is to take available technical, financial, and educational resources, whatever their source and focus, or coordinate them at the local level, to meet the present and future natural resources needs of the local land user.

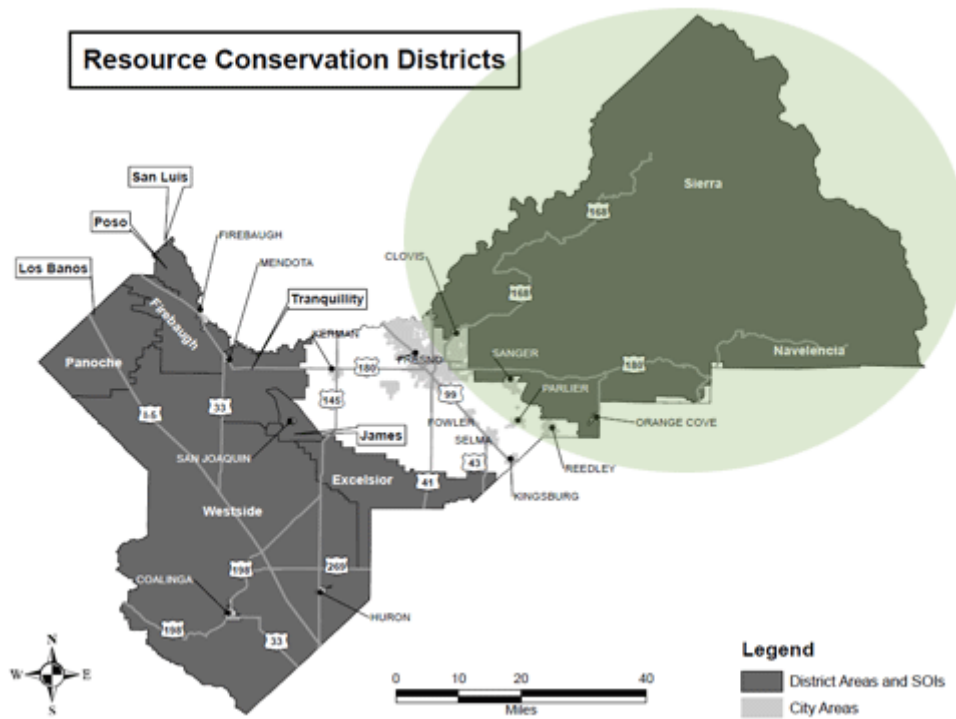
HISTORY

Formed in 1957, the SRCD originally encompassed 1,179,173 acres and over 1,843 square miles in eastern Fresno County (almost one-third of the total acreage of Fresno County). In 2009, the District successfully incorporated the consolidation of the Navelencia Resource Conservation District through the Fresno County LAFCo (Local Agency Formation Commission). The District now encompasses 1,847,537 acres equivalent to 2,887 square miles. This is nearly 50 percent of Fresno County's 6,000 square miles. In 2016, again through Fresno County LAFCo, the District detached 130,000 +/- acres that were within Tulare County to the Tulare County Resource Conservation District. Currently, as of 2024, The Sierra Resource Conservation District (SRCD) encompasses approximately 3,063 square miles (1,960,248 acres). The area is over 50 percent of the total acreage of Fresno County (3,817,025 acres).

The District is now bounded on the north by the San Joaquin River with Madera County, on the east the crest of the Sierra Nevada with Inyo and Mono County, on the south by the Tulare County line, and extends west into the fertile valley areas near Orange Cove, Reedley, Sanger, and then Clovis and the northern part of the City of Fresno. More than 1,000 square miles of the District are public lands, which include portions of several wilderness areas, McKinley Grove, and portions of the Sierra National Forest, Sequoia National Forest and Giant Sequoia National Monument, Sequoia Kings Canyon National Park, Squaw Leap Recreational Area, Millerton Lake State Park, and Pine Flat Reservoir. There are three Indian rancherias within the district: Big Sandy Mono Rancheria, Cold Springs Mono Rancheria which are federally recognized – and the Dunlap Band of Mono Indians which is a non-federally recognized tribe.

The boundaries of the Sierra Resource Conservation District are shown in **Figure 1. Sierra Resource Conservation District.**

Figure 1. Sierra Resource Conservation District



Source: Sierra Resource Conservation District



Approximately 15 percent of the District is on the valley floor with heavy urbanization, production agriculture, and a few public lands. The terrain here is predominately flat. As one heads east, the terrain changes to rolling foothills that cover 20 percent of the District, and the land is predominately eastside rangeland and oak woodlands, then oak/conifer intermix with low-density residential to the 4,000-foot elevation. Continuing east, the remaining 65 percent of the District extends to the 14,000-foot elevation Sierra Nevada crest and is timberland intermixed with lower density rural residential with additional Wildland Urban Interface (WUI).

The rapid rise in elevation from 2,000 feet to 5,000 feet creates steep valleys, rapid runoffs, and associated soil movements. Rapid water runoff from the upper watershed portions of the District has under certain conditions caused downstream flooding on both the San Joaquin and Kings rivers. It can be sunny on the valley floor on the west side of the District and snowing on the east side.

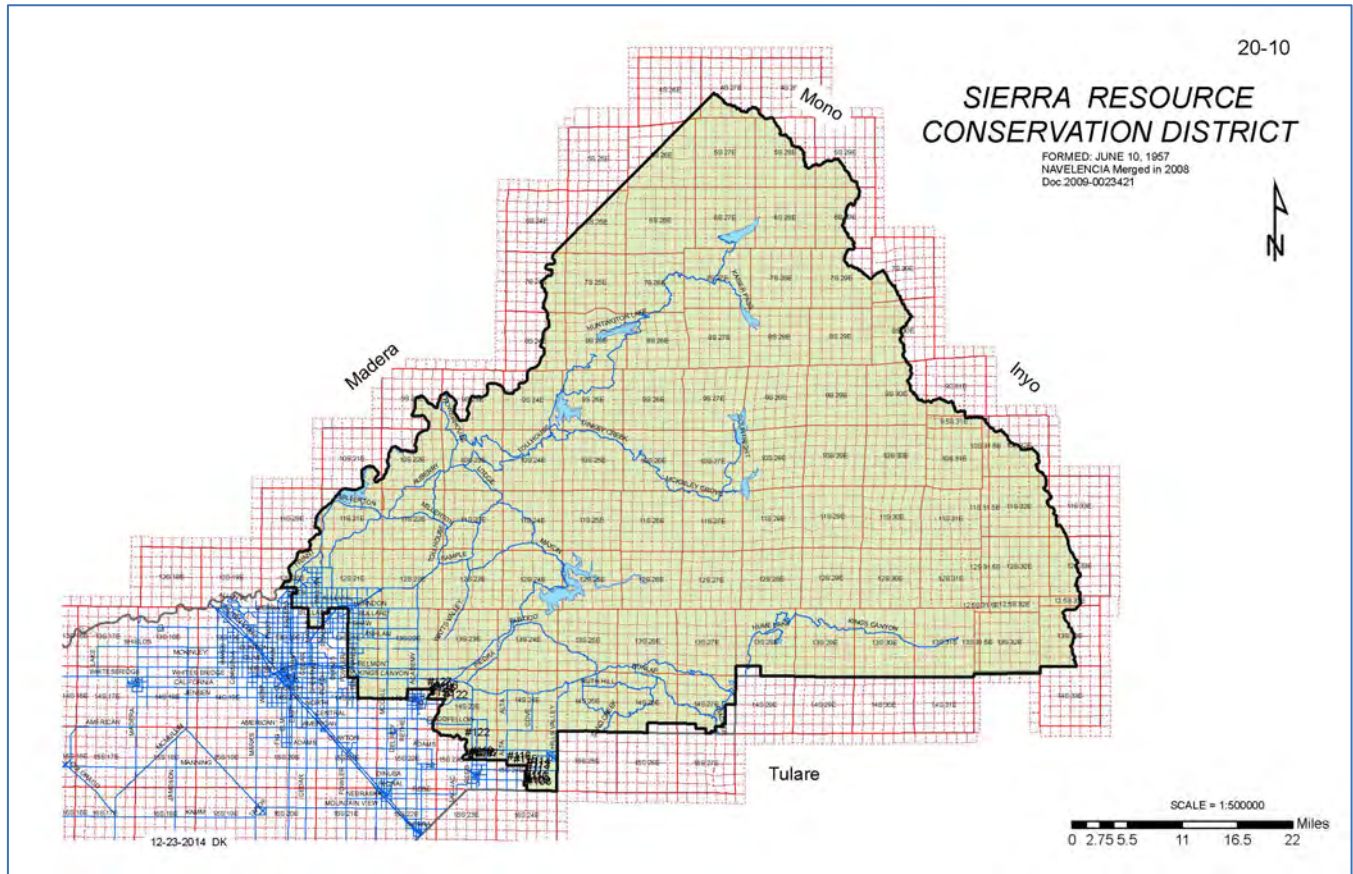
Vegetation types run full spectrum from sensitive citrus fruit and nut orchards, specialty crops on the valley floor, open eastside rangeland, extensive oak woodlands and brush in the foothills, and heavily forested mountains and alpine areas above timberline. The forested lands are abundant with wildlife. Summer range for some wildlife species like deer is on public lands, but the winter range is on predominately private lands in the foothill zone.

Fresno County is the largest agricultural production County in California and the nation. There are about 2,272 farms in the District. Primary agricultural products include oranges, strawberries, nuts, grapes, olives, Asian market crops, truck garden crops, cattle, dairy products, and honey. Timber and rangeland also contribute to the District's economy.

Valuable recreation areas in the District include the Sierra Heritage Scenic Byway and the China Peak Ski Area. High country packing, camping, hiking, water sports, boating, horseback riding, skiing, and bicycling are a few of the activities enjoyed in the District. The Highway 180 corridor is heavily used to bring tourists from around the world to the world-famous Sequoia and Kings Canyon National Parks and Sequoia National Forest.

Figure 2. Sierra Resource Conservation District shows the area's topography.

Figure 2. Sierra Resource Conservation District



Source: Sierra Resource Conservation District



HAZARD IDENTIFICATION AND SUMMARY

The SRCD's planning team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to the District (see **Table 2. SRCD Hazard Summaries**). **Table 1. Risk Methodology** shows methodology to how the hazards were ranked.

Table 1. Risk Methodology

RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x .20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Probability: What is the likelihood of a hazard event occurring in a given year?	Unlikely	Less than 1% annual probability	1	30%
	Possible	Between 1% and 49.9% annual probability	2	
	Likely	Between 50% and 90% annual probability	3	
	Highly Likely	Greater than 90% annual probability	4	
Impact: In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs?	Minor	Very few injuries, if any. Only minor property damage and minimal disruption on quality of life. Temporary shutdown of critical facilities.	1	30%
	Limited	Minor injuries. More than 10% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than one day.	2	
	Critical	Multiple deaths / injuries possible. More than 25% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for more than a week.	3	
	Catastrophic	High number of deaths / injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.	4	
Spatial Extent: How large of an area could be impacted by a hazard event? Are impacts localized or regional?	Negligible	Less than 1% of area affected	1	20%
	Small	Between 1% and 10.9% of area affected	2	
	Moderate	Between 11% and 25% of area affected	3	
	Large	Greater than 25% of area affected	4	



RF Value = {(Probability x .30) + (Impact x .30) + (Spatial Extent x.20) + (Warning Time x .10) + (Duration x .10)}				
Risk Assessment Category	Degrees of Risk			Weight Value
Warning Time: is there usually some lead time associated with the hazard event? Have warning measures been implemented?	More than 24 hours	Self-Defined	1	10%
	12 to 24 hours	Self-Defined	2	
	6 to 12 hours	Self-Defined	3	
	Less than 6 hours	Self-Defined	4	
Duration: how long does the hazard event usually last?	Less than 6 hours	Self-Defined	1	10%
	Less than 24 hours	Self-Defined	2	
	Less than 1 week	Self-Defined	3	
	More than 1 week	Self-Defined	4	



Table 2. SRCD Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Limited	12 to 24 hours*	Less than 24 hours*	High
Avalanche	Likely	Limited	Small	Less than 6 hours	Less than 6 hours	Medium
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours	Medium*
Drought	Possible	Limited	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Catastrophic	Large	Less than 6 hours	Less than 6 hours	Low*
Flood/Levee Failure	Likely	Critical	Large	More than 24 hours	Less than 1 week	High
Hazardous Materials	Likely	Critical	Moderate	Less than 6 hours	Less than 1 week	High
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	High
Fog	Likely	Minor	Large	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Limited	Large	More than 24 hours	Less than 24 hours	Medium*
Tornado	Possible	Limited	Small	Less than 6 hours	Less than 6 hours	Medium
Winter Storm	Highly Likely	Limited	Large	More than 24 hours	Less than 1 week	High
Soil Hazards						
Erosion	Highly Likely	Limited	No Data	N/A	N/A	High
Expansive Soils	Possible	4Minor	Large	N/A	N/A	Low
Land Subsidence	Possible	Limited	Large	N/A	N/A	Medium
Landslide	Possible	Limited	Moderate	12 to 24 hours*	Less than 6 hours*	Medium
Volcano	Unlikely	Minor	Large	Less than 6 hours	More than 1 week	Low*
Wildfire	Highly Likely	Critical	Large	12 to 24 hours*	More than 1 week*	High

*Rated on an average basis. For example, warning time for agricultural hazards by vary by the type of hazard (When under the Warning Time and Duration column).



**Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.*

Note: N/A was identified for the "Overall Risk" when hazards were not applicable to the District. N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/District.



VULNERABILITY ASSESSMENT

The intent of this section is to assess the District's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. However, the vulnerable population served by the district is the same as Fresno County. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction (**See Table 2. SRCD Hazard Summaries**).

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the District's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Figure 6 reflect the hazards that could potentially affect the District. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

ASSETS AT RISK

This section considers the District's assets at risk. **Table 3. Critical Facilities and Other District Assets** lists District assets, including natural resources, identified by representatives from the SRCD as important to protect in the event of a disaster.

Table 3. Critical Facilities and Other District Assets

Name of Asset	Replacement Value (\$)	Occupancy/Capacity #	Hazard Specific Info
Forest timber	Billions	N/A	Timber belt subject to devastating wildfires, stand replacing fires destroy this critical resource and jobs
Wildland ecosystems	Billions or priceless	N/A	Loss of critical ecosystems destroyed by unnatural wildfire events
Endangered and threatened species	Priceless	N/A	Wildfire threatens 172 listed threatened and endangered species in eastern Fresno County



Name of Asset	Replacement Value (\$)	Occupancy/Capacity #	Hazard Specific Info
Powerhouses and associated facilities, including Big Creek community	\$100 million to billions	16 power facilities, 120 employees, 260 residents	Wildfire or floods could destroy one or more facilities during a major events
Watershed and water quality of upper San Joaquin and Kings Rivers	Hundreds of millions	N/A	Wildfire and to a lesser extent flooding threaten water quality and availability along with other watershed values
Wish-I-Ah Care Center (live-in nursing home for mentally challenged)	\$5 million	100+	This facility is only hospital like facility within District boundaries
Sierra High School	\$70 million	800 students 50 staff	School is also primary emergency operations center for District surrounded by wildland susceptible to fire
Auberry Elementary	\$20 million	300 students	Surrounded by wildland susceptible to fire
Sierra Elementary	\$20 million	300 students	Surrounded by wildland susceptible to fire
Big Creek Elementary	\$12 million	150 students	Surrounded by wildland susceptible to fire
21 dams (large and small)	\$100 million to 1 billion	N/A	Subject to damage or failure during flood events
Foothill Middle School	\$30 million	300 students	Surrounded by wildland susceptible to fire alternate operations evacuation center
Highway 168 in eastern Fresno County	\$1-200 million depending on damage	Primary and in some cases only route for over 15,000 residents and up to 25,000 summer visitors	Subject to frequent (multiple times yearly) closers due to primarily wildfire and semiannually due to slides and rock fall during major storm events
Shaver Lake sewage treatment plant	\$50 million	5 employees	At risk for both wildfire and flood
18 fire stations	\$3 million each	4 employees each	Most at risk of wildfire damage or loss
Auberry sheriff substation	\$500,000	10 deputies	At risk of wildfire loss
8 U.S. Forest Service offices/facilities	\$400,000 to 15 million	12 to 40 employees per facility	All at risk from wildfire; some at risk from flood
Unknown # of wooden bridges (~200)	\$500,000	N/A	All at risk of wildfire damage and loss

Source: Sierra Resource Conservation District



GROWTH AND DEVELOPMENT TRENDS

Population growth within the SRCD is widespread but not uniform. The areas closest to the largest cities and communities are growing fastest and have higher housing densities. The foothill areas are growing the next fastest, with most of the growth in widely scattered single family homes within a very high fire hazard environment. An exception to this is the area near Millerton Lake, outside the Town of Friant, known as Millerton New Town. This high-density development when built out will have thousands of homes with a large exposure to the WUI. The mountainous region is the third fastest growing area in the District. Only the limited availability of private land and some issues with water availability are limiting growth in the mountain areas. Many new homes and cabins are built each year, especially along the mountainous portion of the Highway 168 corridor and near the community of Shaver Lake. Approximately 70 percent of new construction in the mountain area is second homes.

Growth within the SRCD on the valley floor is primarily in the form of subdivisions along primary transport corridors. The City of Fresno is the hub of jobs and retail. Growth is spreading outward from that hub. In general, new growth is not being permitted in flood zones, so most flooding in these areas has been minor and primarily due to rain events exceeding the capacities of the flood control drainage infrastructure. There are levees and irrigation canals within the lower elevation portions of the District. Historically, there have not been flooding problems related to these structures, but they are aging (some are over 100 years old). A flood event from the failure of one of these structures could cause widespread damage depending on the location of the break.

The foothill and mountain areas continue to grow and add complexity to the wildland fire issues within the District. Currently, there is no serious effort to control growth in these areas. Projections are for the population within these areas to more than double in the next 10 years. Due to the widely scattered housing in this part of the District, the wildfire problem is more one of wildland-urban intermix rather than the more easily defined wildland-urban interface, as is the case with Millerton New Town. This greatly increases the probability of wildland fire starts, and the complexity of protecting homes is multiplied many times over that of protecting more concentrated populations. The probability of major losses of homes and property in these areas is very high.

The SRCD completed its consolidation with the Navelencia Resource Conservation District (Navelencia RCD). The Navelencia RCD in 2009 encompassed 781,075 acres (1,222 square miles), approximately one fifth of Fresno County's total acreage. The Navelencia RCD is bounded on the north and west by the Kings River, on the south by the Fresno-Tulare county line and the Sequoia National Park boundary, and on the east by the Fresno-Inyo and Fresno-Mono county lines. The former District is fairly indicative of the boundaries for the Oak to Timberline FireSafe Council. This largely agricultural area is rural with an estimated population between 30,000 and 50,000 people. Together, the combined RCDs cover 2,887 square miles.

ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Table 3. Critical Facilities and Other District Assets shows the Sierra Resource Conservation District's critical facilities and assets that could be exposed to hazards. Specific losses for the Cities of Fresno and Clovis and the portion of the County of Fresno within the District's boundaries are discussed elsewhere in this hazard mitigation plan.



AGRICULTURAL HAZARDS (HIGH)

Agricultural land and rangeland are primary elements of the SRCD and are vital to the economy and important to consider when addressing issues related to groundwater, watersheds, and wildfire. Most of the agricultural hazards in the District are weather related (e.g., freeze, hail, wind, rain (flood), drought). Other hazards include insects and disease.

AVALANCHE (MEDIUM)

During an extreme snow year in 1927, two avalanches hit Camp 72 within five hours of each other and killed 13 people. Camp 72 was a work camp associated with the Big Creek Hydroelectric Project located north of modern day Shaver Lake and west of the Town of Big Creek. The avalanches destroyed the majority of two-story wooden structures in the camp and caused \$200,000 in damage (1927 dollars). Phone lines, tunneling equipment, and work rail lines were also damaged or destroyed. The damage also delayed work on the Big Creek project.

Deforestation in the area was a contributor to the avalanche. An avalanche in the same location today would likely have limited impact due to the regrowth of the timber.

Today, the likely impact of an avalanche would be quite limited. Backcountry skiers and snowmobilers are most at risk. If they are caught in a backcountry avalanche and someone is not on hand to dig them out, the situation is likely to be fatal. China Peak (formerly Sierra Summit) Ski Resort monitors and controls the avalanche danger within the recreation area.

There are areas along Highway 168 and the few secondary routes open in the winter that could be hit by avalanche; however, there is very little history of avalanches in these areas. If a person is not caught in an avalanche, then the only likely impact would be from road closures and damage to above ground facilities such as power lines. A long-term road closure and loss of power could strand some small communities, such as Lakeshore at Huntington Lake and China Peak Ski Resort, for extended lengths of time. This could require emergency evacuations or delivery of emergency supplies by snowmobiles or aircraft.

DAM FAILURE (MEDIUM)

Multiple dams on the San Joaquin and Kings rivers provide hydroelectricity, recreation, and flood control. Failure of any of these dams could endanger lands within the Sierra RCD.

DROUGHT (HIGH)

The canals and irrigation districts on the valley floor provide agricultural water during the dry summer months. Their boundaries and practices can affect the SRCD conservation efforts. A number of flood control districts and groundwater recharge basins are within the District's boundaries. Groundwater issues are a recurring theme on private lands within the District and are specifically addressed in the Fresno County General Plan. In the foothills, most residents get water from wells, but groundwater is not overly abundant. Parts of the District are in state recognized groundwater basins and are now affected by new legislation that was enacted in September of 2014 by Governor Edmund G. Brown, Jr. when he signed a three-bill package known as the Sustainable Groundwater Management Act (SGMA).

Crop losses and reduced plantings have occurred during past droughts. Generally, irrigation and ground pumping were used to offset the impacts of past droughts. Both of these alternatives are



becoming less reliable as surface water is diverted to other uses, and groundwater is already being over pumped, leading to lower underground water levels. The District had prolonged drought from 2012 through 2016. The winter and spring of 2017 brought a significant amount of precipitation after which the Governor declared the official end of the 5-year drought in April, 2017. However Executive Order B-40-17 lifts the drought emergency in all California counties except Fresno, Kings, Tulare and Tuolumne, where emergency drinking water projects will continue because of depleted groundwater. Additionally, this water year from October 2017 to date has seen precipitation totals severely below average.

EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The Sierra Resource Conservation District's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

FLOOD/LEVEE FAILURE (HIGH)

The District has two primary watersheds: the San Joaquin River and the Kings River watersheds, which greatly affect the foothills and valley floor.

Flooding and soil erosion due to heavy rains and snow runoff have been a historical problem. Abundant snowfall in the mountains combined with rain and steep terrain can mean rapid runoff and flooding. In the foothills, many streams are seasonal. Water flow can be high in peak runoff periods with historical downstream flooding. Much of the area on the valley floor is subject to flooding and ponding from the San Joaquin and Kings rivers and from several lesser watershed drainages. Severe thunderstorms and heavy rain in the summer also cause flooding. Because of widespread tree mortality, large fires, and the efforts to recover from the impacts of these fires, there is the potential for debris flows and increased erosion and sediment coming off of forestlands and flowing into the major reservoirs – in particular Millerton Lake and Pine Flat Dam.

Major past flood events are described below:

- **December 1955:** A rain on snow event caused local and downstream flooding. It occurred on the western side of the Sierras and eastern Fresno County, affecting the entire valley region. An unknown number of homes were damaged, and roads, bridges, and some dam facilities were destroyed or damaged. School and road closures resulted.
- **January 1997:** A regionwide high elevation rain on snow event caused local flooding and downstream valleywide flooding. Homes and a trailer park flooded, but numbers and values are unknown. Bridges, roads, and other infrastructure near waterways washed out. The event caused hundreds of millions in damage in the valley. In the District, fisheries and wildlife were impacted. Damage occurred to much of the flood control/dam system on the San Joaquin River as water threatened to overtop the dams. Spillway gates were opened to prevent that occurrence. This created flooding to about a dozen mobile homes and resulted in the evacuation of approximately 500 people. In the aftermath of the event, debris and mud had to be cleared from structures, roads, and facilities throughout the District. Many culverts failed, washing out roads, and the approach to



one major bridge in the District on the San Joaquin River connecting Fresno and Madera County was washed away, closing that vital route for over a month. Washouts, mudslides, plugged culverts, and rockfalls along roads required months of work to clean up and correct. Some secondary mountain roads on the Sierra National Forest have never been repaired due to the cost. Exact costs are not available, but costs to infrastructure repairs within the District were easily in the tens of millions. Value of damage to habitat and fisheries within the District were never quantified, and costs to mitigate damage to the environment are also not available. In most cases, the environment was left to recover on its own due to lack of available funds.

- **July 2006:** A flash flood from thunderstorms in drainages above the north end of Huntington Lake caused flooding in Huntington Lake, Rancheria Creek, Kaiser Pass Road, and Eastwood Powerhouse. The powerhouse was inundated, the primary road washed out, and boat docks damaged at an estimated cost of \$200,000. An estimated \$250,000 in damage to private boats occurred. The event resulted in loss of power output for three weeks, closure of the primary summer road, closure of Huntington Lake to recreation for one week, and approximately \$350,000 in damage. Clean-up costs were \$150,000, and search and rescue costs were \$25,000. Four people were injured. Insured losses were \$100,000. No federal or state disaster relief was received for this event.

Based on these past events, major rain on snow events occur every 10-15 years. The primary impacts from flooding within the district include loss of fisheries and wildlife habitat; damage to roads, hydroelectric facilities, dams, bridges; and some flooding of homes. Winter road closures could require large scale evacuations and create difficulties in providing emergency services to areas cut off by flooding. There are quite a few communities that are at the end of one primary access road. In the winter, secondary or emergency roads are usually impassable. If the primary road is closed by a flood, it is likely that secondary roads will also be impacted as well. If the repair time is extended, emergency services may be required to protect the population until repairs can be made.

Since it is a special district, participation in the National Flood Insurance Program (NFIP) does not apply to the Sierra Resource Conservation District, thus NFIP Repetitive Loss and Severe Repetitive Loss properties are not tracked for the jurisdiction; therefore, the District does not have this data available. There are one Repetitive Loss properties in the unincorporated County. There are no Severe Repetitive Loss properties in the unincorporated County as detailed in Chapter 4 of the base plan.

HAZARDOUS MATERIALS INCIDENT (HIGH)

The SRCD is vulnerable to transportation-related hazardous materials releases because only one road serves the communities of Shaver Lake, Big Creek, and Huntington Lake. The road is steep, narrow, and winding. There is a seven-mile stretch of Highway 168 that is very vulnerable to road closure due to accidents, wildfires, or bad weather. No safe alternate routes for this section exist. Closures cut off 700 homes and 400 square miles of the Sierra National Forest open to the public.

On July 26, 2002, Highway 168 closed for two days due to a gas tanker spill during peak summer use season and cut off more than 700 residences and stranded 7,000-10,000 summer visitors to the area. The driver was injured, and direct access to the hospital was not available. The accident damaged the roadbed and culvert, and underground power lines needed to be relocated. The 10,000-gallon spill caused environmental damage to streams and surrounding timber—one-half acre of timber was lost. It caused economic losses to businesses, and people were unable to get to or from work. Most direct losses were covered by the truck company's insurance.



SEVERE WEATHER: EXTREME COLD/FREEZE (HIGH)

Of particular concern to the District is the vulnerability of citrus orchards in the western part of the District to extreme cold/freeze events. This vulnerability increased when the District consolidated with the Navelencia Resource Conservation District.

SEVERE WEATHER: WINTER STORM (HIGH)

In January 2005, a major winter snowstorm caused regionwide closure of roads and loss of power for up to three weeks in three communities. The impacts occurred in eastern Fresno County above 4,000 feet in elevation. Damage included the following:

- Eight injuries from storm and poor road conditions
- Estimated \$3.5 million in damage to trees falling on homes and other structures
- Estimated \$2.5 million in damage to power distribution grid
- \$250,000 to open and repair road system
- 10,000-15,000 merchantable trees damaged or killed
- \$250,000 in miscellaneous damage from heavy snow and falling trees
- All businesses closed and without power, estimated \$500,000 in loss of business and product or inventory
- \$3 million in insured losses
- Schools closed for over two weeks

Similar storms are highly likely to occur in the future. The 2016/2017 weather year had extremely high precipitation, and due to warmer temperatures, the snow/rain transition occurred at higher elevations.

SOIL HAZARDS: EROSION (HIGH)

With the population moving to the foothills, road and home construction is increasing. The popularity of horses and family livestock with families new to the area, combined with the zoning practice of “parceling” is contributing to an increase in soil erosion and compromising wildlife habitats and native animal populations. Soil erosion due to heavy rains and snow runoff is also a problem.

WILDFIRE (HIGH)

All communities within the District are listed on the National Fire Plan’s “Communities at Risk” list. Over one hundred years of aggressive fire suppression under the national fire suppression policy has rendered wildlands severely overgrown. Much of the private land in the foothills area is in the wildland-urban interface with increasing residential development on steep terrain in the brush on highly erodible soils. According to the Highway 168 Fire Safe Council Community Wildfire Protection Plan, the following areas of the District were prioritized for projects because of their dense population, values at



risk, and fuel availability: Burrough Valley of Tollhouse, Peterson Road Subdivision, Dogwood Subdivision, Routt Mill Road, Big Sandy Rancheria, Beal fuel break, and Sugarloaf fuel break.

As more people move into the area and impacts from recreational demands increase, there will be more human-caused wildfire starts each year. And, the increased number of widely scattered homes within the District adds greatly to the danger, complexity, and cost of fighting these fires.

Currently, many of the communities in the District are limited to one route access and egress in the event of a major wildfire. Historically, these routes are closed during major events, stranding many people, including visitors, away from their families and homes. So far there has been no loss of life attributed to the limited evacuation routes, but it is likely only a matter of time before people are cut off and trapped by a major fire event.

Low intensity natural fires kept the Sierra forest from becoming overgrown. Forest overgrowth due to the efficiency of modern firefighting techniques, and to society's current election to limit forest thinning and harvesting, is a serious problem. If wildfire does not impact the forest first, native insects will eventually kill millions of trees as has been clearly demonstrated since 2012. Explosions in insect populations usually start during a drought, when the lack of water combined with too many trees per acre render the trees too weak to fight off insect attacks. On October 30, 2015, Governor Brown proclaimed a State of Emergency and included provisions to expedite the removal and disposal of dead and dying hazardous trees. As a result, costs related to identification, removal, and disposal of dead and dying trees caused from drought conditions may be eligible for California Disaster Assistance Act (CDAA) reimbursement.

Major past wildfires are described below:

- **1933:** The Tollhouse fire started when a local resident was cutting, stacking, and burning brush in late August along Lodge Road. The fire burned across fields and grazing lands and encircled the Town of Tollhouse, which at that time was a large and important hub for the timber industry in eastern Fresno County. The Town of Tollhouse was evacuated for safety. The fire burned portions of the flume that carried logs and boards from Shaver Lake to the valley floor. The fire raced up the hill and burned into Jose Basin and over Burrough Mountain into Blue Canyon, burning very hot and destroying conifers. The once abundant conifers that grew on the slopes did not grow back; the hill is barren of good timber. It is mostly brush now. Stables of mules and horses were scared and had to be controlled by handlers.
- **1955:** McGee fire. "The 1955 heat wave began with very hot weather and fires on August 27th. As the heat wave wore on, fires increased in number until Labor Day weekend when 139 fires were reported throughout the region." While ten large fires were being fought in Northern CA, the McGee Fire broke out in the Sequoia Forest. This fire "was not the largest but was the most damaging." Though fire danger was extreme, a rancher conducted a controlled burn a half-mile outside the forest boundary. It spread rapidly up Milk Ranch Creek to the East towards Pinehurst. The fire burned near Pinehurst, Miramonte, Cedarbrook and the Sequoia Lake community. "The most severe damage was to mixed stands of pine, fir and giant sequoia in the upper Mill Creek and Converse Basin." (Source: July 2005 R5-FR- 003 USDA Forest Service, California, "Fire in the Forest: A History of Forest Fire Control on the National Forests in California 1896-1956")
- **1987:** A number of large wildfires in eastern Fresno County caused over \$1 million in damage to roads, bridges, and other improvements and over \$1 million in damage to resources. Suppression costs were estimated at another \$1 million.
- **1989:** A wildfire burned 21,000 acres near the Town of Auberry. It started near the Fresno and Madera county line on the Fresno side of the San Joaquin River. It was never determined what



caused the fire; arson was suspected. The fire raced up the canyon skirting Powerhouse Road in Auberry, traveling midslope behind the settlement of Jose Basin. Fingers of the fire touched New Auberry and the Town of Auberry. The fire burned across the front of Bald Mountain into Mile High and threatened Meadow Lakes and all the homes in its path. An all out assault by air and ground stopped the fire at Sugarloaf Road at 3,800 feet in elevation. This fire caused an enormous amount of stress on local residents and businesses. Roads were blocked, people did not know if they had homes to return to, and pets were a big concern.

- **1994:** A large wildfire burned 9,000 acres near the Town of Big Creek and resulted in the evacuation of the entire community of Big Creek (for one and a half weeks) and portions of Lakeshore community at Huntington Lake. Damage was estimated at \$2 million to roads and miscellaneous improvements in the national forest and \$500,000 to the power grid. The estimated cost to recover the forest was \$200 million. Mudslides due to fire caused \$500,000 in damage. Scenic values and wildlife were also compromised. Firefighting costs approximated \$50 million. Tourism losses due to damage are still a problem in the affected area. Annual losses to local businesses are estimated at \$10,000.
- **2013:** Aspen Fire, High Sierra District of the Sierra National – burned nearly 23,000 acres in the upper San Joaquin River Watershed.
- **2015:** The Rough Fire was a devastating fire that burned 151,623 acres of land, making it the largest fire of the year in California, involving up to 3,742 firefighters. (Source: Wikipedia)
- **2016:** Goose Fire, State Responsibility Area (SRA) 2,340 acres near the towns of Auberry, Prather and Tollhouse
- **2017:** Two fires occurred in 2017. These were the Silver Fire and the Highway Fire.

These are only examples of events in eastern Fresno County. There are other smaller incidents that have been occurring with increasing frequency. In 2017, the fire season had extended itself into late fall.



CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the District's planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the District's planning representatives and Witt O'Brien's consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The SRCD's updated capabilities are summarized below. A summary of the mitigation capabilities is provided in **Table 4. SRCD Mitigation Capability Summary**.

Table 4. SRCD Mitigation Capability Summary

Area	Degree of Capability		
	Limited	Moderate	High
Planning and Regulatory Capability			X
Administrative and Technical Capability			X
Fiscal Capability			X
Available Staff			X
Political Support/Interest			X
Community Support			X

REGULATORY MITIGATION CAPABILITIES

Table 5. SRCD's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the SRCD.

Table 5. SRCD's Regulatory Mitigation Capabilities

Tool/Program	In Place		Adopted/Updated	Under Development		Expect to Implement
	Yes	No		Yes	No	
Building Codes (please indicate UCC or IBC + year)		X				



Community Emergency Response Team (CERT)		X				
Community Rating System (CRS Program of the NFIP)		X				
Emergency Management Accreditation Program (EMAP)		X				
Fire Code		X				
Firewise Community	X		2 approved communities as of 1/31/24, 26 in development			
Floodplain Management/Flood Damage Prevention Ordinance		X				
Land Use/Development Planning		X				
National Flood Insurance Program (NFIP)		X				
Post Disaster Redevelopment/Reconstruction Plan/Ordinance		X				
Storm Ready		X				
Stormwater Management Plan/Ordinance		X				
Subdivision Regulations/Ordinance		X				
Two Weeks Ready		X				
Unified Development Ordinance		X				
Zoning Ordinance		X				

PLANNING MITIGATION CAPABILITIES

Table 6. Sierra Resource Conservation District Planning Capabilities identifies the plans related to mitigation and loss prevention in the District.

Table 6. Sierra Resource Conservation District Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	No		
Climate Resiliency or Adaptation Plan	No		
Community Wildfire Protection Plan (CWPP)	Yes		2018 CWPPs
Comprehensive Emergency Management Plan	No		



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No		
Continuity of Operations Plan (COOP)	No	Yes	2024
Disaster Recovery Plan	No		
Economic Development Plan	No		
Emergency Operations Plan (EOP)	No		
Evacuation Plan	Yes		
Flood Response Plan	No		
Floodplain Management Plan/Flood Mitigation Plan	No		
Hazard Mitigation Plan	Yes		
Historic Preservation Plan	No		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	No		
Threat Hazard Identification and Risk Assessment	No		

SIERRA RESOURCE CONSERVATION DISTRICT LONG RANGE PLAN 2015-2020

Sierra Resource Conservation District's current Long Range Plan describes the physical setting of the District, the history of the organization, and data and personnel resources; identifies the critical issues of the District; and develops a program of action and an annual summary report. This plan identifies several critical issues that must be addressed if the natural resource base for sustained use is to be maintained. These issues include soil erosion, watershed/wetlands, agriculture and rangeland, vegetative management, wildlife habitat, environmental education, and air quality. More recently, due to the impacts of wide-spread tree mortality, the LRP was updated to include the critical challenges associated with millions of dead and dying conifers. Additionally, due to the increase of large and unpredictable fires – with the potential to destroy communities and the surrounding environment, the District has focused most of its resources towards this challenge. The LRP reflects the effort to move from recovery to prevention, working with the FireSafe Councils, CAL FIRE and the U.S. Forest Service and others.

HIGHWAY 168 FIRE SAFE COUNCIL COMMUNITY WILDFIRE PROTECTION PLAN

The Highway 168 Fire Safe Council Community Wildfire Protection Plan (CWPP) summarizes wildfire dangers and issues on a community by community basis within the Council's area of influence. The CWPP also catalogs community wildfire protection needs and identifies corrective action and community projects that will mitigate some of the problems. The CWPP is currently under revision with the Sierra RCD and is to be completed at a later date.



OAK TO TIMBERLINE FIRE SAFE COUNCIL COMMUNITY WILDFIRE PROTECTION PLAN

Oak to Timberline FireSafe Council is in the process of developing their first Community Wildfire Protection Plan (CWPP) under the auspices of Sierra RCD. The plan is expected to be completed by at a later date.



ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

The SRCD is a “Local State Agency” under California Public Resources Code (PRC) 9003. It has at this time five (5) part-time staff, including the District Manager, and also relies upon other outside governmental/non-governmental resources and volunteers. The Board of Directors (currently 3 members, with 2 vacancies) are under a standing resolution by the Fresno County Board of Supervisors and come from private land owners and other conservation-conscious citizens from within the District who often have expertise in a variety of natural resource fields. Each director serves a four-year term. Additional nonvoting associate directors are also appointed, of which there are currently two (2). The District works closely with the Natural Resource Conservation Service (NRCS), California Department of Conservation (DOC), Sierra Nevada Conservancy (SNC) and U.S. Forest Service under interagency agreements, as well as with many other local, state, and federal agencies, research and academic institutions.

Volunteers are an important strength in the District. The community is very aware of the wildfire issues in particular, and many within the community are motivated through the two FireSafe Councils and other entities to help by donating time and talent to improve the situation. Volunteers especially enjoy the educational aspects of teaching wildland fire safety to help prevent fire starts and educating homeowners on how to maintain their property to reduce the hazards from wildfire. Landowners are also generally ready to allow fuel breaks across their property in support of community fuel breaks that mitigate the impact of any fires that do start. **Table 7. SRCD Administrative and Technical Mitigation Capabilities** describes the administrative and technical mitigation capacity of the District.

Table 7. SRCD Administrative and Technical Mitigation Capabilities

Staff and Personnel Resources	Yes	No	Department or Single Staff Member	Comments
Emergency Manager		X		
Engineers or professionals trained in construction practices related to buildings and/or infrastructure		X		
Fiscal Management or Procurement Specialists	X			
Floodplain Manager		X		
Land Surveyors		X		
Land Use/Management/Development Planning		X		
Planners or engineers with an understanding of natural and/or human-caused hazards		X		
Resource Development Staff or Grant-writing	X		Program Managers	Sierra RCD has four staff training in development and grant writing
Scientists familiar with the hazards of the community	X		Forestry and Watershed Program Manager	



Staff experienced with Geographic Information Systems (GIS)	X		GIS specialist	
Staff with education or expertise to assess the community's vulnerability to hazards	X		Forestry and Watershed Program	Sierra RCD provides a Fire Risk Evaluations for private landowners living in Eastern Fresno County through our team of trained technicians

FISCAL MITIGATION CAPABILITIES

The SRCD is eligible for various wildfire, watershed, and community development grants from County, state, and federal agencies and programs as a local state agency under PRC9003. There was no taxing authority by agreement at the time the District was established. The District does not have a designated funding source for mitigation but seeks to implement multi-objective projects that incorporate mitigation activities and considerations. **Table 8. SRCD Fiscal Mitigation Capabilities** describes the fiscal capacity of the District.

Table 8. SRCD Fiscal Mitigation Capabilities

Staff or Personnel Resource	Never Used	Previously Used	Currently Used	Comments
Capital Improvement Programming	X			
Community Development Block Grants (CDBG)	X			
Special Purpose Taxes (or taxing districts)	X			
Gas/Electric Utility Fee	X			
Water/Sewer Fees	X			
Stormwater Utility Fees	X			
Development Impact Fees	X			
General Obligation, revenue, and/or Special Tax Bonds	X			
Partnering Agreements or Intergovernmental Agreements	X			
FEMA Hazard Mitigation	X			



Assistance Grants (HMGP, FMA, PDM)				
Homeland Security Grants (HSGP)	X			
USDA Rural Development Agency Grants	X			
US Economic Development Administration Grants	X			
Infrastructure Investment and Jobs Act (IIJA)	X			

MITIGATION OUTREACH AND PARTNERSHIPS

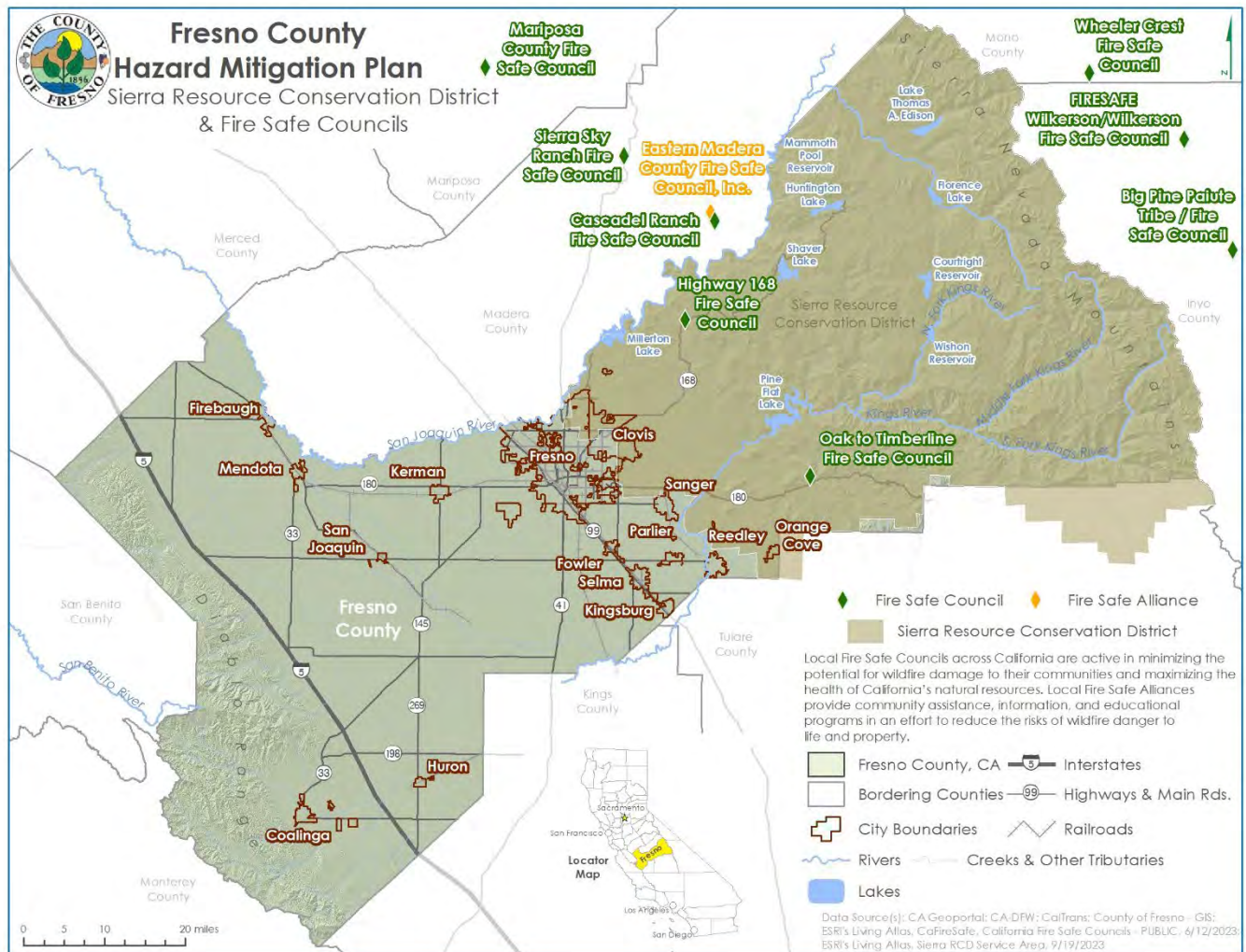
HIGHWAY 168 FIRE SAFE COUNCIL

The Highway 168 Fire Council is a critical partner for the SRCD and has served as a primary partner in the development and update of this annex. It is a volunteer-based nonprofit organization that was formed as one of currently over 150 local chapters of the California Fire Safe Council. The Highway 168 Fire Safe Council was founded in 1997 by local volunteers, businesses, and agency representatives to reduce the risk of wildfire damage to improvements and natural resources within its area of influence. Using education, project grants, and grassroots action, the Council continues to be the primary resource for local efforts to live safely with fire and reduce community risks within the wildland-urban intermix. The Council has successfully administered over \$1.5 million in community project grants to build wildfire fuel breaks and educate the community on living safely in a fire-prone ecosystem. These projects have been credited with saving over a dozen homes and millions in firefighting costs to date.

The Council's area of influence resides entirely within the boundaries of the SRCD, with which the Council has a formal memorandum of understanding to partner on the Fresno County Multi- Hazard Mitigation Plan and other efforts that are to be undertaken. Specifically, the Council represents the portion of the San Joaquin River watershed in eastern Fresno County from the community of Friant in the west to the headwaters of the San Joaquin River in the east. The boundaries of the Highway 168 Fire Safe Council are shown in **Figure 3. Fresno County Sierra Resource Conservation District & Fire Safe Councils.**



Figure 3. Fresno County Sierra Resource Conservation District & Fire Safe Councils



Source: CA Geoportal; CA-DFW; CalTrans; County of Fresno – GIS; ESRI's Living Atlas, CalFireSafe, California Fire Safe Councils – PUBLIC, 6/12/2023, ESRI's Living Atlas, Sierra RCD Service Area, 9/19/2023

The Highway 168 Fire Council has three positions which includes Council President, Vice President, and Secretary/Treasurer. Volunteers include wildfire prevention and suppression experts and prescribed burn and fuel break construction experts. California Department of Forestry and Fire Protection and the U.S. Forest Service provide additional technical assistance and resources. Currently, all hazard mitigation planning and review is being performed by volunteers.

The Council has developed education materials for distribution and conducts various wildland fire education programs throughout the year at schools, town hall meetings, homeowners' associations, and at the annual Fire Safe Festival. They also contribute two wildfire educational pieces a month for publication in local newspapers and have developed a serial story of a fictitious local major fire. The Council maintains a storefront office that provides fire safety information and has a library of wildfire education publications and films.

Highway 168 Fire Safe Council (PO Box 639, Prather CA 93651) Patricia Gallegos (Project Coordinator) (559) 855-3144 Howard Hendrix (Council President) Ryan Stewart (Council Vice



President) The three council members above, along with Craig Jones, Project Manager for the Sierra RCD new constitutes the Highway 168 CWPP Update Committee. This committee now meets two times per month to help expedite the update process.

OAK TO TIMBERLINE FIRE SAFE COUNCIL

Within the Oak to Timberline FireSafe Council's boundary are State and Federal lands, private homes, ranches, schools, churches, youth camps, businesses, and wildlife refuges, and the communities of Piedra, Tivy Valley, Wonder Valley, Squaw Valley, Dunlap, Miramonte, Pinehurst, and Sequoia to Hume Lakes. Its territory lies within the Kings and Kaweah River watersheds, which offer an array of wildlife habitats and recreational activities, as well as being a vacation destination for visitors from all over the world.

Figure 4. Sierra Resource Conservation District / Oak to Timberline FireSafe Council shows the Oak to Timberline FireSafe Council's boundaries.

Figure 4. Sierra Resource Conservation District / Oak to Timberline FireSafe Council

(old map was amec foster)

The Oak to Timberline Fire Safe Council (OTFSC) is a key organization for the overall wildfire mitigation effort within its organizational boundaries and its contiguous neighbors and cooperators. It serves as the conduit for information, resources, and communication for the landowners, businesses, communities and residents within its area of influence. The OTFSC has recently partnered under a MOU (Memorandum of Understanding) with the SRCD to develop its Community Wildfire Protection Plan through funding provided by the California FireSafe Council. The Council Team is comprised of a chairperson, co-project manager, grants coordinator, secretary, historian, treasurer, and several other members.

OTFSC is a volunteer-based, nonprofit organization that was formed as one of currently over 150 local chapters of the California Fire Safe Council. OTFSC was founded in 2005 by local volunteers, businesses, and agency representatives to reduce the risk of wildfire damage to improvements and natural resources within its area of influence. Using education and outreach efforts, project grants, and community action, the Council is a primary resource for local efforts to learn and live safely within the wildland-urban interface.

OTFSC serves a diverse region ranging from 500' to 6500' elevation. From the grasslands, through the brush and oak of the foothills, and all the way to the timberlands of the Giant Sequoias, the Council's service area encompasses nearly 217,000 acres of public and private lands.

Since 2015, the Council has successfully administered over \$475,000 in project grants from CAL FIRE and PG&E to fell dead trees along county and feeder roads in Fresno County, fell and remove logs from the Hartland and Eshom areas, and clear 1000' around PG&E assets. OTFSC relies entirely on volunteers, who include wildfire prevention and suppression experts, grant seekers experienced in writing federal grants, and local businesspeople. CalFire, USFS, and Fresno County Office of Emergency Services provide additional technical assistance and resources. Currently, all hazard mitigation planning and review is being performed by volunteers.

The Council is developing education materials for distribution and offers wildland fire education programs at schools, town hall meetings, homeowners associations, and Mountain Rodeo Association events. They distribute an online monthly newsletter, maintain an active Facebook page, and have an informative and dynamic website.



As a community based, non-profit organization, OTFSC is prepared to fulfill its mission to “promote fire safety by providing information, education, support incentives, and projects that encourage fire safety in our communities east of the Friant-Kern Canal and south of the Kings River, from Oak to Timberline.”

OTHER OUTREACH AND PARTNERSHIPS

The SRCD has working relationships with several federal, state, and county agencies and private landowners. Historically, the District has worked with conservation agency partners like the Natural Resources Conservation Service to provide technical assistance, cost-share programs to encourage use of conservation practices on agricultural and rangeland, and educational activities.

Over the years, the SRCD has been active in conservation partnerships on a variety of field projects with other agencies, including the California Department of Forestry and Fire Protection (CAL FIRE), California Department of Conservation (DOC), the U.S. Forest Service, the California Department of Fish and Game, and the University of California Cooperative Extension. Multiple conservation plans have been developed and implemented on private lands.

The District also works with other agencies on wildfire-related matters. Working with professional fire experts from the U.S. Forest Service and CAL FIRE helps ensure that the District's work complements state and federal efforts and is up to standard for controlling wildfires.

The following lists the resource groups and governmental agencies that are partnered with the SRCD to address resource issues within the District:

- Natural Resource Conservation Service (NRCS)
- California Department of Conservation (DOC)
- California Association of Resource Conservation Districts (CARCD)
- Governor's Office of Planning and Research (GOPR)
- California Natural Resources Agency (CNRA)
- Sierra Nevada Conservancy (SNC)
- Dinkey Creek Landscape Collaborative
- California Department of Water Resources (DWR)
- California State Water Resources Control Board (SWRCB)
- Regional Water Quality Control Board (RWQCB)
- Yosemite/Sequoia Resource Conservation and Development (YSRC&DC)
- Fresno County Resource Advisory Council (RAC)
- Sierra/San Joaquin Noxious Weed Alliance
- Highway 168 Fire Safe Council
- Oak to Timberline Fire Safe Council
- Sierra and Sequoia National Forests
- Fresno County Board of Supervisors



- Sierra Foothill Conservancy (SFC)
- Back Country Horsemen of California
- San Joaquin River Trail Council
- Sierra Club
- CSU Fresno – Lyles College of Engineering

The District supports youth workshops, the Envirothon, and adult stewardship training programs. The District has sponsored Fresno County's Resource Conservation District Day, a "Living among the Oaks" landowner workshop, and a Rangeland Water Quality workshop series. It provides support for minority farmers in the Hmong and Punjabi communities in partnership with the NRCS.

OTHER MITIGATION EFFORTS

The SRCD, in partnership with the Highway 168 Fire Safe Council, has completed 11 fuel break projects. Three other fuel break projects are in various stages of completion. All projects were funded through various federal, state, and County grants along with the donation of thousands of hours of volunteer time. The fuel break projects are only possible with the cooperation of private property owners, so partnerships with landholders are absolute necessities.

Already, two of the fuel break projects have helped stop the spread of major fires:

- The Peterson fire started on Peterson Road, one-half mile downslope and downwind from the community on Cressman's Road, where a shaded fuel break project had been completed only two months prior. The fire quickly became a major wind- and slope-driven crown fire with flame lengths of over 250 feet. As explained by on-site firefighters, there was no way they were going to stop that fire, and there were close to one hundred homes in the path the fire was expected to take in its first day alone. When the flame front hit the "Cressman" fuel break, it was cut off from its ability to spread through the tree tops as a crown fire. It immediately "went to ground" with a flame length of only one to two feet, and firefighters were able to stop its spread at the road running through the middle of the fuel break. All homes were saved, only minor injuries were reported, and the fire was controlled within one burn period instead of the expected multi-period fire. It was estimated that at least two dozen homes with a replacement value of over \$10 million were saved by this fuel break. Using best case estimations, an additional 2,000 acres of timberland would have burned over two additional burn periods. Additional suppression costs would likely have exceeded \$2 million. Not a bad return on a
- \$50,000 fuel break grant from California Department of Forestry and Fire Protection, and lots of volunteer time.
- In the second incident, a major fire burning up a very steep slope was imminently threatening 20 homes with 50 more in its path. Working from the safety of the "Beal" fuel break, which was still under construction at the time, firefighters were able to stop the fire before it could reach the homes. Property loss prevention was estimated at \$1-2 million and suppression cost savings at \$250,000 to \$500,000. And, an estimated 1,000 acres of pine and brush woodland were saved. This project was funded by an \$80,000 Proposition 40 watershed protection grant.



The District has been active in vegetation management projects, including prescribed burns, to reduce fuel loads and fire risk. Additionally, the District has taken a leadership role in the development of voluntary Oak Woodland Guidelines for Fresno County and Rangeland Water Quality Guidelines.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the Sierra Resource Conservation District has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as priorities set forth in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the communities the District serves. Future improvements may include providing training for staff members and volunteers related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Continuing to train staff and volunteers will lead to more informed staff and volunteers who can better communicate this information to the public.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The Sierra Resource Conservation District adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy. Updates on how the District is adhering to the mitigation goals are listed below.

- 1. Provide protection for people's lives from hazards**
- 2. Improve all communities' resilience and capabilities to mitigate hazards and reduce exposures to hazard-related losses**
 - Sierra RCD has funded technical assistance and outreach for Firewise Communities, community workdays, and mitigation projects. In the last three years, the District has funded and implemented projects on over 600 acres of private forested lands mitigating fire risks and improving forest health conditions.
- 3. Improve community and agency awareness about hazards and associated vulnerabilities that threaten Fresno County planning area communities**
 - Fresno County has established two Firewise Communities since 2021 and Sierra RCD is providing technical assistance for forming over two dozen educational, outreach, and implementation funding to fifteen communities identified as at risk in the CalFIRE Fresno-Kings Unit Plan.
 - Outreach in the past three years has met well over 15,000 residents in Eastern Fresno County including 496 Fire Risk Evaluations and approximately 300 landowners have received wildfire mitigation services.
- 4. Provide protection for critical facilities utilities, and services from hazard impacts**
 - Sierra RCD was funded by the Department of Water Resources to install SCADA at three public water systems, test water quality and sustainability at 5 community water systems including Pine Ridge Elementary School, Alder Springs Water Association, the former Auberry Elementary School and at Big Sandy Rancheria. Sierra RCD is also in the process of restoring the Alder Springs Water Association water system that was destroyed in the 2020 Creek Fire.
- 5. Maintain coordination of disaster planning**
 - Sierra RCD is an active participant in various collaborative groups, including the Southern Sierra Integrated Regional Water Management Group and the Dinkey Creek Collaborative. Critical partnerships extend to organizations such as Cal FIRE, USFS, Highway 168 FireSafe Council, Oak to Timberline FireSafe Council, Big Sandy Rancheria, Cold Springs Rancheria, and Dunlap Band of Mono Indians.
 - The Fresno County Tree Mortality Task Force, initially addressing tree mortality pre-2020 Creek Fire, evolved into the Fresno County Wildfire Prevention and Recovery Coordination Task Force.
 - In addition, Sierra RCD is launching a Voluntary Organizations Active in Disasters (VOAD) initiative, aimed at developing a community disaster response plan. Through the network of Firewise communities on evacuation planning and disseminates information about county-wide disaster planning initiatives.



6. Maintain/provide for FEMA eligibility and work to position jurisdictions for Grant Funding

- Sierra RCD has developed a \$10 million FEMA proposal for Creek Fire Recovery. Sierra RCD received funding from the California FireSafe Council to support the completion of the Highway 168 and Highway 180 Community Wildfire Protection Plans.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

The Sierra Resource Conservation District has not identified any specific planning mechanisms into which information from the previous plan was integrated. The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to inform future mitigation projects and planning efforts. The hazard information and mitigation projects will be useful when updating the District's Long-Range Plan as well as updating the Community Wildfire Protection Plans. The District is involved in several wildfire mitigation projects including fuel break projects and vegetation management projects. The information contained in this plan will help the District to focus on areas that are most vulnerable to wildfire. The District has focused on wildfire mitigation in the past, due to it being a high significant hazard for the District. This plan will help to inform staff and volunteers to understand the connection between wildfire and other hazards, such as drought and flooding and think holistically when developing future mitigation project and planning efforts.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from the Sierra Resource Conservation District will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

COMPLETED 2009 MITIGATION ACTIONS

The Sierra Resource Conservation District completed two of the mitigation actions identified in the 2009 plan, which were as follows:

- Create an Integrated Regional Water Management Plan for Eastern Fresno County
- Conduct a Fractured Rock Groundwater Capacity Study for Eastern Fresno County

These actions have increased the SRCD's capability to implement future mitigation actions and have reduced vulnerability to hazards in the District.

SRCD has also begun implementation of several other 2009 actions, which will be continued with the incorporation of these actions in the mitigation strategy for this plan update.

COMPLETED 2018 MITIGATION ACTIONS

1. STRENGTHEN DAM FAILURE/FLOOD PLANNING, COORDINATION, AND TRAINING

Hazard(s) Addressed: Multi-hazard: flood, dam failure



Issue/Background: Dam failure and flood planning are done as required by law. However, due to lack of funding, most of this knowledge and planning are kept at the top levels. Mid- and lower- level first responders are not part of coordination planning and do not receive significant training in procedures, key downstream hazard locations, access routes, alternate evacuation routes, and where to set up roadblocks. While the probability of a dam failure is low, the potential impact is extreme. Flooding from the inability to control water during extreme weather events is much more likely, and response procedures are similar.

Responsible Office: Sierra Resource Conservation District/Highway 168 Fire Safe Council, Fresno County Sheriff's Office, Madera County Sheriff's Office

Priority (High, Medium, Low): Low

Cost Estimate: \$25,000 Potential Funding: Grants Benefits (Avoided Losses):

Tremendous amounts of time will be saved and safety for first responders will be greatly enhanced.

- 10 lives saved (including first responders)
- 50 injuries avoided
- Savings from dispatching too many personnel to wrong locations or lost equipment estimated at \$100,000

Schedule: 1-3 years

Status: Removed

2. UPDATE HIGHWAY 168 FIRESAFE COUNCIL'S COMMUNITY WILDFIRE PROTECTION PLAN THROUGH CA FIRESAFE COUNCIL FUNDING

Hazard(s) Addressed: Wildfire

Issue/Background: The Highway 168 FireSafe Council (FSC) CWPP needs to be updated as per requirements of National CWPP protocols.

Other Alternatives: None – this is needed to continue the efforts of the Highway 168 FSC.

Responsible Office: Sierra RCD in cooperation with the Highway 168 FSC and its partners **Priority** (High, Medium, Low): High

Cost Estimate: As per current grant funding

Potential Funding: CA FireSafe Council, CalFire

Benefits (Avoided Losses): Losses to life, property, and ecological resources **Schedule:** Initiated in October 2016 - Completion by September 2018

Status: Removed



3. DEVELOP WILDFIRE PROTECTION PLAN WITH OAK TO TIMBERLINE FIRESAFE COUNCIL THROUGH CA FIRESAFE COUNCIL FUNDING

Hazard(s) Addressed: Wildfire

Issue/Background: The Southern part of Fresno County is not covered by a CWPP. The current effort and updates will allow the entire forested portion of the County to be covered.

Other Alternatives: This is the only viable alternative to ensure the entire Fresno County forested area is covered by a CWPP.

Responsible Office: Sierra RCD

Priority (High, Medium, Low): High

Cost Estimate: As per current grant funding

Potential Funding: CA FireSafe Council, CalFire

Benefits (Avoided Losses): Losses to life, property, and ecological resources Schedule: Initiated in October 2016 - Completion by September 2019 Status: New project

Status: Removed

4. REMOVAL OF ILLEGAL MARIJUANA GROWS TO REDUCE FIRE RISK IN WILDLAND URBAN INTERFACE (WUI)

Hazard(s) Addressed: Wildfire

Issue/Background: Many mountain and foothill residents have illegal pot grows on their properties – many do not know that they do. Pot grows have caused wildfires because of their use of stolen electricity. They also illegally use waterways and well water and make residents fearful of leaving their properties in a wildfire because of potential looting.

Other Alternatives: None

Responsible Office: Fresno County Sheriff in coordination with SRCD

Priority (High, Medium, Low): High

Cost Estimate: Low; can be done with existing staff

Potential Funding: County budget

Benefits (Avoided Losses): This will reduce fire risks, reduce polluted water and soil, and eliminate fear of illegal activity that may cause problems during evacuations or ordinary hazard removal by property owner.

Schedule: No Text.

Status: Removed

5. BURNS FLAT FUEL BREAK



Hazard(s) Addressed: Wildfire

Issue/Background: The region below Pinehurst and Miramonte CA is very heavily vegetated with highly flammable fuels, having last burned in or before the McGee Fire of 1955 and is a serious wildfire threat to these villages.

Other Alternatives: Complete in small sections over a longer period of time which is a much less viable approach

Responsible Office: Sierra Resource Conservation District with Oak to Timberline Fire Safe Council

Priority (High, Medium, Low): High

Cost Estimate: \$21,150 for 25 acres of clearing at \$850/acre

Potential Funding: CALFIRE Grant

Benefits (Avoided Losses): A fuel break extending from Dunlap Road to Todd Eymann Road widening existing access roads, fire roads and natural fuel breaks (Burns Flat) will greatly mitigate the progress of wildfire out of the canyons below and toward the more heavily populated villages.

Schedule: Completion 2 years following funding

Status: Removed

6. WHISPERING SPRINGS FUEL BREAK

Hazard(s) Addressed: Wildfire

Issue/Background: Lower elevation project off Lodge Road in Tollhouse. We cleared this area a few years ago but it could use some work. It is mostly brush and annual grass that is highly flammable. The area is filled with homes and is located on a steep slope. The Goose Fire threatened this area in 2016 but according to residents some of the work the FSC did help avert the fire away from a certain areas.

Other Alternatives: Alternatives are minimal. Short sections could be completed over a period of time but this results in a less effective fuel break and would require more maintenance over time.

Responsible Office: Highway 168 Fire Safe Council

Priority (High, Medium, Low): High

Cost Estimate: \$150,000

Potential Funding: Grant money

Benefits (Avoided Losses): The area is high in values at risk, lives, homes, livestock. It is better to be prepared than worry.

Schedule: 2018

Status: Removed



7. PARTNER WITH U.S. FOREST SERVICE TO REDUCE FIRE RISK IN WILDLAND URBAN INTERFACE (WUI)

Hazard(s) Addressed: Wildfire

Issue/Background: Partnered with Sierra National Forest with project through March 2020 and to receive initial funding for processing equipment as a proof of concept as noted in prior project. This project will determine the ability to prevent burning of debris piles and the resultant impact to air quality and human health through alternative approaches.

Other Alternatives: None known.

Responsible Office: U.S. Forest Service Sierra National Forest under 5-year Participating Agreement with Sierra RCD.

Priority (High, Medium, Low): High

Cost Estimate: \$5 to \$10 million

Potential Funding: Other funding from CALFIRE and California Energy Commission (CEC)

Benefits (Avoided Losses): Hundreds of millions of dollars and potentially over \$1 billion or more in avoided losses to human life, property, businesses, and destruction to foothill and mountain communities; impact to water quality and quantity. Additionally, the benefits include avoided losses to the complex and heavily invested hydroelectric production infrastructure, including transmission lines as a significant part of the electrical grid within the District and impacts to electrical production and transmission within the whole state of California.

Schedule: 2017- 2020

Status: Completed

MITIGATION ACTIONS

The planning team for the SRCD identified and prioritized the mitigation actions listed below based on the risk assessment. Background information and information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are included.

The Sierra Resource Conservation District, in coordination with the Oak to Timberline FireSafe Council and Highway 168 FireSafe Council, will be participating in the new multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program, with an emphasis on wildfire, drought, flood and severe weather hazards. The county-wide project will be led by the County in partnership with all municipalities and special districts. The District agrees to help disseminate information on hazards provided by the County. More information on the multi-jurisdictional public education and awareness action can be found in the base plan Chapter 5 Mitigation Strategy.

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Extreme heat and cold impact the conservation district through the health of the forest, which is addressed through wildfire mitigation and planning efforts, and also do not have standalone mitigation actions. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.



1. STRENGTHEN NON-NATIVE NOXIOUS WEED CONTROL EFFORTS

Hazard(s) Addressed: Multi-Hazard: wildfire, drought

Issue/Background: The incursion of noxious weeds into California has been a concern for many years, however, in the rural and mountain regions of the County, the populations of various California Department of Food and Agriculture “A” and “B” rated weeds are still at a point that control and in some cases, eradication is possible. These weeds typically alter the water cycle and increase the threat of wildfire in the foothill and mountains. The threat of these noxious weeds has been termed by one noted weed scientist as “a disaster in slow motion.”

While work is in progress on this threat, funding is very short. The Fresno County Department of Agriculture (FCDA) and the SRCD are currently partnering with landowners and other agencies to combat the spread of selected weeds, but the threat continues to grow as new weeds are introduced and less common weed populations remain undetected.

Education of landowners, agencies, and utilities is a daunting task that must be done to stem the tide of invasive weeds. Agriculture, ecosystems, waterways, and wildlife habitat are in jeopardy because of this often overlooked threat.

Control and detection of noxious weeds is very expensive and time consuming for a single agency to undertake. The FCDA has attempted to fulfill underfunded mandated control responsibilities.

Other Alternatives: None

Responsible Office: Sierra Resource Conservation District General Manager

Priority (High, Medium, Low): Low

Cost Estimate: \$2-5 million per year for detection and control, \$200,000 per year for education and workshops for 5-10 years

Potential Funding: Limited funding has been secured from the California Department of Food and Agriculture, watershed grants, Resource Advisory Council, and the U.S. Forest Service.

Benefits (Avoided Losses): Estimates of reduced agricultural production currently run into several millions of dollars each year for the County. Current control and education costs approximate \$150,000. Destruction of habitat, ecosystems, and waterways has not been established. Estimated benefits of noxious weed control may be in the hundreds of millions of dollars per year for the County.

Schedule: Work is ongoing as funding is available. Future, reliable funding would ensure that the weeds present now are controlled and future infestations would be detected and eradicated.

Status: Routine activity/seasonal

Comments: Sierra RCD has partnered with the San Joaquin River Conservancy and Parkway Trust for the removal of invasive species along the San Joaquin River. Sierra RCD has also implemented non-native noxious weed control for watershed restoration on the upper San Joaquin river watershed.

2. IMPROVE ALTERNATE EMERGENCY ACCESS ROADS

Hazard(s) Addressed: Wildfire

Issue/Background: The communities of Shaver Lake, Big Creek, and Lakeshore (Huntington Lake) and 250,000 acres of the Sierra National Forest open to public use are accessed by only one main



transportation route, Highway 168. This highway has a history of being closed from three days to a week almost every year because of wildfires. It also has a history of closures for up to three weeks at a time about once every five years due to vehicle accidents and washouts. Lesser closures of one-three days happen almost every two years. Two- to six-hour temporary closures happen an average of twice per month. During all of these closures, emergency responders, including ambulances, must seek alternate routes to reach emergency sites or transport patients to medical care.

In many cases, the only alternate routes into or out of the area are narrow mountain back roads, which residents and visitors (thousands on busy summer day) are using to evacuate, reach stranded family members or pets, get into the area for recreation, or get home or to work. This can create a traffic jam and stop all traffic on these alternate routes. The following can make traffic problems worse: when two large vehicles meet on a narrow section of road, an accident occurs, or a vehicle breaks down at a choke point. Traffic could cause a second emergency/disaster if (for example) a vehicle went off road and caused a wildfire. At the very least, it is unsafe and impairs the movement of emergency equipment and personnel. In some cases, the back roads cannot handle large vehicles, such as buses and structure protection fire trucks, even when there is no traffic.

With relatively low expense, improvements could be made to these back roads, located primarily in the Sierra National Forest, that would allow for the reasonable flow of public traffic and access for emergency vehicles. Two roads, one east and one west of Highway 168 would need to be improved to cover the high probability of both 168 and one of the alternate routes being closed by a major wildfire, which most experts agree is inevitable.

Other Alternatives: Close all side roads to all but emergency traffic, stranding thousands and requiring evacuation centers and large numbers of emergency personnel to reach stranded residents and transport them to safe locations. Buses and other large vehicles would not be able to reach the cut-off area.

Responsible Office: Sierra Resource Conservation District General Manager/Highway 168 Fire Safe Council, Sierra National Forest

Priority (High, Medium, Low): High

Cost Estimate: \$1 million

Potential Funding: California State DOT grants

Benefits (Avoided Losses):

- More than 20 lives saved
- 20 or more incidents of reduced injury due to prompt emergency response, estimated savings
- \$500,000
- More than 100 homes saved with a value of over \$40 million
- Reduced fire suppression costs of \$20-100 million
- Reduced losses to natural resources and ecosystems, estimated value \$600 million
- Savings of \$20-100 million in forest and habitat restoration
- Reduced damage to infrastructure \$4 million
- Reduced need for emergency response and fewer emergency responders required, estimated savings \$500,000-\$1 million



- Reduced need to set up evacuation centers and reduced cost to operate centers when needed

Schedule: Two years, April-November

Status: 1-3 years

Comments: Up to a dozen alternate emergency access roads have been improved in the Wildland Urban Interface. Plans are being developed within Firewise Communities to improve additional emergency access roads.

3. CONDUCT COMMUNITY FUEL BREAK CONSTRUCTION AND MAINTENANCE ON A LANDSCAPE SCALE

Hazard(s) Addressed: Wildfire

Issue/Background: There is a high occurrence of wildland fires in rural areas of eastern Fresno County and a heavy urban intermix of homes and businesses in very high and extreme fire danger zones. All communities in the foothill and mountain region of eastern Fresno County were included on the National Fire Plan's list of Communities at Risk.

Historically, community fuel breaks have proven to be the most effective pre-fire treatment available for lessening the impact of wildfires. These fuel breaks have proven themselves time and again in stopping the spread of even major fire events and saving lives, homes, businesses, resources, ecosystems, and suppression costs. In two recent local examples, fuel breaks were credited with saving dozens of homes, hundreds of acres, and millions of dollars in losses and suppression costs.

Current fuel break projects are effective, but due to lack of sufficient funding, there are large gaps in the system that need to be addressed before maximum benefit can be realized. Due to re-growth after 5 to 6 years, unmaintained fuel breaks start to lose some of their effectiveness, and after 10 to 12 years, unmaintained fuel breaks need to be reconstructed. Relatively inexpensive treatments with herbicides or other methods can maintain these important community projects indefinitely.

Responsible Office: Sierra Resource Conservation District General Manager/Highway 168 Fire Safe Council, Sierra National Forest

Priority (High, Medium, Low): High

Cost Estimate: \$2.5 million for new construction, \$200,000 annually to maintain system

Potential Funding: CalFire grants

Benefits (Avoided Losses): Over 20 years:

- More than 10 lives saved
- More than 500 homes saved with a value of over \$200 million
- Reduced fire suppression costs of \$100-500 million
- Reduced losses to natural resources and ecosystems, estimate value \$3 billion
- Savings of \$100-500 million in forest and habitat restoration
- Reduced damage to infrastructure, estimated \$20 million
- Reduced need for emergency response and fewer emergency responders required, estimated savings \$5-10 million



Schedule: 10 years, as weather permits each year

Status: Routine activity/seasonal

Comments: Highway 168 FireSafe Council, Oak to Timberline FireSafe Council, and Fresno County have partnered with CAL FIRE to develop community fuel breaks.

4. CREATE A FUEL BREAK ALONG HIGHWAY 168

Hazard(s) Addressed: Wildfire

Issue/Background: Several communities and half a million acres of heavy recreation use land are served by the two-lane state Highway 168 in eastern Fresno County, which offers the only year-round access and egress from the area. During peak-use periods, the area served by this highway may hold close to 20,000 people on a weekend day. A ten-mile stretch of the highway has a history of closures due to emergencies (wildfires, washouts) and transportation accidents, closing the area for access by emergency responders (including ambulances) and repair crews. Closures along this portion of highway prevent evacuation from the area and access by delivery vehicles (food). They also prevent people from reaching work or homes. Any evacuation centers set up above the closure may require aircraft to bring in supplies.

Other Alternatives: Develop safe alternate year-round road to service the area. Responsible Office: Sierra Resource Conservation District/Highway 168 Fire Safe Council Priority (High, Medium, Low): High

Cost Estimate: \$450,000

Potential Funding: CalFire grants

Benefits (Avoided Losses):

A fuel break will limit the spread of wildfires caused by vehicle accidents and malfunctions from spreading into residential areas and business districts on this portion of the highway. A fuel break along the corridor will reduce the frequency and duration of closures. Also, a fuel break along this corridor will serve as a line of defense providing a place for fire crews to safely make a stand against major wildfires in the San Joaquin River drainage area that threaten the community of Shaver Lake.

- More than 5 lives saved
- 20 or more incidents of reduced injury due to prompt emergency response, estimated savings
- \$500,000
- More than 50 homes saved with a value of over \$20 million
- Reduced fire suppression costs of \$10-50 million
- Reduced losses to natural resources and ecosystems, estimated value \$300 million
- Savings of \$10-50 million in forest and habitat restoration
- Reduced damage to infrastructure, estimated savings \$2 million
- Reduced need for emergency response and fewer emergency responders required, estimated savings \$500,000-\$1 million
- Reduced need to set up evacuation centers and reduced cost to operate centers



It will also have the benefit of lessening traffic hazards and closures due to weather-related tree falls blocking the highway.

Schedule: Three years, April-November

Status: In planning stage

5. IMPLEMENT A NEIGHBORHOOD CHIPPER PROGRAM

Hazard(s) Addressed: Wildfire

Issue/Background: Rural areas in the County are subject to high incidence of wildfires. In the areas where natural growth is other than grass (i.e., brush and trees), the fire hazard and intensity are much higher. Improvements (i.e., structures, infrastructure) in these areas are subject to damage and destruction on an annual basis. The larger the fire, the more significant the loss potential. Often, the fires originate from the improvements or from operations associated with the improvements.

Emergency responders must spend far more time defensively protecting improvements that do not have adequate clearance of flammable vegetation, which delays them from directly attacking the main fire. This typically results in a larger more destructive fire than would otherwise have occurred.

Even with state laws, clearances are often not maintained to an adequate distance to protect improvements or prevent fires that originate at the improvement from spreading to the wildlands. Currently, a very short season for hazard-reduction burning is the only viable option for elimination of the flammable material. Most of the year (10 months), this is not an option. Providing on-site chipping of the material removed by the party responsible for the improvement, (homeowner, business, agency etc.) has been shown to be an effective way to encourage proper clearances are maintained, thus reducing fire damage, frequency, and size.

Operation of a small crew in year one requires the purchase of a commercial quality chipper, necessary supplies, and insurance as well as provision of labor expenses. Supplies, insurance, maintenance, and labor expenses are also required for each additional year.

Other Alternatives:

- More aggressive enforcement of clearance regulations would work in some cases. In many instances, the minimum requirements are inadequate to protect the improvement or the surrounding wildlands.
- Development of alternate disposal options within the areas in jeopardy. Composting, biomass generation, and other options for utilization or disposal of the material have been exhaustively explored and so far rejected as economically unviable.

Responsible Office: Sierra Resource Conservation District General Manager/Highway 168 Fire Safe Council

Priority (High, Medium, Low): High

Cost Estimate: \$120,000 first year, \$70,000 each additional year

Potential Funding: HMA grants, In-kind matching (labor, etc.), \$20,000 annually

Benefits (Avoided Losses):

- More than two lives saved
- More than 25 homes or business saved with a value of over \$10 million



- Reduced fire suppression costs of \$5-20 million
- Reduced losses to natural resources and ecosystems, estimated value \$50 million
- Savings of 1-5 million in forest and habitat restoration
- Reduced damage to infrastructure, estimated savings greater than \$10 million
- Reduced need for emergency response and fewer emergency responders required, estimated savings \$50-500,000 annually

Schedule: Year round as weather and funding permit

Status: Routine activity/seasonal

Comments: Sierra RCD successfully launched a community chipper program and have done several dozen community chipper workdays in the effort to reduce post fire fuels and improve defensible space with communities along highway 168 and Highway 180.

6. CONDUCT PRESCRIBED FIRES

Hazard(s) Addressed: Wildfire

Issue/Background: Historical natural fire regimes have been disrupted, which has led to ever increasing fuel loadings and disruptions of natural processes, changing the natural mix of vegetation. This increased fuel loading poses a severe threat to the communities of eastern Fresno County. In many cases, the lack of fire in a given area has led to the suppression (or extinction) of endangered species and the introduction and spread of invasive non-native species. In addition to extreme threat to life and property that modern wildfires pose, they also destroy ecosystems that had once been able to survive the occasional natural fire. The careful reintroduction of fire to the landscape through prescribed burning offers the only environmentally sound method of addressing all these issues in one cost-effective treatment.

Other Alternatives: The reduction of the fire hazard can be addressed through other expensive projects, but only prescribed fire addresses the role that fire naturally played in maintaining healthy, less fire hazardous ecosystems.

Responsible Office: Sierra Resource Conservation District General Manager/Highway 168 Fire Safe Council

Priority (High, Medium, Low): High

Cost Estimate: \$100,000 annually

Potential Funding: Funding from burn program funds on national forest lands, vegetation management program funds through the California Department of Forestry and Fire Protection for private lands

Benefits (Avoided Losses):

- More than one life saved
- Suppression of nonnative invasive species, estimated savings \$5 million
- More than 10 homes saved with a value of over \$2 million
- Reduced fire suppression costs of \$2-5 million
- Reduced losses to natural resources and ecosystems, estimated value \$30 million



- Savings of 5-25 million in forest and habitat restoration
- Reduced damage to infrastructure \$500,000
- Restoration of natural systems and native species, estimated value \$15 million

Schedule: Annually, April-December, as weather and air quality dictates

Status: Routine activity/seasonal

Comments: Sierra RCD has successfully launched a prescribed fire program for small acre and low severity fire. To date, Sierra RCD has completed two burn units.

7. ESTABLISH A SYSTEM OF FIRE PUMPER/TANKER FILL STATIONS AND WATER STORAGE

Hazard(s) Addressed: Multi-hazard: drought, wildfire

Issue/Background: Water is a scarce commodity in many portions of rural Fresno County. During fires (wildland and structure), the nearest available water source can be more than a half hour away, requiring an hour or more turnaround time to return to fires with a load of water. Fires could be stopped or kept smaller if the turnaround times could be reduced. During drought years, when wildfires are at their worst, potential locations for water sources are scarcest.

There are many locations with available water that can be accessed if pre-arranged agreements are in place and/or road work is done to allow trucks to access the source. Other locations have undeveloped year-round spring or creek access that would only require some basic development and installation of a hydrant or storage tank to make them usable. In some cases, property owners are willing to provide well water to maintain a fire storage tank. Maps of all available fill locations would further increase the effectiveness of current equipment and staff.

Responsible Office: Sierra Resource Conservation District General Manager

Priority (High, Medium, Low): High

Cost Estimate: \$500,000 construction, \$25,000 annual maintenance

Potential Funding: California Forestry and Fire Protection, U.S. Forest Service grants

Benefits (Avoided Losses):

- Improve water availability during times of drought
- More than five lives saved
- 20 fewer serious injuries
- More than 50 homes saved with a value of over \$20 million
- Reduced fire suppression costs of \$10-50 million
- Reduced losses to natural resources and ecosystems, estimated value \$300 million
- Savings of 10-50 million in forest and habitat restoration
- Reduced damage to infrastructure, estimated savings \$2 million

Schedule: Five years, May-November each year

Status: 1-5 years



Comments: Due to the Creek Fire, the Creek Fire Recovery Collaborative has assisted approximately 10 landowners with repairing their water system and/or replacing water storage containers. Firewise Communities are being educated on the importance of establishing fire suppression systems in their communities.

8. IMPLEMENT A PUBLIC FIRE PREVENTION, SURVIVAL, AND MITIGATION EDUCATION PROGRAM

Hazard(s) Addressed: Wildfire

Issue/Background: Each year, more people move into the wildland-urban intermix, and communities expand, which increases Fresno County's wildland-urban interface. Wildfire threats to homes and communities in these areas increase every year, which taxes the abilities of fire agencies to protect them. Also, fire occurrences increase as fires that originate from human encroachment spread into the surrounding wildlands. Ignorance of the hazards associated with living in these extreme fire hazard locations and prevention measures needed to prevent the accidental start of fires and increase individual and structural survivability during a fire event is ever increasing.

Programs, literature, and outreach for new residents and children have proven effective. There is also a great need to develop and distribute emergency evacuation plans, including how to stay informed, what to do, and alternate evacuation routes.

Responsible Office: Sierra Resource Conservation District General Manager, Highway 168 Fire Safe Council, Oak to Timberline Fire Safe Council, California Department of Forestry and Fire Protection, Sierra National Forest

Priority (High, Medium, Low): Medium

Cost Estimate: \$20,000 annually

Potential Funding: Sierra Resource Conservation District fire prevention funds

Benefits (Avoided Losses):

- Fewer wildfires
- More than 20 lives saved
- More than 50 homes saved with a value of over \$20 million
- Reduced fire suppression costs of 5-10 million
- Reduced losses to natural resources and ecosystems, estimated value \$50 million
- Savings of \$1-25 million in forest and habitat restoration
- Reduced damage to infrastructure, estimated savings \$500,000
- Reduced need for emergency response and fewer emergency responders required, estimated savings \$50-\$300,000

Schedule: Annually, April-October

Status: Routine activity

Comments: Sierra RCD's Forestry and Watershed Program has provided over the past 5 years 496 Fire Risk Evaluations to private landowners living in the Wildland Urban Interface. These evaluations



focus on Home Hardening, Defensible Space and Forest Stewardship. Completed approximately 9000 hours of outreach to local landowners through the community events.

9. IMPLEMENT A BIOMASS UTILIZATION AND DISPOSITIONING PROGRAM FOR EXCESSIVE FOREST AND RANGELAND VEGETATION

Hazard(s) Addressed: Multi-Hazard: wildfire, severe weather – winter storm and wind

Issue/Background: Program initiated in 2016 to begin addressing cost-effective approach with review of processing equipment. Sierra RCD is looking towards the integration of efforts to assure that there are no gaps that impact public safety due to extreme fuel load. The District has been working with the Governor's Office of Planning and Research to identify cost-effective technologies for increasing the utilization of these excess hazardous fuels materials for beneficial uses such as community scale electrical production, small scale biodiesel production and carbon sequestration in the form of biochar.

Other Alternatives: None. The District has been significantly impacted by the Tree Mortality Crisis which has been officially declared under a State of Emergency Proclamation by the Governor of California. Nearly two-thirds of the District overlays private and public forest land.

Responsible Office: This is a combined multi-agency responsibility, including the Sierra RCD General Manager, CALFIRE in State Responsibility Areas (SRA), Natural Resources Conservation Service (NRCS) under EQIP (Environmental Quality Improvement Program) for private landowners and the U.S. Forest Service (USFS) for public lands.

Priority (High, Medium, Low): High

Cost Estimate: \$15 to \$25 million for initial remediation, rehabilitation, and restoration efforts. May take over \$100 million to minimize public and environmental impacts.

Potential Funding: Sources include CALFIRE, California Energy Commission (CEC), USFS, NRCS, Pacific Gas and Electric (PG&E), and Southern California Edison (SCE).

Benefits (Avoided Losses): Hundreds of millions of dollars and potentially over \$1 billion or more dollars to human life, property, businesses, and destruction to foothill and mountain communities; impact to water quality and quantity. Additionally, the benefits include avoided losses to the complex and heavily invested hydroelectric production infrastructure, including transmission lines as a significant part of the electrical grid within the District and impacts to electrical production and transmission within the whole state of California. Removing standing dead trees also has the added benefit of mitigating damage to electrical transmission lines and transportation corridors by reducing the potential for trees to be blown down from wind and winter storms. This also has a public safety benefit.

Schedule: Phase 1 – January 2018 through December 2022 / Phase 2 – January 2023 through December 2027

Status: In progress

Comments: Sierra RCD has completed a feasibility study for a biomass to biofuel utilization for Fresno County

10. THE BEAL FIRE ROAD FUEL BREAK

**Hazard(s) Addressed:** Wildfire

Issue/Background: The Historical Beal Fire Road has been in existence since 1933 when it was constructed by the CCC's under the direction of President Roosevelt. The Beal has over the years been credited with helping halt or slowing down a wildland fire. The area at mid-slope from Auberry Road has homes along the Beal for a couple of miles then turns into Forest Service Land then picks back up with homes again before connecting with Highway 168 at mid-slope. The values at risk are high here, if a fire gets past this area it could travel into Meadow Lakes, the many subdivisions along Highway 168 and enter Shaver Lake and possibly higher. Types of fuel include brush, annual grass and ladder fuels and some dead trees.

Other Alternatives: Few viable alternatives exist. Shorter sections over time or implementing completely new fuel breaks closer to the values at risk but both are far less effective.

Responsible Office: Sierra Resource Conservation District General Manager/Highway 168 Fire Safe Council

Priority (High, Medium, Low): High

Cost Estimate: \$100,000 to \$150,000

Potential Funding: CalFire

Benefits (Avoided Losses): Avoid losing lives, structures, businesses, infrastructure

Schedule: Initiated in 2019

Status: Planning phase

11. PETERSON ROAD FUEL BREAK

Hazard(s) Addressed: Wildfire

Issue/Background: The Council has worked on Peterson twice in masticating and removing ladder fuels. Even with tree work going on we feel there is still clearing that needs to be done. The road is narrow and some three mile long and requires a lot of work to provide a safe environment for residents and homes. If a fire were to break out, it would be very difficult to safely evacuate the residents and allow firefighters to enter.

Other Alternatives: Other than doing shorter sections over time, the proposed action is the most cost effective and will result in a more effective fuel break.

Responsible Office: Sierra Resource Conservation District General Manager/Highway 168 Fire Safe Council

Priority (High, Medium, Low): High

Cost Estimate: \$100,000

Potential Funding: CalFire

Benefits (Avoided Losses): In 2004 a fire was started by a welder near dry grass that traveled up slope to Cressman Road just above. The fire burned 75 acres and came to a halt when it hit the FSC Cressman fuel break. This is an effective strategy for controlling wildfires and minimizing potential damage.

Schedule: Initiated 2018/2019

Status: Planning phase



12. ENSURE THE COMMUNITY WILDFIRE PROTECTION PLANS ARE UP TO DATE

Hazard(s) Addressed: Wildfire

Responsible Office: Sierra Resource Conservation District General Manager

Priority (High, Medium, Low): High

Potential Funding: USDA grants

Status: New mitigation action

Annex Q: Westlands Water District





PARTICIPATION

To update the Westlands Water District's jurisdictional annex, the District had the opportunity to consult and engage local stakeholders and partners during the planning process as needed. Additionally, during the planning process, the Witt O'Brien's consulting team provided opportunities for the District's input. These opportunities included completing worksheets (such as the Capability Assessment, Hazard Risk Assessment, and Mitigation Strategy Worksheets), reviewing and providing feedback on the draft jurisdictional annex, providing feedback during planning team meetings, and providing feedback through emails or phone calls. Westlands Water District did not engage with stakeholders outside of those invited by the Hazard Mitigation Planning Committee (identified in Appendix B) or conduct additional rounds of public outreach.



DISTRICT PROFILE

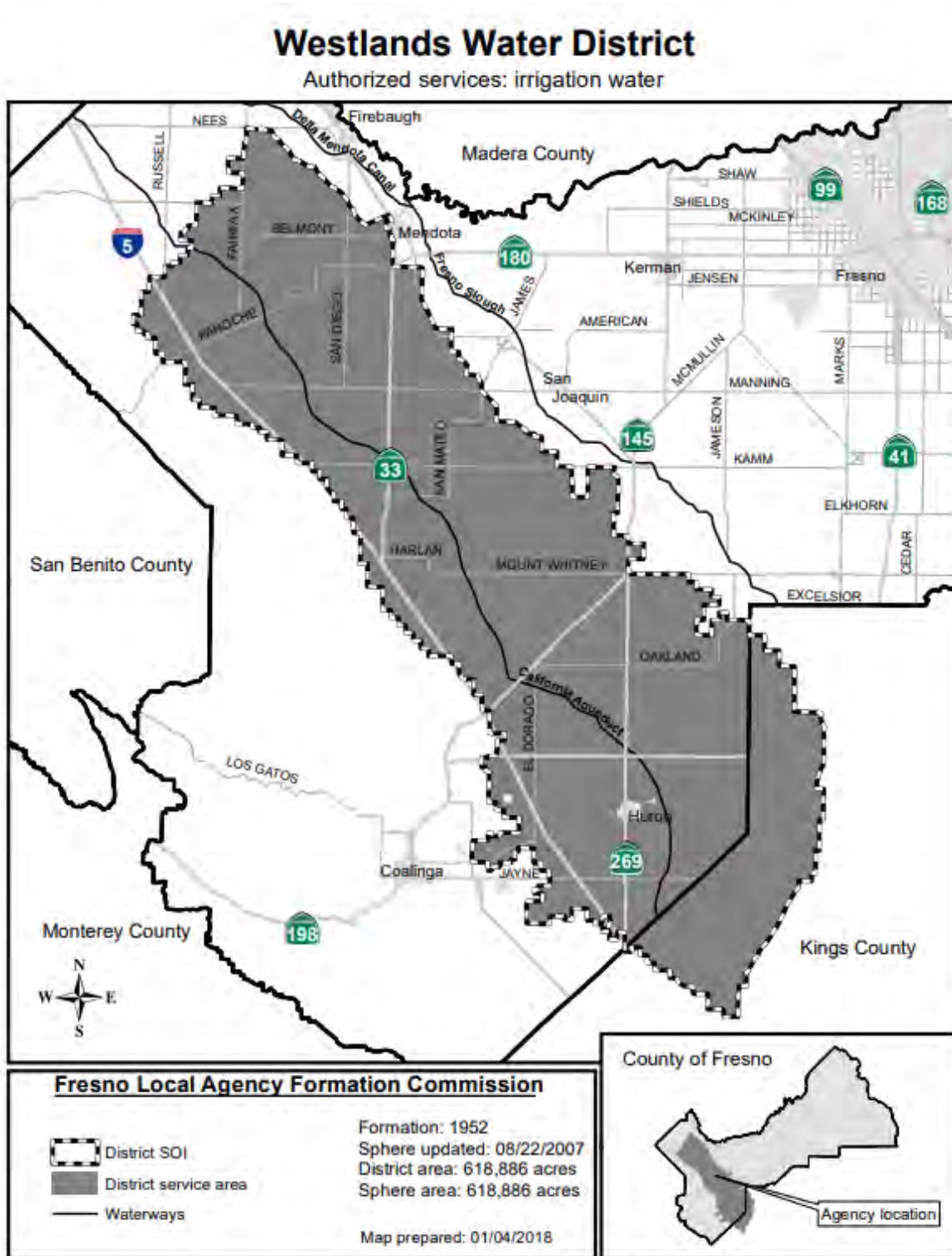
The mission of Westlands Water District (District) is to provide timely, reliable and affordable water supply to its landowners and water users, and to provide drainage service to those lands that need it. To this end, Westlands is committed to the preservation of its federal contract, which includes water and drainage service, and to the acquisition of additional water necessary to meet the needs of its landowners and water users.

Westlands formed under California Water District Law in 1952 upon petition of landowners located within the District's proposed boundaries. Westlands Water District consists of nearly 1,000 square miles of prime farmland between the Diablo Range of the California Coast Range Mountains and the trough, or lowest point, of the San Joaquin Valley in western Fresno and Kings Counties. Westlands averages 22 miles in width at its widest point and stretches about 67 miles from the City of Mendota in the north to Kettleman City in the south. When the original Westlands was organized, it included approximately 376,000 acres. In 1965, it merged with its western neighbor, Westplains Water Storage District, adding 210,000 acres and Broadview Water District, adding 10,000 acres. Additionally, lands comprising about 18,000 acres were annexed to the District after the merger to form the current 614,000-acre District with an irrigable acreage of 568,000 acres.

Westlands encompasses more than 600,000 acres of farmland and serves approximately 700 family-owned farms that average 875 acres in size. Westlands is a Central Valley Project (CVP) contractor with water service contracts for 1,196,948 AF. Westlands receives water through the Delta Division/San Luis Unit of the CVP. Major conveyance CVP facilities used for delivering water to Westlands include the Delta Mendota Canal (DMC) and the San Luis Canal (SLC). Water is delivered directly to lands in the San Luis Unit or is stored temporarily in San Luis Reservoir (SLR) for later delivery. Once diverted from the CVP facilities, water is delivered to farmers through 1,034 miles of underground pipe and over 3,300 metered delivery outlets. In addition to the CVP supply, landowners in Westlands rely on groundwater pumping, water transfers, and water acquisitions to supplement the CVP supply. If the water portfolio is insufficient to farm all land, land is allowed.

The District's boundaries, surrounding communities, and nearby water infrastructure are shown in **Figure 1. Westlands Water District.**

Figure 1. Westlands Water District



Source: Fresno Local Agency Formation Commission,
<https://www.fresnolafco.org/files/c89b4931a/Westlands+WD+01042018.pdf>



Westlands Water District is in the western parts of both Fresno and Kings Counties. The only communities within the District are Huron in Fresno County and Lemoore Naval Air Station in Kings County. Huron's 2022 population was 6,240 with a population-projected increase of 25 percent by 2030. The population growth for Fresno and Kings Counties were 28 percent and 34 percent, respectively, during the period 1990 to 2010. **Table 1. Community Population Projections** summarizes the population projections for selected communities within the District's boundaries through 2030.

Table 1. Community Population Projections

Community	2020	2030	2040	2050
Firebaugh	7,720	9,200	9,920	10,450
Huron	5,700	6,200	6,680	7,030
Mendota	11,220	12,330	13,200	13,850

Source: Fresno County Council of Governments, 2020



HAZARD IDENTIFICATION AND SUMMARY

The District's resources team identified the hazards that affect the District and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance. (see **Table 2. Westlands Water District - Hazard Summaries**).

Table 2. Westlands Water District - Hazard Summaries

Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Agricultural Hazards	Highly Likely	Critical	Small	12 to 24 hours*	Less than 24 hours*	High
Avalanche	Likely	Limited	Small	Less than 6 hours	Less than 6 hours	Low*
Dam Failure	Possible	Critical	Large	Less than 6 hours	Less than 24 hours	High
Drought	Highly Likely	Critical	Large	More than 24 hours	More than 1 week	High
Earthquake	Possible	Catastrophic	Large	Less than 6 hours	Less than 6 hours	Low*
Flood/Levee Failure	Likely	Critical	Extensive	More than 24 hours	Less than 1 week	Medium*
Hazardous Materials	Likely	Critical	Moderate	Less than 6 hours	Less than 1 week	Low*
Human Health Hazards						
Epidemic/Pandemic	Possible	Catastrophic	Large	More than 24 hours	More than 1 week	High
West Nile Virus	Highly Likely	Minor	N/A	N/A	N/A	Low
Severe Weather						
Extreme Cold/Freeze/Heat	Highly Likely	Minor	Large	More than 24 hours	Less than 1 week	Low*
Fog	Likely	Negligible	Extensive	More than 24 hours	Less than 24 hours	Low*
Heavy Rain/Thunderstorm/Hail/Lightning/Wind	Highly Likely	Limited	Extensive	More than 24 hours	Less than 24 hours	Low*
Tornado	Possible	Minor	Small	Less than 6 hours	Less than 6 hours	Low
Winter Storm	Highly Likely	Negligible	Extensive	More than 24 hours	Less than 1 week	Low*
Soil Hazards						
Erosion	Likely	N/A	N/A	N/A	N/A	Low
Expansive Soils	Possible	N/A	N/A	N/A	N/A	Low
Land Subsidence	Highly Likely	Critical	Small	N/A	N/A	High
Landslide	Possible	Limited	Small	12 to 24 hours*	Less than 6 hours*	Low



Hazard	0.3	0.3	0.2	0.1	0.1	Overall Risk
	Probability	Impact	Spatial Extent	Warning Time	Duration	
Volcano	Unlikely	Negligible	Extensive	Less than 6 hours	More than 1 week	Low*
Wildfire	Highly Likely	Critical	Large	12 to 24 hours*	More than 1 week*	Low*

*Rated on an average basis. For example, warning time for agricultural hazards by vary by the type of hazard (When under the Warning Time and Duration column).

*Hazard "Overall Risk" column differs from the risk factor methodology used based on the jurisdiction's Hazard Risk Assessment Worksheet. For example, the "Overall Risk" for a hazard may be High but the jurisdiction assessed the hazard to be a Low risk based on other factors.

Note: N/A was identified for the "Overall Risk" when hazards were not applicable to the District. N/A was identified for hazard characteristics when the information was not available or relevant to the hazard/District.



VULNERABILITY ASSESSMENT

The intent of this section is to assess Westlands Water District's vulnerability separate from that of the planning area as a whole, which has already been assessed in the Vulnerability Assessment section in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a worksheet, which was distributed to each participating municipality or special district to complete during the 2024 plan update. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and to identify the related vulnerabilities unique to each jurisdiction (**See Table 2. Westlands Water District - Hazard Summaries**).

Each participating jurisdiction was in support of the main hazard summary identified in the base plan. However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction. Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

The hazard risk reflects overall ranking for each hazard and is based on the Westland Water District's HMPC member input from the Risk Assessment Worksheet and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in **Table 2. Hazard Summaries** reflect the hazards that could potentially affect the District. The discussion of vulnerability for each of the following hazards is located in the Estimating Potential Losses section. **Those hazards that are not profiled in the vulnerability assessment were identified as consistent with the County's overall vulnerability assessment. See Chapter 4 Risk Assessment for details on vulnerability to these hazards.**

ASSETS AT RISK

This section considers the District's assets at risk, which include real property; structures, and appurtenances throughout the District's Boundary (see **Table 3. Specific Critical Facilities and Other Assets Identified by District's Planning Team**). It should be noted that real property and impact locations are maintained and operated entirely by the District. The District encompasses 614,000-acres, 1,034 miles of distribution pipeline, and 3,300 ag deliveries that are used for operation and maintenance (O&M).

Table 3. Specific Critical Facilities and Other Assets Identified by District's Planning Team

Name of Asset	Replacement Value (\$)	Hazard Specific Info
Distribution Pipeline	500,000,000	Drought

ESTIMATING POTENTIAL LOSSES

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.



Specific losses for the incorporated communities and the portion of the County of Fresno within the District's boundaries are discussed elsewhere in this hazard mitigation plan.

Note: Flood/levee failure is considered a Medium priority hazard by the District but is addressed for the cities and unincorporated Fresno County in the jurisdictional annexes and main plan risk assessment. See Chapter 4 Risk Assessment for details on vulnerability to this hazard.

Since it is a special district, participation in the National Flood Insurance Program (NFIP) does not apply to the Westland Water District, thus NFIP Repetitive Loss and Severe Repetitive Loss properties are not tracked for the jurisdiction; therefore, the District does not have this data available. There are one Repetitive Loss properties in the unincorporated County. There are no Severe Repetitive Loss properties in the Unincorporated County as detailed in Chapter 4 of the base plan.

AGRICULTURAL HAZARDS (HIGH)

Due to the extent of customers that are farmers within the district, agricultural hazards can have significant impact the local economy.

DAM FAILURE (HIGH)

There are several dams within or that could affect the district facilities if a failure were to occur.

DROUGHT (HIGH)

Due to the extent of customers that are farmers within the district, drought can have significant impact on the district's income and the local economy. Drought also exacerbates land subsidence as noted below.

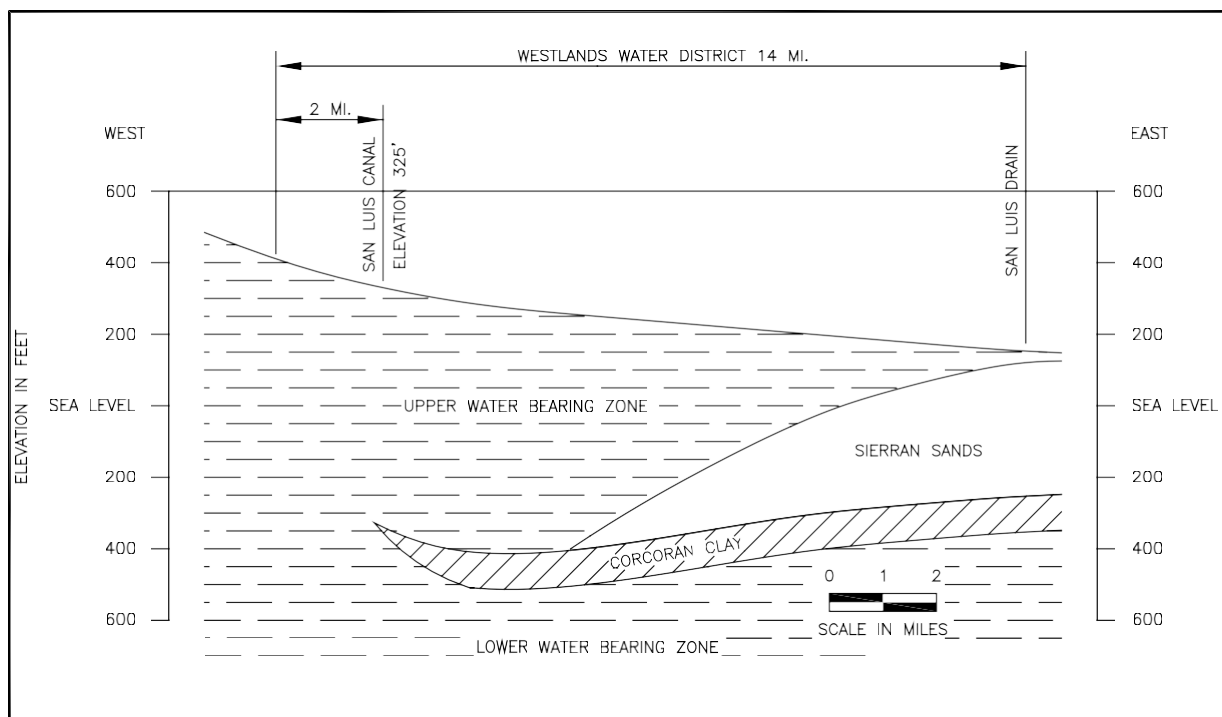
EPIDEMIC/PANDEMIC (HIGH)

Based on the recent COVID-19 pandemic, epidemic and pandemic is ranked as high due to high mortality, hospitalizations, and infection rates. The Westlands Water District's vulnerability to an epidemic and pandemic is similar to the County's and therefore no further information is needed to add to this section.

LAND SUBSIDENCE (HIGH)

The groundwater basin underlying Westlands is comprised generally of two water-bearing zones: an upper zone above a nearly impervious Corcoran Clay layer containing the Coastal and Sierra aquifers and (2) a lower zone below the Corcoran Clay containing the Sub-Corcoran aquifer. The location of these water-bearing zones is depicted on a generalized cross section of the District shown on **Figure 2. Generalized Hydrological Cross Sections of Wetlands**. These water-bearing zones are recharged by subsurface inflow from the east and northeast, the compaction of water-bearing sediments, percolation of pumped groundwater, and percolation from imported and natural surface water. Land subsidence due to groundwater overdraft ranged from one to 24 feet between 1926 and 1972 (U.S. Geological Survey (USGS), 1988).

Figure 2. Generalized Hydrological Cross Sections of Wetlands



Source: Westlands Water District

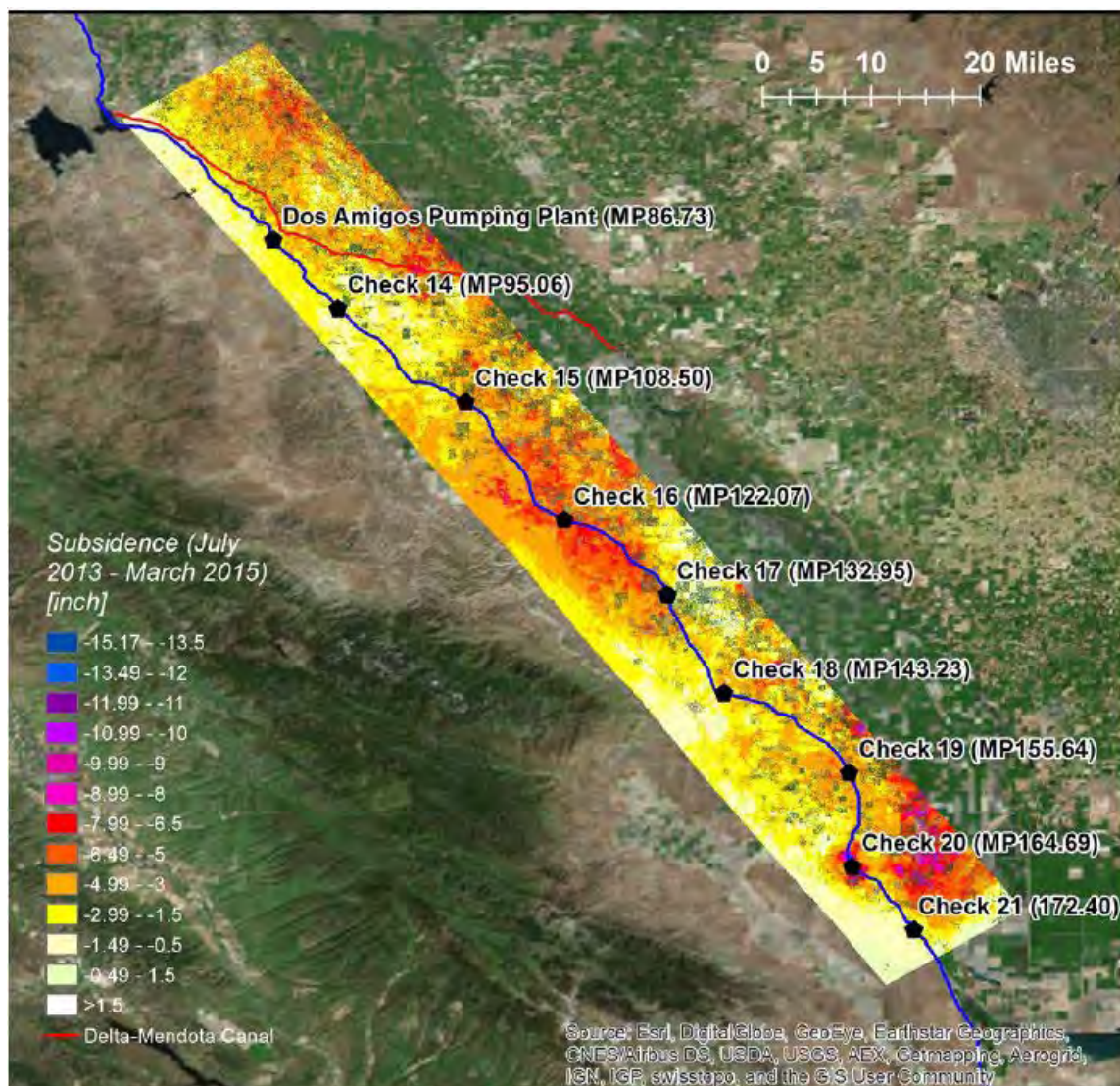
Surface water deliveries from the San Luis Unit (SLU) began in 1968 and largely replaced by groundwater for irrigation. However, extensive pumping occurred in 1977, a drought year when deliveries of CVP water amounted to only 25 percent of the District's entitlement. In response to the surface water shortfall, farmers reactivated old wells and constructed new wells, pumping groundwater to irrigate their crops. During 1977, groundwater pumping rose to nearly 600,000 AF and the piezometric surface declined about 90 feet, resulting in localized subsidence of about 4 inches according to USGS officials. With less groundwater use the surface level recovered through the 1980's. This cycle of groundwater use and recovery continues as groundwater pumping in the District fluctuates annually and the variation depends primarily on the amount of CVP surface water allocation.

Groundwater pumping increased to about 300,000 AF in 1989-90 because of decreased CVP water supplies caused by the drought. Pumping during 1990-91 and 1991-92 estimated to be about 600,000 AF annually. This occurred again in 2009 and for a four-year period 2012-16 (see Figure 6. Historic Average Groundwater Elevation vs. Groundwater Pumping). The current piezometric groundwater

elevation has dropped from a high of 89 feet to a current low of -120 feet for a total decline of 209 feet. With 100% CVP allocation in 2017 the level has increased some with less than 60,000 AF of groundwater pumped. The 2018 water year was another critically dry year. The current 2023 water year has improved from recent years due to drought conditions being relieved. The initial CVP surface water allocation is only 20 percent and groundwater pumping is again projected to greatly increase.

Westlands does not supply groundwater to District farmers nor does the District regulate or control groundwater pumping; individuals pump their own groundwater. The District however, does survey the static water levels in the wells and the water quality and quantity of the pumped groundwater, as part of the Groundwater Management Plan completed under provisions of AB 3030 in 1996. More recent District analyses of these data indicate that a better-estimated safe yield may be between 135,000 and 200,000 AF. Going forward to protect the aquifer as a source of water supply groundwater use may be limited to levels closer to the safe yield. Groundwater sustainability legislation will begin to implement management of the groundwater resource.

Figure 3. Subsidence in San Luis Field Division between July 2013 and March 2015



Overdraft of the underlying basin in the San Joaquin Valley continues to be the major cause of subsidence in Westlands as ground water pumping increases. Consequently, land subsidence is the cause of many problems which include; (1) elevation and slope changes to the California Aqueduct that encompass a portion through the District from UAVSAR (NASA 2015); (2) the District's delivery system consisting of pipelines, access roads, drains, canals, and metering deliveries; (3) damage to electrical utility infrastructure; (4) groundwater well casing from forces generated by compaction of fine grained materials in the aquifer systems.

The California Aqueduct runs through the District from Check 13 to Check 21. **Figure 3. Subsidence in San Luis Field Division between July 2013 and March 2015** suggests elevation drops along the California Aqueduct, the estimates include subsidence data between July 2013 and March 2015, from O'Neill Forebay to Kettleman City, in yellows (- 1.5 inches to -3.0 inches), oranges (-3.0 inches to -5.0 inches) and reds (-5.0 inches to -8.0 inches).

Figure 4. Lateral &r-4.5 Subline Earth Movement Caused Fracture and Pipeline Blow



Source: Westlands Water District

Subsidence caused from groundwater overdraft over the years has notable consequences to the District's distribution system. **Figure 4. Lateral &r-4.5 Subline Earth Movement Caused Fracture and Pipeline Blow** shows an example of fracture and pipeline blow (visible in background) caused by subsidence. **Figure 5. Lateral 1R-4.0-1.0C Sunk Intake Structure** shows the strain on an intake structure, demonstrating how subsidence can affect key conveyance facilities and cause structure failure. Both observations are examples of the damage reported by the District's Field Engineer from a previous inspection of both sites.

Figure 5. Lateral 1R-4.0-1.0C Sunk Intake Structure



Source: Westlands Water District

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the District's planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the District's planning representatives and Witt O'Brien's consultant team to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. Westlands Water District's updated capabilities are summarized below.

REGULATORY MITIGATION CAPABILITIES

Table 4. Westlands Water District's Regulatory Mitigation Capabilities lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the District.

Table 4. Westlands Water District's Regulatory Mitigation Capabilities

Regulatory Tool	Yes/No	Comments
General plan	No	
Zoning ordinance	No	
Subdivision ordinance	Yes	CUP
Site plan review requirements	No	
Growth management ordinance	No	
Floodplain ordinance	No	
Other special purpose ordinance (storm water, water conservation, wildfire)	Yes	USACE 404, CEQA, NEPA, MND
Building code	No	
Erosion or sediment control program	No	
Storm water management program	No	
Capital improvements plan	No	
Economic development plan	No	
Local emergency operations plan	Yes	Operations and Maintenance
Other special plans	Yes	Dust Control
Flood Insurance Study or other engineering study for streams	No	



Regulatory Tool	Yes/No	Comments
Elevation certificates	No	

In order to implement the mitigation action identified, Westlands will obtain the appropriate regulatory permits. The regulatory permits include: Biological Evaluation, Land Use application, Army Corps 404, Storm water Pollution Prevention Plan, Dust Control Plan, Encroachment permit, Building Permit, California Environmental Quality Act, Mitigated Negative Declaration and National Environmental Protect Act.

PLANNING MITIGATION CAPABILITIES

Table 5. Westlands Water District Planning Capabilities identifies the plans related to mitigation and loss prevention in the District.

Table 5. Westlands Water District Planning Capabilities

Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Capital Improvement Plan (CIP)	No		
Climate Resiliency or Adaptation Plan	No		
Community Wildfire Protection Plan (CWPP)	No		
Comprehensive Emergency Management Plan	No		
Comprehensive Land Use Plan (or General, Master, or Growth Management Plan)	No		
Continuity of Operations Plan (COOP)	No		
Disaster Recovery Plan	No		
Economic Development Plan	No		
Emergency Operations Plan (EOP)	No		
Evacuation Plan	No		
Flood Response Plan	No		
Floodplain Management Plan/Flood Mitigation Plan	No		
Hazard Mitigation Plan	Yes	Yes	
Historic Preservation Plan	No		
Natural Resources Protection Plan (NRPP)	No		
Open Space Management Plan (Parks and Rec/Greenway Plan)	No		



Regulatory Tool	In Place Yes/No	Under Development Yes/No	Comments
Threat Hazard Identification and Risk Assessment	No		

Westlands would develop a Dust Control Plan as prescribed and approved by San Joaquin Valley Air Pollution Control District (SJVAPCD) to minimize and control fugitive dust during construction.



ADMINISTRATIVE/TECHNICAL MITIGATION CAPABILITIES

Table 6. Westland Water District's Administrative and Technical Mitigation Capabilities identifies the personnel responsible for activities related to mitigation and loss prevention in the District.

Table 6. Westland Water District's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position	Comments
Planner/engineer with knowledge of land development/land management practices	Yes	Resources Division	
Engineer/professional trained in construction practices related to infrastructure	Yes	Senior Field Engineer	Personnel
Planner/engineer/scientist with an understanding of natural hazards	Yes		Consultant
Personnel skilled in GIS	Yes	Associate Resource	Personnel
Full time building official	No		
Floodplain manager	No		
Emergency manager	Yes	Manager	Personnel
Grant writer	Yes	Resources Engineer	Personnel
Other personnel	Yes	Associate Resource	Personnel
GIS Data—Land use	Yes	Associate Resource	Personnel
GIS Data—Links to Assessor's data	No		
Warning systems/services (Reverse 9-11, outdoor warning signals)	No		

The District is governed by a nine-member Board of Directors and elected to four-year terms of office. The District's Board manages and conducts the business and affairs of the District. The philosophy of the District is to provide for communities and farms dependent on water deliveries commitment for the preservation of its federal contract water supply and to conduct the maintenance, operational and administrative functions of Westlands in an efficient and effective manner.

FISCAL MITIGATION CAPABILITIES

Table 7. Westlands Water District's Fiscal Mitigation Capabilities identifies financial tools or resources that the District could potentially use to help fund mitigation activities.



Table 7. Westlands Water District's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	No	
Capital improvements project funding	Yes	
Authority to levy costs for specific purposes	Yes	
Fees for water	Yes	
Impact fees for new development	Yes	
Incur debt through general obligation bonds	Yes	
Incur debt through special tax bonds	No	
Incur debt through private activities	No	
Withhold spending in hazard prone areas	No	

The District's fiscal year begins on March 1 and ends on the last day of February. The budget adopted in February may be changed during the year as necessary. Westlands raises annual operating revenue from water sales that are billed monthly. In a normal year, its water sales revenue is used for all operating expenses. In addition, assessments are collected for non-operating costs such as repayment for the District's distribution and drainage collector systems. The District's O&M component of the water rate covers all costs associated with supplying and distributing water to customers, in addition to acquisition of capital assets and preventive maintenance programs. Rates may subsequently be adjusted if water supplies change. District O&M is added to the cost of CVP water.

MITIGATION OUTREACH AND PARTNERSHIPS

Cooperation from landowners, DWR, and the Bureau is essential in the drought mitigation activities needed to operate and maintain the facility during an event. Needed manpower for running equipment such as pumps and conveyance will be a cooperative effort by District personnel.

OTHER MITIGATION EFFORTS

Annual maintenance activity includes vegetation control (herbicide, handwork), fence/gate repairs, erosion repairs, basin roadway graveling, basin slope repairs, pump/pipeline repairs, and structure inspections. During basin replenishment and recovery periods, the District personnel will oversee the basin operations.

OPPORTUNITIES FOR ENHANCEMENT

Based on the capabilities assessment, the Westlands Water District has several existing mechanisms in place that will help to mitigate hazards. These capabilities remain relevant as many priorities set for



in the prior hazard mitigation plan are unchanged. In addition to these existing capabilities, there are also opportunities to expand or improve on these policies and programs to further protect the communities the District serves. Some of the opportunities for enhancement of the District's existing mitigation program are listed below.

- Develop a Drought Contingency Plan in partnership with the County that will help to create a framework for drought response and mitigation for the District and individuals the District serves.
- Provide training to staff members and the Board of Directors related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Continuing to inform and train staff on mitigation and the hazards that pose a risk to the communities in the District and the potential impacts to the service the District provides will lead to more informed staff members who can better communicate hazard related information to the public.



MITIGATION STRATEGY

MITIGATION GOALS AND OBJECTIVES

The Westlands Water District adopts the hazard mitigation goals and objectives developed by the Fresno County Hazard Mitigation Planning Committee.

INCORPORATION INTO EXISTING PLANNING MECHANISMS

Westlands Water District indicated that information from the 2018 Fresno County Hazard Mitigation Plan was used in part to develop their latest Groundwater Sustainability Plan. The information contained within this 2024 plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the District to help inform updates and the development of plans, programs and policies. The District is dependent on continued cooperation with landowners to implement projects and better serve the communities. The hazard information contained in this plan will also help to inform development of an outreach strategy.

Currently, the Westlands Water District has not determined the specific planning mechanisms into which they will incorporate aspects of the plan. However, as noted in Chapter 7 Plan Implementation, the HMPC representatives from the Westlands Water District will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.



MITIGATION ACTIONS

The Westlands Water District planning team identified and prioritized the following mitigation action. In addition to implementing the mitigation action below the Westlands Water District will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in partnership with all municipalities and special districts. The District agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see the Multi-Jurisdictional Mitigation Actions section, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

While epidemics and pandemics are ranked as high risk, there are no mitigations actions listed below. Mitigation, planning, and preparedness activities are being led by the Fresno County Department of Health.

1. INSTITUTE A GROUNDWATER REPLENISHMENT AND DROUGHT RESILIENCY PROJECT

Hazard(s) Addressed: Multi-hazard: drought, flood, land subsidence

Issue/Background: The history of land subsidence in the San Joaquin Valley is integrally linked to the development of agriculture and the availability of water for irrigation. Further agricultural development without accompanying subsidence is dependent on the continued availability of surface water, which is subject to uncertainties due to climate and regulatory decisions.

Construction of a 60-acre recharge basin on District land. The recharge basin could be used to percolate and seasonally store Kings River Floodwater, CVP Section 215 and rescheduled water. The recharged water could then be recovered and used in drought years. Kings River non-project water conveyed through the James Bypass will enter the Mendota Pool/Fresno Slough and pumped from Lateral 7 Pumping Plant into the San Luis Canal (SLC) at milepost 115.43. CVP Section 215 water from the San Joaquin River can also be conveyed in this manner. These diverse sources of supply would be pumped from the SLC via the Pleasant Valley Pumping Plant at milepost 143.16 into the Coalinga Canal (CC). This water would then be delivered through Lateral PV8P to the Project site. CVP Section 215 water will be conveyed when available and water users are not irrigating. This CVP Section 215 water would be requested and banked in the basin project. The 60-acre basin will have a recharge design capacity for up to 10,800 AF/year. After a five- year-period the amount of surface water recharged could range from 10,000 AF to as much as 50,000 AF. During drought periods, or when the lack of CVP allocation creates increased burden on groundwater supplies, the stored water would be recovered, less approximately 10 percent for basin losses.

Other Alternatives: No action

Responsible Office: Westlands Water District General Manager

Priority (High, Medium, Low): High

Cost Estimate: \$2.6 million

Potential Funding: District Reserve Funds, O&M, FEMA mitigation grants

Benefits (Avoided Losses): The Project will enable water storage as a long-term resiliency plan by recharging the basin with Kings River floodwater, CVP Section 215 and rescheduled water when available to minimize potential risks caused by overdraft during dry periods. This would help mitigate



land subsidence from over-drafting of wells during drought, and also has the benefit of alleviating flood flows on the Kings River.

Schedule: Water conveyed annually – routine activity.

Status: In progress

